UNIVERSITY OF TRENTO

Doctoral School in Civil, Environmental and Mechanical Engineering

Curriculum 4. Architecture and Planning, Landscape

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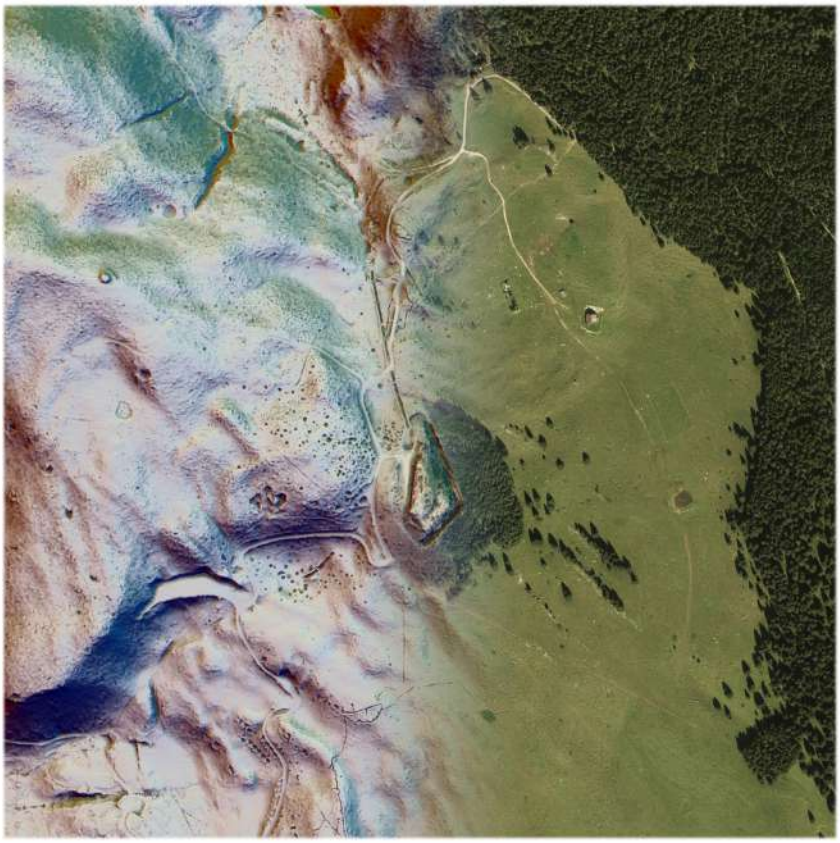
(Great War)-Scapes: a future for military heritage.

The "testimonial gradient" as a new paradigm.



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Chapter 1

A future for *Great-War heritage*: first considerations from which to re-start

1.1 Prologue

A little more than a hundred years ago, the First World War profoundly disrupted the landscape of entire Europe: from the fields of Galicia to the French plains, from the Alps to the coasts of the Baltic Sea, the position's war brought transformations by carving the ground, excavating the mountains, reorganizing the territorial assets and the original environmental ecosystems. Over time, the stratification of these new traces and meanings has contributed to the construction of what is now universally recognized as a fragile cultural heritage of high complexity.

For many years, this both tangible and intangible heritage has represented the beating heart of an active and dynamic cultural climate that has gradually contributed to recognizing an important "value of historical-identity testimony" to the heterogeneous and varied set of works related to offense and defense, that had been built in anticipation of and during the Great War.

Permanent fortifications, entrenched systems, barracks, hypogeous shelters, walkways, and connecting infrastructural systems represent only a part of the constituent elements of what was the great "war machine". Precisely because they were "parts of a system", these elements were linked by deep functional connections of mutual coherence but, over time, natural and anthropic transformations have fragmented the original military system, breaking the symbiotic relationships that coexisted between the different works and weakening the networks of relationships that substantiated them.

Despite this, the permanences of the vestiges represent the last "direct witnesses" of the tragic events that have disrupted the entire European

territory. For this reason, they assume the importance of tangible mediums able to reactivate the memory and the sense of identity, both in the present time and for future generations.

The dynamics of post-war transformation, the processes of slow degradation and abandonment, as well as the uncontrolled anthropic actions that do not respect the authentic character of these "remains", represent a threat to all those vestigia that remain in the contemporary landscape, even in the state of fragment. Concerning these more fragile signs, there is a growing concern for the dispersion's risk because this risk would correspond to the potential loss of the "possibilities of memory" that such material traces can stimulate.

The present research is developed within this horizon of meaning, in the transdisciplinary sphere of those who are interested in the "objects and goods of the past" as "material evidence having a value of civility" to take care of them to allow them a "possibility of future".

1.2 A fragile heritage with high complexity: first considerations and problem statement

Thinking about the possible future of the remains of the Great War is not a new theme: in the last twenty years and in particular on the occasion of the Centenary, a conscious awareness of the care of this heritage has grown. In response to the risk of "loss of memory",this awareness materialized with the birth of specific cultural initiatives at the international level, involving different disciplines and multiple stakeholdes[1].

In the Italian context, for example, a fundamental point of arrival and departure is represented by the Law of 2001 Nr. 78 on the "Protection of the historical heritage of the remains of the First World War". This low recognizes the "historical and cultural value" promoting the recognition, cataloging, restoration, and enhancement with light guardianship interventions. Thanks to this law, specific attention has gradually developed towards this special type of heritage, which has resulted in

1 In addition to a rich historical-anthropological bibliography, constantly updated, which traces the phases of the conflict and its social impact on the communities, can be mentioned (by way of example and without any claim to exhaustiveness): the analysis of the numerous diary sources preserved in archives, foundations and museums, as well as in many private collections; the in-depth studies of militarization plans to understand the evolution of construction techniques and technologies developed by the various Military Geniuses in relation to the construction experiments conducted on new materials introduced precisely in anticipation of the Great War (such as reinforced concrete); the development of projects aimed at the recovery of fortified works with multiple and different objectives and "new uses"; the archaeological approach that recognizes the "landscapes of war" as "materia signata" by history and time, and therefore as an accumulation's basin, pregnant with memorial and identity meanings.

a rich and varied range of projects and initiatives, such as the "Great War Project", launched by the Autonomous Province of Trento in 2003, or the Eco-museum of the Vicentine Prealps, financed at a national level in the implementation of law 78/2001. In all these activities, the objective of knowing, recovering, and enhancing the cultural heritage and the architectural testimonies present in the territory was translated into the elaboration of some "pilot projects" for the recovery of some forts and entrenchments, identified for their historical, architectural and landscape value, in the hope that they could be considered as reference models for other initiatives, both at the provincial and national level.

At the same time, in other European contexts, different research trajectories have begun to develop that have focused their attention not only on the permanent works, as the most visible vestiges, but also on the heritage of more minute and fragile but equally significant "signs", such as temporary and field fortifications[2].

The permanent fortifications represent only a fragment of all those "signs", material and immaterial, that constitute the complex and heterogeneous heritage related to the "vestiges" of the Great War. One hundred years ago, the territories of entire Europe were radically transformed through the construction of countless fortified works linked to defense and offense, such as trenches, vertical and underground fortifications, shelters, roads and bridges, tunnels, tombstones, and cemeteries, which have also profoundly changed the perception of the landscape. As already introduced, the result of this great construction was originally a mosaic of artificial and mutually functional elements, wisely connected by an intricate infrastructural system, conceived and designed by the different military geniuses in strict relation to the morphological characters of the different contexts[3].

In addition to these considerations, the effects caused by the conflict itself were also decisive in the "construction of war landscapes". After having inflicted deep "wounds" in the hearts and minds of the peoples who lived through the war, the destruction caused by the conflict

2 In this regard, and also for the direct link with the developments and orientation of the present work, it is worth mentioning the research conducted by the inter-departmental units of Ghent University in Belgium (Prof. Van Eetvelde) concerning the elaboration of a non-invasive approach for the recognition of the permanences of vestigia in the contemporary landscape by implementing the studies with the new techniques of remote sensing and visualization of spatial datasets.

3 The fortification models included in the military manuals drawn up in the mid-nineteenth century, which presented features of repetitiveness and modularity, were adapted from time to time in construction techniques and tactical solutions, about the different morphological and territorial conditions of the areas in which these works had to be built. The understanding of these peculiarities highlights the influential role of the "landscape" as a significant design element in the drafting phase of the various plans of militarization.

profoundly transformed the original fortification systems, affecting the morphology of the territory with the traces of bombing, the craters left by the explosion of mines, and the blood of millions of fallen soldiers that deeply permeated the battlefields.

In this sense, perhaps no conflict has been so deeply connected to the physicality of the territories as the Great War, a positions and trenches war, which has imprinted the signs of history in the territory giving it the meaning of collective memory, the value of cultural heritage to be recognized and preserved for future generations precisely because this historical landscape is the "sacred" witness to the sacrifice of millions of fallen soldiers.

In other words, to understand the contemporary landscape as a multi-layered palimpsest built both from the projects of militarization of the territories elaborated by the different military geniuses, and the destructions of the war period means to recognize the meaning and dignity of historical space on which the European culture and identity has been built to the places that are now called "places of memory".

To this already complex stratification of "signs", natural and anthropic transformations have been added, over time, the result of multiple organizational, socio-political, and even economic needs, linked to the inevitable dynamics of landscape modification. As a consequence of these articulated processes of continuous transformation and rewriting, today the imprint of the Great War is no longer clearly recognizable within the contemporary landscape, although it has not lost its memorial potential[4]. The most easily recognizable elements are, in fact, almost exclusively the remains of permanent fortifications, while many of the "signs" related to semi-permanent and field fortifications, as well as the "traces of destruction", have been reabsorbed into the multiple transformation's dynamics of the territory. In other cases, the remains still live in the current landscape as labile and minute "signs", with high testimonial potential but at risk of loss because affected by obvious problems of degradation that, if not recognized and resolved, can compromise the very existence.

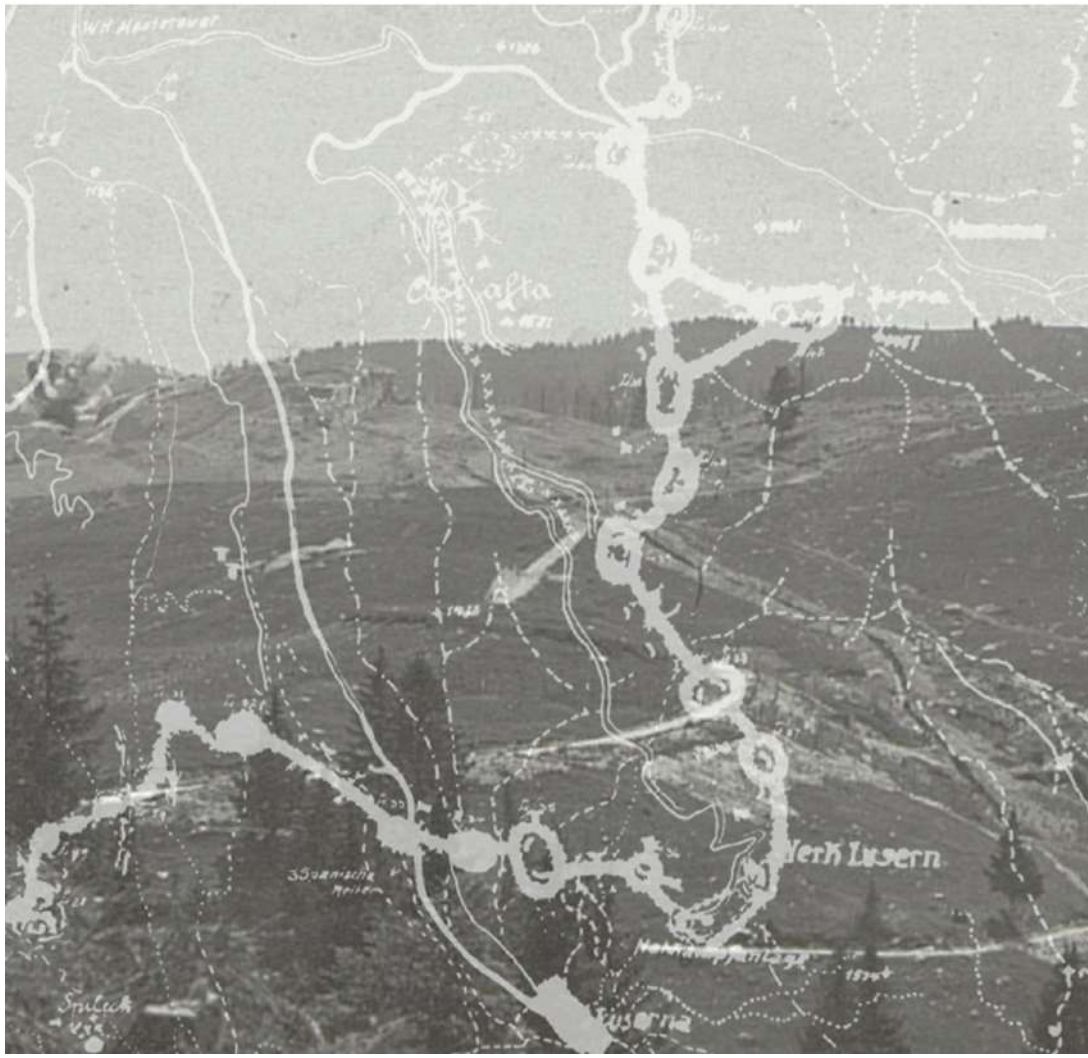
In other words, the complex recognition of the vestiges within the contemporary landscape becomes a central problem, specifically the permanence of the "most fragile signs", such as field fortifications, entrenchments, barracks, and obstacle fields, Etc. This complicated recognizability leads to a consequent weakening of the meaningful force of the vestiges as a "system", as an "assemblage" of punctual elements that are deeply connected by relationships of necessity and mutual functionality. Consequently, the main issue is a "problem of scale": the

4 The concept of "memorial potential" will be better explored in later chapters, particularly Chapters 5 and 6.

inability to recognize the permanences of the vestiges as fragments of a "whole" that is now lost, but that is waiting to be understood and, at least intangibly, "re-composed".

As will be better explained in the following chapters, this short-sighted approach has also reverberated on the operational level in the numerous interventions and projects of recovery/restoration/enhancement that have interested almost exclusively the permanent fortifications in the last twenty years, leaving in the background the heterogeneous set of more fragile and minute vestigia. In this way, the fragmentation of the implemented projects and their management policies has only highlighted the lack of a broader and more far-sighted systemic vision.

This is a short-circuit that, if not resolved, can only lead to the loss of this heritage in the long term: a loss that, in general, would translate



Pic.1.1.Stratifications of "signs", traces, wounds. Elab. J.Aldrighettoni

into the dispersion of all those testimonial values kept in the physicality of the minor fortifications, which are essential to recovering that intangible wholeness of the system-vestigia, today apparently shattered. In the light of the above considerations, thinking about the destiny of this cultural heritage, also after the many initiatives and activities promoted and implemented during the celebrations of the Great War Centenary, implies an important change of perspective that embraces a broader vision able to move skillfully at different scales and between different disciplines to recognize, within the contemporary multi-layered landscape, areas with different semantic significance, in which the war permanences remain at different temperatures in terms of visibility and legibility (Pic.1.2). Only through the identification of these different "testimonial gradients" will it be possible to conceive and organize

Pic.1.2. Field fortifications at different degrees of permanence. Elab. J.Aldrighettoni

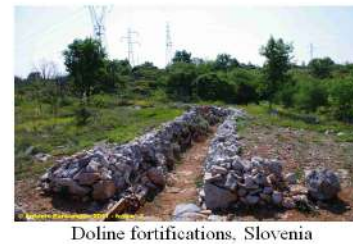

Frasche Trenches, Carso


Trenches Kolovrat, Slovenia


Rifle room– Vezzena (TN)


Sanctuary Wood, Belgium


Battlefield Verdun, Francia


Doline fortifications, Slovenia


Fortifications Lessinia (Vr) - Italy


Trenches M.te Altissimo (TN) - Italy


Crater Lochnagar, Francia


Trenches, Nago (TN) - Italy


Trenches– Matassone (TN) - Italy


Covered rifle room
Marani di Ala (Vallagarina – TN) - Italy

coherent strategies of protection and valorization, to be exercised not only one single and isolated "ruins or remains", but rather to be applied on the entire territorial palimpsest.

1.3 Research objectives, methodological aspects, outline of the dissertation, and extended abstract

1.3.1 Research objectives

This research work is part of the above-described meaning perspective, trying to provide a useful methodological contribution to recognize the different temperatures according to which the remains of the Great War are still present in the contemporary landscape. This aim is based on the awareness that only through a broad and deep knowledge of the heritage of which "take care" is it possible to set up coherent reasonings in terms of proactive construction of the heritage of the future.

This means going back to investigating the different warscapes, placing as central a "search for meaning" of our action, able to decline purposes and means coherent to protect this particular historical heritage, accepting the challenge implied by the expansion at the landscape scale of what can have testimonial value, and therefore a foundation to save a "possibility of memory".

This challenge raises questions at different levels of meaning, to which this work tries to give answers:

- the methodological one, linked to the possibility of identifying and recognizing fragments of vestigia that are very fragile, as they are subjected to natural and anthropic changes, but still present and often "submerged" under the multiple post-depositional layers stratified over time;
- the semantic one, linked to the ability to recognize the value of "cultural semiophors" with a high memorial potential to the permanences of vestigia and even to the most labile and minute "signs";
- the operational one, linked to the need to develop a widespread awareness/knowledge of the different "testimonial gradients" with respect to which the vestigia remain in today's landscape. This aspect represents the indispensable cultural basis on which set future "design margins" regarding the different "life possibilities" of war landscapes.

In other words, the present work aims to elaborate a contribution able to respond to the increasingly evident need to overcome the current fragmentation of protection interventions, too restricted to single artifacts and with little attention to the context in which they are inserted, with a broader, inter-scalar view that coordinates "different knowledge" to

recover the networks of relationships between architecture, territories, and landscapes. If understanding the meaning of cultural heritage implies knowing the works in relation to the territory in which they were built, preserving and transmitting to the future the value of the vestigia of the Great War means, first of all, shifting the research focus from the single vestigium to the fortified landscape as a "system", identifying networks and connections, rediscovering paths and finding new ways of preservation and enhancement, in order to safeguard the fragments and recover the relationships that connected and substantiated them.

Working in this direction means starting from a holistic knowledge of the evolutionary biography of the different "landscapes of war" and their specific potentialities (nature of the works, driving forces of transformation, manifest or latent meanings impressed in the material, traces engraved in the landscape), to build a solid knowledge-based path as a foundation on which to responsibly develop future practices of "care" and narrative in terms of protection, preservation, conservation, and transformation.

Declining operationally what is sustained in the art.6 of the Code of the Cultural Goods and the Landscape, that associates the activity of valorization to the concept of knowledge[5], this research does not aim at the elaboration of specific intervention abacuses, guidelines and operational best practices to be adopted and applied to the Great War heritage in an automatic and generalized way, but wants to propose a substantial paradigm[6] shift to overcome the traditional dichotomies of preservation/innovation through innovative knowledge-based methods able to deal with complexity without reducing its semantic significance.

As will be better addressed in the following chapters, it is, therefore, a matter of identifying new theoretical approaches and methodological tools that, thanks to a practical and fertile interdisciplinary contamination (from architectural history to geography, from cartography to building technology, from geomatics to restoration, from archaeology to management), can weave the plots of a precise and in-depth methodological apparatus, both at the scale of the single artifact and at that of the landscape, to be able to re-know the areas with different degrees of witness within which the permanences of the Great War remain at different temperatures.

Only through such in-depth knowledge will it be possible to increase

5 "The valorization consists in the exercise of the functions and in the discipline of the activities directed to promote the knowledge of the cultural heritage and to assure the best conditions of use and public fruition of the same heritage, also for disabled people, in order to promote the development of the culture. It also includes the promotion and support of interventions for the conservation of cultural heritage." Art. 6, Codice dei Beni Culturali e del Paesaggio, 2004.

6 This concept will be better explanin in Chapter 6.

and spread the awareness of the value capital of this heritage, whose "care" represents, in perspective, a sort of ethical responsibility towards which the community should be sensitized to build a worthy heritage for future generations.

1.3.2 Methodological aspects

As already introduced, this research is characterized by a distinctly interdisciplinary approach that is based on the observatory of those who want to "take care" of objects/goods of the past in a future perspective, expanding the traditional practices of the architectural restoration and conservation to the scale of the landscape-system. As it will be widely discussed during the dissertation, this "passage of scale" will be made operational thanks to the integration and combination of theoretical and methodological contributions of the many disciplines involved in this line of research. To mention a few: from the research of archival sources available in archives, libraries, museums, foundations, and public and/or private institutions, to the study of the constructive and technological characteristics of both fortification projects and the permanence of vestiges; from the analysis of historical cartography to the detailed

Pic.1.3. Hooge Crater, Ypres (Belgiumj). Trenches permanences.
Ph. J.Aldrighettoni

Pic.1.4. Verle Fort, Vezzena, Trento (Italy). 1915vs2018 image.
Ph. J.Aldrighettoni

interpretation of geographic datasets obtained through modern non-invasive techniques of land survey (e.g., LiDar data and the use of aerial photogrammetry); from the investigation of historical photographs to the techniques of analysis of the archaeological research; from the analysis through SWOT matrices to understand and systematize data sets up to the declination of an innovative multi-criteria analysis to assess the priorities for intervention and the need for protection.

As it will become clear in the following chapters, the whole research is based on an in-depth study of the documental apparatus (textual, design, iconographic, and photographic materials found in the archives and the collections of public and private institutions and museums), as well as on an exhaustive examination of the state of the art of places and artifacts, carried out through the study of the rich reference bibliography on the subject as well as on the information and perceptions obtained in direct surveys and field visits.

In addition to the general bibliography of reference, to which we refer for specific details, Table Tab.1.1 summarizes the main archives and museums consulted and visited personally, whose collections provided essential contributions, as well as the main basic materials that were operationally useful for the development of the entire research work. ricerca.

1.3.3 Outline of dissertation

On the whole, the present work is organized in three macro parts: a first section (Chapters 2-3) dedicated to the general framework of the theme, the study of the state of the art of places and artifacts, and the declaration of the main issues to be dealt with; a large central part in which the heart of the research is developed from a theoretical and methodological point of view, starting from a critical reinterpretation of the status quo to propose the setting of a "new paradigm" useful to develop future enhancement practices of this particular heritage (Chapters 4-5-6); a final and essential

Institution	Place	Documentary sources for the research
Museo storico Italiano della Guerra	Rovereto (Tn) - Italy	Italian and Austro-Hungarian military genius: project documents Large collection of period photographs Bibliography of Galician fortified areas (Austro-Hungarian Empire)
Archivio di Stato	Trento – Italy	Italian and Austro-Hungarian military genius: project documents
Soprintendenza – Ufficio Beni Architettonici	Trento – Italy	Documentation related to specific projects implemented in the province (Project "Great War", survey of field works, reference bibliography)
Kriegsarchiv	Vienna - Austria	Austro-Hungarian military genius: project documents Extensive collection of war photographs entire front line, focus Austro-Hungarian areas (research-stay - September 2019).
Biblioteca Cantonale – Fondo Daccò Viganò	Locarno - Svizzera	A private collection donated to the Cantonal Library of Locarno, entirely dedicated to fortifications of every era, on a worldwide scale. For the purposes of research, the section dedicated to the First World War was consulted mainly. (research-stay - August 2019)
In Flanders Fields	Ypres - Belgio	Project documents for the Western Front (specifically "Flanders Fields") Extensive collection of period photographs (specifically regarding the Western Front). (research-stay - February/June 2020)
ISCAG - Istituto Storico e di Cultura dell'Arma del Genio	Roma - Italy	Italian military genius: project documents Extensive collection of war photographs entire front line, focus Italian border
AUSSME - Archivio dell'Ufficio Storico dello Stato Maggiore dell'Esercito	Roma - Italy	Documentation of the information services of the Italian army. Large collection of period photographs entire front line of the Italian border
Museo della Terza Armata	Padova - Italy	Large collection of period photographs entire front line of the Italian border, focus Isonzo area.

Tab.1.1. Summary table of the visited and consulted archives and museums to find the basic materials on which the entire research is based.

part reserved for specific in-depth analysis and case-study examples to put into practice the methodological contribution previously introduced, also illustrating the critical issues that emerged and the open questions to be investigated in future research developments (Chapters 7-8). Below is a detailed abstract of the work as a helpful roadmap to orient and facilitate the reading of the entire dissertation.

1.3.4 Extended abstract

Just over a hundred years ago, the First World War profoundly disrupted the landscape of Europe: from the fields of Galicia to the French plains, from the Alpine arc to the coasts of the Baltic Sea, position and trench warfare brought about transformations by etching the ground, carving out mountains, reorganizing territorial arrangements and original environmental ecosystems, leaving room for the stratification of new traces and meanings that, over time, have contributed to the construction of what is now universally recognized as a **fragile cultural heritage of high complexity.**

Chapter 2.1-3.2

If **Law n.78 of 2001**, as a synthesis of a very intense and fruitful debate, protects the remains of the First World War mainly intending to protect this particular historical heritage without altering "the material and historical characteristics" (in the Italian context), in the aftermath of the **celebrations for the Centenary,** and in light of numerous projects that have been applied to the restoration/recovery/evaluation of these assets, to return to investigate the "landscapes of war" means to set up a new research to understand how these remains can continue to narrate their **"being in time"** to future generations, stimulating "possibilities of memory" and representing at the same time **substantial resources**, cultural but also economic, for the future.

Chapter 2.2.2

Chapter 2.2.1

A problem of scale clearly emerged following the analysis of the ***status quo*** of a representative sample of places and artifacts and concluded/ongoing projects at the international level. The pregnant force of the remains as a "system" deeply connected not only by a **physical infrastructure** of field fortifications, entrenchments, barracks, and obstacle courses but also by a dense **network of intangible and visual relationships** that substantiated their functioning, today is increasingly weakening. As a confirmation of this, it is evident, for example, how the **fragmentation** of the interventions and their management policies is also reflected in the greater attention paid by the majority of the carried out projects to the permanent fortifications compared to the entrenched articulated systems that surrounded them and were an integral part of them.

Chapter 2.3

Chapter 2.2.3

To solve this interpretative-operative gap, the need to recover a **systemic vision** capable of moving at different scales and grasping the intangible wholeness of the system-vestiges, today apparently shattered, has emerged. This vision should focus attention not on the fragments as "remains of a whole that no longer exists", but on the potential that they can still generate if put in tension with each other: a **magnetic field** capable of binding the different parts and recomposing their meanings.

This has led to moving away from the specificity of individual disciplinary knowledge to embrace a transversal approach able to place the **warscape** at the core and analyze it in its entire nature and **biography of landscape-palimpsest multi-layered in different times**. **Chapter 3.1** **Chapter 3.2**

In this perspective, the indissoluble symbiosis between physical "signs" and immaterial values (deposited over time) has turned out to be the specific peculiarity of the "**character**" of these "war landscapes", thus recognizing the condition of **fragility** not as a point of weakness, but rather as their most "authentic" peculiarity.

It was possible to identify different "**ways of seeing**" these warscapes through this simultaneously inductive and deductive knowledge-based process, studying not only the theoretical and methodological aspects of spatial analysis but also the relationships between the socio-cultural, historical, and anthropological factors that have defined its development and transformation. This approach focuses increasingly on the need to adopt a **holistic vision** to overcome the current fragmentation of this heritage and think about its future without betraying its authenticity. **Chapter 3.3** **Chapter 3.4**

Operationally, this approach has been declined through two current levels of research.

As an essential moment to consciously set up the future operative proposals, an **order matrix** was defined to reread the complexity recovering a systemic vision also in the analytical phase. By arranging the building typologies with the different morphologies of the territories, it was possible to identify some "**war-scape classes**", useful to interpret the fragmentary nature of the different "war landscapes" through the identification both of the **driving forces** that had determined their construction, in different times, and of the same ones that can determine the trajectories of future change. By identifying the different "war-scape classes", it was possible to critically reinterpret the ***status quo*** of places and artifacts through a "systemic look". Based on what emerged, an articulate **SWOT analysis** was devolped to highlight the main potential and criticality of the remains at the system level. **Chapter 4.1** **Chapter 4.1.2** **Chapter 4.2**

The second declination of this holistic approach focused on the meaning of the recognition of "war landscapes" as "**places of memory**". Through the evolutionary study of the different phases of the "construction of the Great War memory", which throughout a century have alternated multiple and polysense "**practices of narration**", it was possible **Chapter 5** **Chapter 5.1**

to better understand the processes that led to the recognition of the testimonial value of the remains. In this way, it was also possible to understand that specific "**sense of place**" that, metaphorically, identifies the different warscapes as "**high capacity condensers of values**", in which the intensity of the potential (the meaningfulness of meanings/ new re-significations) is directly proportional to the charge that is generated at the moment in which the relationships between the different poles (archipelago of vestiges as fragments) are strengthened.

Chapter 5.2.1

Chapter 5.2

In this specific regard, it was possible to identify the physical space of the **threshold** between "the visible and the submerged" as a particularly dense and pregnant **accumulation basin** to be "poetically investigated" to unveil the permanence of the imprint of the war (manifested there as much on a physical level in the "matter marked" by the conflict as in the meanings assumed by such "signs"), still present today but "hidden" under the multiple layers of deposition that have stratified over time.

Chapter 5.3

The considerations obtained through the two levels of research have been combined with a theoretical reflection on the recognition of the "landscapes of war" as "**heritage**" understood in its various etymological meanings (**legacy, inheritance, and patrimony**). In this way, it was possible to better understand the meaning of the concept of **enhancement** applied to this heritage, bringing to the surface some semantic nuclei that are currently critical concerning the strengthening and/or enhancement of which to consciously direct future orientations of priorities.

Chapter 6.1

Chapter 6.2

The priority issue, which strongly emerged, was the pressing need to develop new operational strategies to facilitate the **recognition**, within the contemporary multi-layered landscape, of the different levels of permanence of the remains, including in particular the most fragile "signs" in terms of permanence, currently at greater "risk of loss". In addition to this, the need to propose new strategies regarding the policies of coordination and management of processes with particular attention to the importance of **participatory aspects** (issues identified but not explored in detail in this research), and the need to better understand some **aspects of construction technology** (related to technological experiments of reinforced concrete of whose structural behavior little is known), also emerged. In an inter-scalar vision, these aspects have assumed even greater importance in the awareness that the ability to recognize different areas concerning which the vestiges remain in the contemporary world at different levels of semantic significance is a necessary prerequisite for future projects to operate recovering that systemic vision lost today, ensuring the system-vestiges, as such, different **margins of design**, preserving our "possibility of memory" through its evocative potential.

In this perspective, the research has therefore elaborated and proposed a "**method in complexity**" proper to facilitate the recognition of what can have testimonial value at the landscape scale by identifying areas in which the vestiges of war persist at different temperatures. This is a new paradigm that, moving from the need to recover a systemic view capable of recognizing the permanence of even the most fragile remains, expands the meaning of "testimonial value" at the scale of the "warscape" by introducing the concept of "**testimonial gradient**". This is a useful parameter to identify the different areas in which the degree of semantic significance of the vestiges and the related "possibilities of memory" are graduated according to the level of knowledge of specific **indicators**, such as the historical-identity aspects, the typological-constructive knowledge of the artifacts, the degree of community involvement and, above all, the legibility of the vestige-system.

Chapter 6.3
Chapter 6.3.2
Chapter 6.3.3

In addition to having defined at a conceptual level the meaning of these indicators, the research has also developed an analytical method based on a **multi-criteria analysis** to make operational the qualitative considerations expressed by the knowledge-based parameters previously identified and to obtain accurate **fragility maps** of the different warscapes. These documents are fascinating not only because they give an overall view of the semantic density of a given context, but because they are a fundamental **proactive tool** for future practices of "care": the essential knowledge base on which to base future choices in terms of conservation, protection, and enhancement.

Chapter 6.4

In the light of the previous considerations, it has emerged the awareness of how necessary is the interdisciplinary collaboration for the definition of the indicators constituting the "testimonial gradient": the last part of the present research has therefore been mainly focused on the elaboration of an operative method to facilitate the deepening of two of these indicators, in relation also to the criticalities previously emerged, linked to the **issues of recognizability** of the most fragile permanences, both from an overall point of view and of **construction technology**.

Chapter 8
Chapter 7

Therefore, intending to contribute to the unveiling of the broad and deep **information basin** in which the complex system of visible but also "submerged" vestiges has been recognized, the research proposed the elaboration of a knowledge-based method called **"stratigraphic telescope"**, a methodological tool able to explore the processes of construction/transformation of war landscapes at different scales.

This method proved to be a fertile contribution to place, side by side with the study of archival documents and **manuals of fortifications**, an indispensable store of knowledge to better understand the construction techniques, the technical and technological details, the materials used, and the tactical or planting solutions proposed. This method is clearly based on applying the interpretive code of architectural stratigraphy to

Chapter 7

the scale of the landscape, thus interpreting the history of artifacts as the result of processes of addition, subtraction, and transformation that have left physical traces linked together in a stratigraphic sequence.

Chapter 8.1

Operationally, this has been interpreted in understanding the **archaeological transformation's dynamics** of the landscapes over time, comparing the impact of the war event with the current recognition of land uses and the permanence of the remains. This method founds itself mainly on analyzing, comparing, and interpreting historical documentation, period aerial photographs, current orthophotos, and data processing obtained by techniques of high-resolution (**remote sensing**).

In this perspective, the use of software for the creation of Geographic Information Systems such as ArcGis and QuantumGis has been fundamental, as these work environments have allowed overall coordination of the entire cognitive process: from the integrated management of the different input datasets (georeferencing of historical maps of militarization and military aerial photographs) to the processing of the expected outputs. In this regard, the most innovative result of the research has been the important contribution that some

Chapter 8.2

specific **visualization modalities of LIDAR** data obtained through specific tools such as the Relief Tool Visualization (e.g., **Hillshading from multiple directions and Sky-View-Factor visualization**) have provided in the identification of different degrees of legibility of the footprint of the Great War within the topography of today's landscape.

Chapter 8.3

The **validation phase** on specific case studies, for example, on the system of Austro-Hungarian forts in Trentino (Italy) and on the entrenched system around Fort Busa Verle (Altopiano di Vezzena, TN, Italy), has allowed us to verify the effectiveness of this method not only on a qualitative but also on a quantitative level.

Chapter 9

In conclusion, therefore, the elaboration of the tool "stratigraphic telescope", in addition to the new **possibilities of narration** introduced by it, is a significant **methodological contribution** to the definition of the "testimonial gradient" previously described as a crucial moment to consciously set up future projects. The implementation of the proposed method on other case histories and the theoretical-operational deepening of the other identified indicators are the main directions towards which **future research perspectives** can be developed.

Chapter 2

The *vestigia* of the Great War: a fragile heritage at high complexity

2.1 From the conception to the "construction": synthesis of the plans of militarization of the different European countries elaborated in prevision of the war

To better know the heterogeneous heritage related to the remains of the Great War, it is appropriate to start setting a common horizon in which to contextualize the developments of the different fortification trends that have characterized the different European countries from the first half of the nineteenth century until the dawn of the First World War.

To this end, it is necessary to briefly summarize the evolutionary history of militarization processes, which, depending on the contexts of reference, have accompanied the development of fortified works and related planning strategies. To better understand the reasons behind these choices, it is necessary to start with some considerations regarding the consequences of the political and organizational reorganization of the different European borders sanctioned after the Congress of Vienna, which were decisive in the conception and subsequent evolution of the fortification plans that began to radically transform the landscape of the whole of Europe during the 19th century.

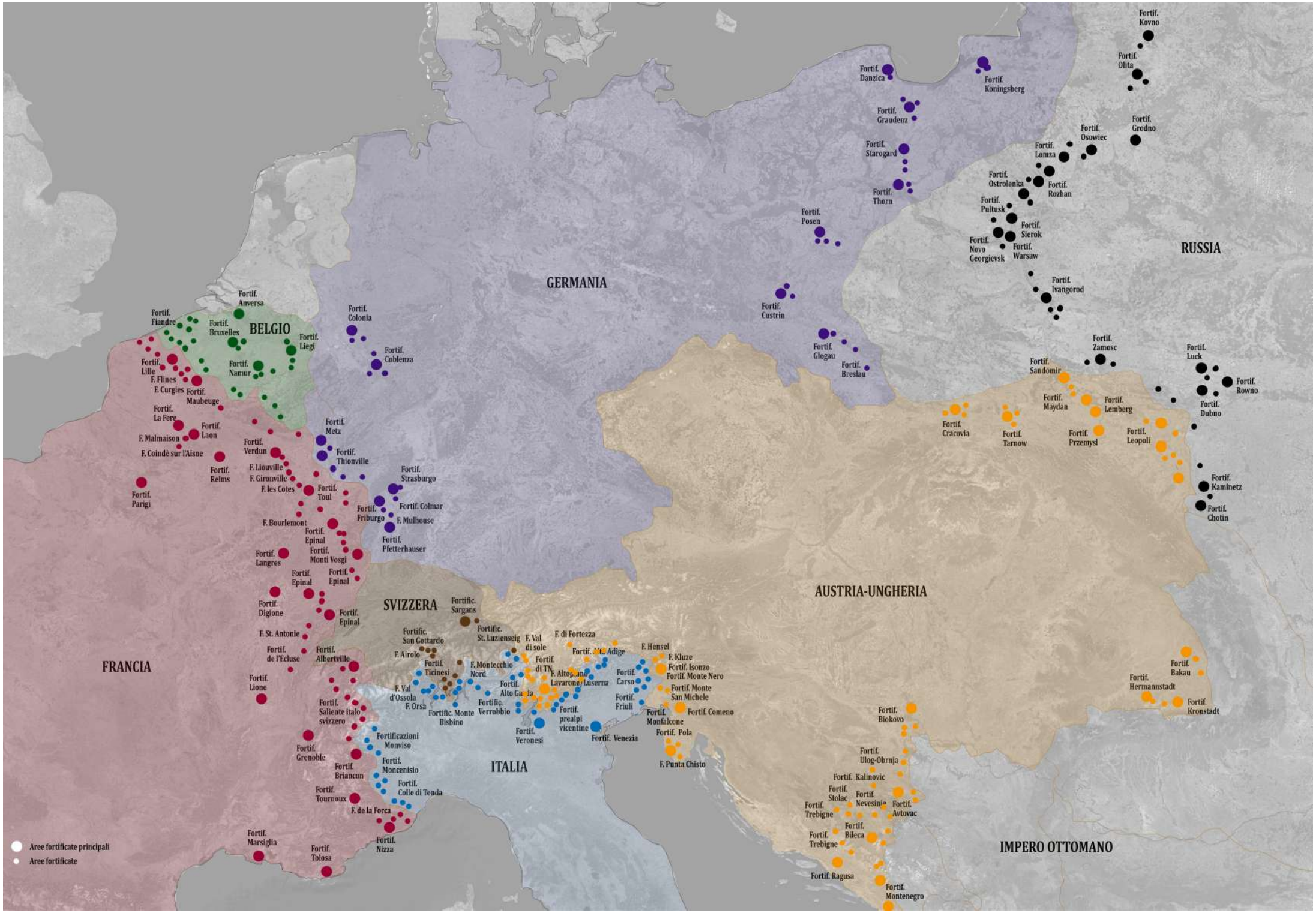
The reference bibliography on these issues is vast and varied, even if it is very often concentrated at the national level (on the fortifying processes of individual countries), without favoring a global overview at the European scale. Trying to overcome this gap to provide a "global view" on a transnational scale, the following paragraphs will present a synthetic examination of how the different war-involved countries gradually developed their plans for militarizing their territories in relation to the historical-political events that determined them, not concentrating exclusively on the scale of the single fortifications, but

preferring a broader approach, aimed at understanding the territorial dimension of the remains as a "fortified system".

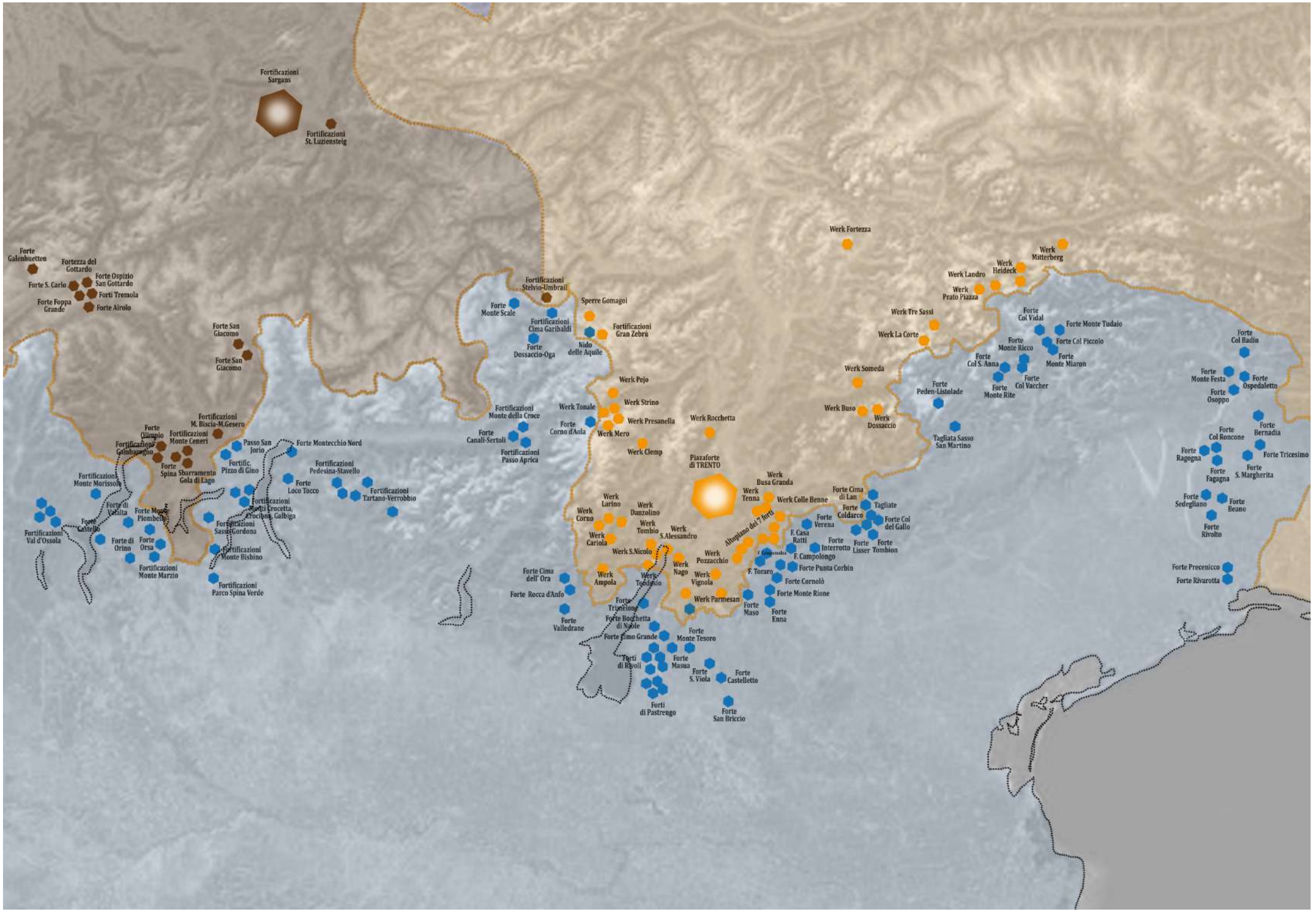
In Tab.2.1, one can observe the geopolitical order of Europe at the outbreak of the Great War with the indication, for each nation involved in the conflict, of the principal fortified works that were subsequently studied at a general level. Without any claim to being exhaustive, this first mapping immediately allows us to understand the extent of the militarization phenomenon connected to the conflict, which determined the transformation of a large part of the European landscape in the early 20th century. On the other hand, Table 2.2 proposes an initial qualitative analysis that shows how, at different scales, the processes of fortification of the territory involved not only the "front lines" but also the innermost places, with consequent territorial and organizational reorganization at a wide range. In focus have been indicated the main fortified works, permanent and field, built on the border between Italy, Switzerland, and Austro-Hungarian Empire, paying particular attention to the two main Salient of this part of the front, namely the Salient Trentino-Tyrolese and that of Canton Ticino.

Starting from this general mapping at the European level, a sort of guided introduction was developed to understand the specific observatory of reference in which this research is developed, within the vastness of the fortification phenomenon linked to the Great War. In detail, the historical-political events that determined, "from conception to construction", the evolution of the main fortified networks of some extra-national contexts (Belgium, Switzerland, France, Prussia, and the Austro-Hungarian empire) have been framed with respect to which the knowledge of the historical-constructive evolution of the fortifications was less known than the national events, at least in the Italian context. Due to the difficult availability of information and bibliography of reference, as well as linguistic complications, it was unfortunately not possible to develop the same in-depth study for the countries involved in the conflict on the Eastern Front (such as the Russian Empire), for which, however, some cartographic data of the fortification plans were found, used for the subsequent developments of the research (chapter 7).

Regarding the layout organization, in addition to some illustrative images inserted in the body of the text, some significant indexes of historical images have been inserted at the end of each specific study. These images refer to the main fortified works mentioned in the discussion and found in the various museums and collections previously mentioned in Chapter 1.



Tab. | 2.1 Fragile heritage at high complexity — *The former front lines - European Level*



Tab. | 2.2 Fragile heritage at high complexity *__The former front lines - Souther Front*

2.1.1 Belgium's militarization plans and the figure of A. Brialmont

With respect to Belgium, already after 1815 the victorious powers of Austria, Russia, Prussia and Great Britain, besides forcing France to renounce to all the territories conquered during the Napoleonic period, established the necessity to adopt specific countermeasures in order to avoid that such Country could cause further devastations at European level. The decision to protect the newly formed United Kingdom of the Netherlands by reinforcing and strengthening a series of forts and defensive posts located along the northern border of France was one of these countermeasures. The construction of this imposing defensive line, which took its name from Arthur Wellesley, Duke of Wellington, represented a project of unprecedented scope and complexity, both from an organizational and financial point of view. Great Britain and Holland cooperated in the design, construction and supervision phases, obviously not without disputes and disagreements.[7]

Britain and Holland cooperated in the design, implementation, and supervision phases, obviously not without disagreements and disagreements.[8]

The main objective was to build a device capable of blocking a possible French incursion from the south, which, theoretically, would have been advantaged by the presence of favorable morphological-territorial conditions, such as the lack of critical natural barriers. Despite the common intentions, constant contrasts and different points of view accompanied the construction of these works, particularly regarding the placement of a second fortified line in a rearmost position to guarantee

7 BECHET, 2014.

8 First of all, there was no consensus on the real usefulness of such fortifications. As far as Belgium was concerned, King William I was of the opinion that fortifications should be the backbone of a defence, and therefore had to be built with a lot of money in order to achieve good quality. He was supported in this view by the Inspector General of Fortifications, General C.R.T Kraijenhoff. On the other hand, there were diametrically opposed opinions, also supported by the king's own son, Prince William Frederik, who argued that fortifications were not of primary importance in modern warfare, and that excessive efforts (also in financial terms) to build them would not be useful. At the same time, there was no single opinion on the British side either. Nevertheless, Wellington seized the opportunity and decided to start the fortification process at any cost. In a memorandum of 22 September 1814, he wrote to the British Minister of War and Colonies that he was aware that during the last war the possession of fortified cities had been of relatively little value, yet at that time he was convinced that new fortifications were necessary. In addition to these differing positions of opinion there were also more operational issues of responsibility for planning and construction. There was not much trust between the British and the Belgians: the British engineers did not hold their Allied colleagues in high esteem, so much so that they promoted the setting up of two different technical commissions, one British and one Dutch: each was to be responsible for the design and construction of a certain part of the line. Essentially, mutual trust was lacking. See KAUFMANN, 2014.

the necessary defense depth.[9]

However, the fortifications built were essentially brick constructions with a mainly bastioned layout, inherited from the French Vauban models.[10]

Large bastioned fronts in brick and earth with the typical star-shaped layout were then built in the citadel of Dendermonde, Ghent, Keelfort in Edelare wine in Oudenaarde, Ostend, Antwerp, Nieuwpoort, Tournai, Aat, Charleroi, Nomi, Huy, Liège, Philippeville, Dinant, Mariembourg, Brodo, as well as the fortresses of Ypres and the Casematte of Menen. Geopolitically, the situation changed in 1831 when Belgium became an independent state concerning the United Kingdom of the Netherlands and declared its neutrality, as guaranteed by Article 5 of the London Conference of the same year. As part of these changes, five of the forts in the Wellington Barrier were razed to the ground, the only ones remaining active being the forts along the Scheldt and Meuse rivers. Also built a sizeable entrenched camp around Antwerp, which remained the country's dominant trading center, despite

9 Wellington opted for a line along the Scheldt from Oudenaarde to Antwerp. This would have required the fortification of Oudenaarde and Dendermonde. He also considered that defence works were needed south of Brussels, Halle and Waterloo. Kraijenhoff wanted to go ahead and fortify Oudenaarde and Dendermonde, but he did not consider Halle and Waterloo logical and also too expensive. In fact, he much preferred a second line from Antwerp to Maastricht along the Demer. See BECHET, 2014.

10 A man of inventiveness, versatility and reformist ideas, Marshal Sebastien Le Preste de Vauban built a formidable ring of fortresses to protect France's national frontiers. More than just a fortification designer, Vauban was also a gifted economist, author, and political strategist. Vauban developed a model of bastioned fortification that set an international standard, so much so that it became an undisputed and universally recognized model.
Three defensive systems are credited to him. The first system consisted of a polygonal bastioned layout: the length of the architectural complex since the number of bastioned fronts depended on the dimensions that were to be given to the defensive building and concerning the necessity of the terrain. The length of the bastioned front was 330 m, and all the other elements of the fortress became submultiples of this fundamental measure. When the situation imposed the forced adoption of a broader or narrower front, all other measures were adjusted in proportion, multiplying by the same coefficient that gave the ratio between the primary measure and the one adopted so that each element was perfectly proportioned. Characteristic of Vauban was also the use of a curved connection, instead of a flat one, for the faces of the bastion: the so-called "trunnion". The system also provided for the use of "pincers" in the shape of V at obtuse angles, i.e., low walls inserted in front of the wall septum defined "curtain". This addition aimed to provide an additional fire grazing the moat. The whole system was reinforced by using half-moons and counter-guards situated to protect the "pincers" and the ramparts. The second system was based on the detachment of the bastions from the first line of defense: should a bastion fall into the besiegers' hands, the latter had conquered only an isolated pocket of the fortress. The third system consisted of a refinement of the second one with a series of defenses even more profound and, in parallel, a variation of defensive combinations in front of the main curtain. Cfr. BAIOCCHI, 2019.

negotiating a toll system with Holland to gain access to the sea. In terms of fortifications, the Belgians followed the example of the Germans and Austro-Hungarians in abandoning the rampart style in favor of the polygonal style, which was less vulnerable to attack by rifled guns or explosive shells. In contrast to Germany and Austria, however, in Belgium, the nation's entire fortification policy in the 19th century was dominated by a single person of great charisma and technical ability: the Belgian general and engineer Henri Brialmont. Unlike his contemporaries Sere de Riviers in France, Daniel Salis Soglio in Austria-Hungary or Alex von Biehler in Prussia, thanks also to his long operational career, Brialmont was the first to elaborate new technical-constructive solutions, using concrete, in an attempt to build fortifications capable of resisting the new weapons produced by the revolution in the field of artillery. From 1885, the introduction of rifled barrels in cannons, which ensured greater directionality, and the invention of picric acid (melinite), a powerful explosive capable of increasing the destructive power of black powder artillery by 3 to 4 times, made almost all existing fortifications obsolete and at the same time rendered ineffective the construction techniques of the time, which were based on the use of materials such as stone, brick, and earth. Aware of the more extraordinary resistance of protective masses made of concrete, Brialmont proposed the total abandonment of ordinary masonry constructions for new buildings and the reinforcement of existing ones with new support layers.[11] Brialmont's first official task in 1859 was creating Antwerp's fortification system, a work in progress that he modified and improved several times over time. In this first phase, he reorganized the city's central core and built a first ring of eight detached polygonal forts around it (Pic.2.1).[12] However, the experience of the Franco-Prussian war made it clear that the proximity of the forts to the heart of the city represented a point of vulnerability for the city's resistance, so after 1878 created a further outer ring of fortifications at a distance of 8 to 15 km from the city center (Pic.2.2).[13] Although Article 5 of the Protocol of the London Conference of 20 January 1831 guaranteed Belgium neutrality, the birth of the Triple Alliance in 1871 was a cause for concern about a possible German invasion to reach the French border.[14] In the 1980s, Brialmont calculated that the

11 FAQUE, 1987.

12 LOMBAERDE, 1997.

13 Atlas Belgische Versterkingente Antwerpen, Luik en namem (1859 - 1914), Uitgeverij de Krijger.

14 The birth of the Triple Alliance had effects all over Europe: not only did the 100 km of the Belgian-Prussian border become vulnerable, but also the 520 km on the southern border with France became potential attack fronts, and therefore to be defended. For the same reason, as will be discussed in the following paragraphs, a tight fortification

Germans could reach Antwerp in four or five days' march from the border but that Antwerp would need a fortnight to prepare itself. To slow down this eventual advance, he concluded that it was necessary to fortify the Meuse valley, which until then had only been garrisoned by the ancient fortified citadels belonging to the Wellington Barrier. The cities of Liège and Namur represented strategic positions for the conquest of the entire country, and this reason, they were chosen as ideal locations for the creation of the most essential modern strongholds of the time.[15] Brialmont had to design the construction plans for the new forts on the Meuse simultaneously as he was conducting concrete experiments on the fortifications for the city of Bucharest in Romania.[16]

This experience was essential for the choice of the new types of construction adopted in Liège and Namur. For the first time, the structures were almost entirely made of concrete, using a mixture of Portland cement, sand, crushed stone, and water. In terms of the plan, Brialmont mainly developed two types of permanent fortifications, destined to set the standard and be taken up and adapted in many other European countries: a triangular or trapezoidal layout studded with caponieres, casemates, and firing posts located in the counterscapes of the moats, corresponded to a central nucleus consisting of a large concrete block, almost entirely underground, triangular in the smaller forts, or rectangular in the larger ones (Pic.2.3-2.4).[17] Despite the economic limitations imposed by the Belgian government, the strongholds were completed in 1892 after a long and complex construction process, both because of the number of forts to be built (12 in Liège and 9 in Namur) but also because of the need to employ specialized personnel capable of guaranteeing the correct use of cement concrete, which at the time was a new construction technique and not yet known on a large scale.[18] Brialmont designed the forts at Liège and Namur to withstand the possible destructive power generated by howitzers of up to 220 mm,

programme was initiated on the Gotthard territories in Switzerland.

15 Liege, 1000 ans de fortifications militaires, Centre Leigeois d'Histoire et d'archeologie Militaires, atti del convegno, (Liege, 16 dicembre 1980 - 16 gennaio 1981).

16 The concrete tested in Bucharest consists of one volume of Johnson cement, two volumes of sand, and four volumes of gravel. The percentage of water is such that the concrete to be placed too dry. In addition, the amount of water is adjusted about the pouring temperature. The concrete, placed in horizontal layers of 20 cm thickness, without ever interrupting the casting (not even at night), thus ensuring maximum grip between them. Each layer is then pressed with iron "pestles" until it is rejected. Cfr. ISGRO', 2019.

17 FAQUE, 1987.

18 For more detailed information on the construction technique, please refer to the following chapters, in particular Chapter 7.

the most potent known to the Belgian general. In reality, the Germans had already developed weapons that are far more powerful in the early 20th century, with calibers of up to 420 mm, to the destructive power of which the fortifications along the Meuse did not prove capable of offering adequate resistance.[19] When the Germans mobilized their armies on the Western Front in 1914, Belgium immediately declared its neutrality. Still, Prussian troops soon violated this neutrality to quickly reach the French border and launch an attack on Paris from that position. To carry out this maneuver, the first target to be overcome was the fortified system of the Meuse valley, particularly the strongholds of Liège and Namur, which the German High Command hoped to seize in a lightning strike. However, the first German offensives were unsuccessful, because not only the entire Meuse line had previously been garrisoned with numerous infantry divisions and the bridges over the river had been destroyed beforehand, but also because the Germans continued to underestimate the defensive capacity of the stronghold without considering the intervention of the very heavy siege artillery necessary. After a small number of German soldiers managed to penetrate the heart of the citadel of Liège, highlighting one of the weaknesses of the stronghold's organizational structure (the distance between one fort and another), the forts on the right bank of the Scheldt were put out of action. Shortly afterward, the German troops realized the need to bring in the heavy artillery to resolve the entire siege in a short time. Just a few days of bombardment with German 420mm guns were enough to dismantle the Belgian forts, one after the other systematically. Under enemy fire, the armored turrets were hit by the large howitzers and collapsed, as did the ventilation systems, thus compromising any possible resistance and reaction.[20]

The tragic epilogue of the Liege stronghold made the French understand that, most likely, their fortifications would have presented the same problems. Therefore they decided to downgrade them and use them only as support points and not as front line.

The German advance continued, and after a single glorious cavalry, battle that temporarily brought the outcome of the fight in favor of the Belgians, on August 17, the German First and Second Armies advanced against the line of King Albert, forcing him to retreat towards the fortress of Antwerp. At the same time, the Germans shifted their attention towards the conquest of the defense of Namur, the last bastion of resistance before having free access to the open plains of northeastern France.

In a tactical move to prevent French troops from supporting the

19 KAUFMANN, 2014.

20 BALACE, 1981.

Belgians in defense of Namur, German General Bülow unleashed his powerful siege artillery, including the fearsome "Bertha" howitzers, against the Belgian stronghold (Pic.2.5): after two days of heavy bombardments, on August 23, the German infantry went on the offensive, making the situation of the defenders extremely precarious, who were forced to evacuate the stronghold in the evening of August 23.[21] The destructive power of the new weapons used, assisted by the total absence of natural obstacles to be exploited to their advantage, proved capable of bending in a brief time two of the most modern and advanced strongholds of the time.[22] This did not go unnoticed by the great military strategists. They understood the structural inadequacy of most of the permanent fortifications, even though they reinforced them with new concrete structures after 1885. In an attempt to resolve the issue, this period began a massive construction of semi-permanent and field defensive apparatuses, taking full advantage of the morphology of the territory (even flat) for actions related to defense and offense, even extemporaneous but indispensable. Therefore, new projects of militarization of the region, developed by all the other Military Geniuses, began to take shape. This was probably a symptom of the transformative process underway at the level of war tactics that in a short time led to the abandonment of the traditional war of movement in favor of static trench warfare.

The simultaneous defeat of the French troops in the battle of Charleroi allowed the German forces to advance faster and faster towards Paris, but, without going into historical details, it was unexpectedly blocked in what can be defined as the last great battle of movement: the First Battle of the Marne.[23] As a result of this defeat, the Germans saw their

21 On 22 August 1914, while two German corps were attacking Namur, the 2nd Army commanded by Commandant von Bülow occupied the Sambre passages upstream of the same fortress, pushing the French back to the heights south of the river. The next day the Prussian troops directly attacked the French enemies who, attacked simultaneously on three fronts, were forced to retreat to avoid being surrounded. The battle, known as the Battle of Charleroi, or the Battle of Namur, had a great moral effect, nipping the French offensive in the bud and opening up France to the invader, giving it a moral superiority that lasted until the Battle of the Marne. See BURTSCHER P., HOFF F., 2008.

22 The forts built by General Brialmont at Liège and Namur were the first experiments in fortified constructions built using concrete coupled with iron to increase their resistance to the increasingly improved artillery. For a more in-depth analysis in this regard, see the specific files on the forts belonging to the Liège stronghold in Chapter 4 and the technological-constructive considerations elaborated in Chapter 7.

23 That of September 1914 is the first of three bloody battles between the opposing French-English and German armies around the Marne River in northern France. The first battle of the Marne was a decisive clash that took place in the region between the rivers Marne and Ourcq, east of Paris, where the German army, engaged in the great general offensive foreseen by the Schlieffen plan, was unexpectedly counterattacked

initial invasion of France thwarted and were forced to retreat to the back lines. From this moment on, the Germans and the French repeatedly attempted to outflank each other on the northern flank, resulting in an extension of the front line to the North Sea (hence the name "sea race"). This series of repeated and unsuccessful attacks on the flanks of an army on the other did not bring advantage to any of the parties but determined the stabilization of the front first on the line of the Aisne, where the Germans, by now reorganized and entrenched, were able to repel the Anglo-French attacks gradually.

The conclusion of the fights on the Aisne allowed the Germans to concentrate on the threat constituted by Antwerp in the extreme north of the front, where the Belgian army here sheltered had conducted an active defense launching raids against the vulnerable enemy lines of communication. Still, the influx of massive German contingents supported by heavy artillery marked the destiny of the fortress. In a few days, the siege of Antwerp ended with the fall of the city. Still, the Belgian forces were once again able to evade capture and fall back to the region of Flanders, where the front stood, thus beginning the grueling trench warfare that characterized the conflict for the next four years.

The city of Ypres and its surroundings were the main theaters of war in the area, where the different fronts began a continuous process of militarization of the territory through the construction of kilometers and kilometers of trenches, underground shelters, observatories, and firing positions, connected by thick barbed wire fences, obstacles and minefields. Between 1914 and 1918, the opposing armies repeatedly tried to conquer the city and the surrounding territories with repeated bombings, which repeatedly marred the Belgian landscape, and bloody battles during which used chemical weapons for the first time, such as chlorine gas and mustard gas.[24] The enormous devastation caused

by the French army that despite the long retreat had maintained cohesion and offensive spirit. The battle took place between 5 and 12 September 1914 and ended with the Anglo-French victory thanks to a series of strategic errors of the Germanic High Command; the Germans had to retreat behind the Marne and then on the Aisne. The first battle of the Marne marked a decisive moment of the First World War; it decreed the failure of the ambitious German plans and their hopes of victory within six weeks, it strengthened the resistance and the fighting will of the Allies and transformed the war into a long struggle of attrition in the trenches that would continue for another four years until the final defeat of Imperial Germany.

24 The first major battle, the First Battle of Ypres, took place in October 1914. However, during the heavy autumn fighting the German army was unable to conquer Ypres. From January 1915 a stalemate developed between the Allies and the Germans. This led to the Second Battle of Ypres, at which the German troops again attempted an attack on the town. Although both battles of Ypres were initiated by the Germans, the third was a planned Allied breakthrough in June 1917 that continued until the fall of Passchendaele in November. The First Battle of Ypres lasted until November, when the

in the three battles of Ypres (Pic.2.6) which is still visible in the contemporary landscape as a testimony of the harsh clashes that took place in these places, permeated in depth both the physical/natural landscape of the fields of Flanders and the inner landscape of the millions of young soldiers who sacrificed their lives in those fields.[25] At the same time, on the northern frontier near Antwerp, German troops began to fear a possible real English attack through the Netherlands, with an action similar to the one they had implemented at the beginning of the conflict to invade France through Belgium. To avoid this, the German command elaborated an articulated plan of fortification of the entire Belgian-Dutch border up to the coasts on the North Sea based on constructing a dense network of concrete bunkers.[26] The so-called Hollandstellung resulted in the construction of 411 bunkers in the

arrival of a harsh winter interrupted hostilities. In the end, the Allies held an important position, the Ypres Salient, which stretched 6 kilometres to the German lines, while the Germans captured the ring of high ground above the town. The Second Battle of Ypres began on 22 April 1915 and was a surprise attack by the Germans. For the first time chlorine gas was used on the Western Front. The poisonous gas had a devastating effect on the Allied troops and killed thousands of soldiers in a matter of minutes, while others were left blind or condemned to a slow death. The Allies were forced to retreat several kilometres, but the Germans, as surprised as the Allied troops at the devastating effect of the gas, failed to take full advantage of the situation and the breakthrough did not take place. The fighting was very heavy and spread to the south of Hill 60, located 60 metres above sea level to the south-east of Ypres. The British decided to retake this strategic position through an underground war mine. On 17 April 1915, five mines blew up under the German position, which literally fell off the top of the hill. The fighting of the Second Battle of Ypres ended with the British controlling the hill. As a result, the German army abandoned its attempt to take the town, choosing instead to reduce Ypres to rubble with constant bombardment. In 1917, British forces planned to take the railway line behind the German lines in an attempt to attack the submarine base at Bruges. At this point in the conflict, the German U-boat campaign had become even more intense and threatened to defeat Britain. This major British offensive marked the beginning of the Third Battle of Ypres. As part of the plan of attack, 19 mines were detonated under the German lines at Messines Ridge, causing explosions that could be heard from as far away as London (Battle of Messines). In addition, flooding, caused by frequent periods of rain, together with the solid German defence lines around the Ypres Salient made the Allied advance impossible. The following 'Battle of Passchendaele', which ended with the capture of the village of Passchendaele, simply widened the Ypres Salient by 8 km, resulting in 400,000 dead, wounded and missing on the British side alone. For the first time, during the Third Battle of Ypres, German troops used mustard gas as opposed to the chlorine gas used in the Second Battle. The same gas was also renamed 'mustard gas' after the town of Ypres, where it was first used. It burned the skin, eyes and lungs, and killed thousands of soldiers in painful and often slow agony.

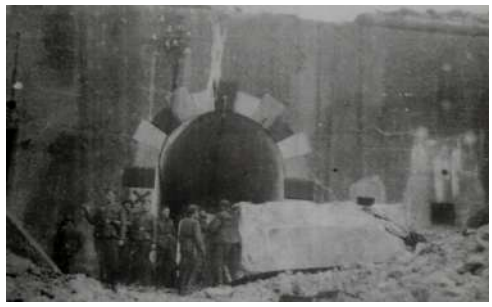
25 LOMAS D., 2003.

26 These bunkers could serve both as a shelter for the troops and as firing positions, and were made of reinforced concrete with reinforcing bars and metal plates to prevent spalling of the concrete. The thickness of the walls was up to 1 metre for the exposed sides, and about 50 cm for the others. They had double armoured doors for gas protection. See KAUFMANN, 2014.

territory from the Belgian coast to the Scheldt river (80km), 830 bunkers around the Antwerp stronghold (the Stellung Antwerpen - 48km), and another 132 bunkers on the Turnhoutkanalstellung (from Antwerp to Turnhout-34km). At the end of the war, the bunkers were emptied by the Germans and abandoned.[27] In summary, therefore, if in the very first phases of the war, the situation of Belgian fortified systems was essentially concentrated on the permanent fortification of the three main strongholds of Liège, Namur, and Antwerp, with the succession of events, in particular with the stabilization of offensive and defensive actions in the so-called "trench warfare," the backbone of the theaters of war became the field and temporary defensive systems that deeply permeated the fields of Flanders, around the city of Ypres, but also the territory around Antwerp, with the construction of the Hollandstellung (even if by German troops).

27 GHEYLE, 2013.

Fort de Barchon- Liegi
Wartime



Fort de Embourg- Liegi
Wartime

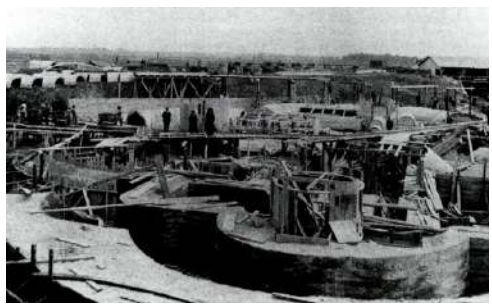
Fort de Loncin- Liegi
Wartime

Fort de Fleron- Liegi
Wartime

Fort de Flemalle- Liegi
Wartime

Fort de Liers- Liegi
Wartime

Fort de Boncelles- Liegi
Wartime



Fort de Hollogne- Liegi
Wartime

Trenches after battle - Ypres
Wartime

Trenches - Ypres
Wartime

Bayernwald trenches - Ypres
Wartime

Dodengang Trenches - Yser
Wartime

Siege of Antwerp
Wartime

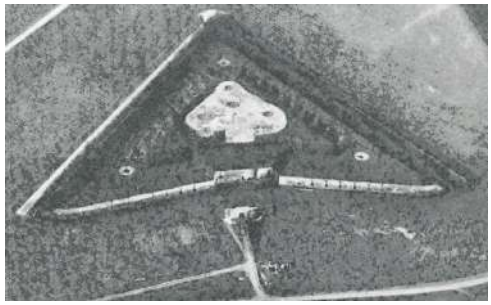
Fort von Liers - Antwerp
Wartime

Fort St Katerine - Antwerp
Wartime

Fort Broechem - Antwerp
Wartime

Fort de Oelengem - Antwerp
Wartime

Moonscape around Ypres
Wartime



Fort d'Evegneè - Liegi
Wartime

Yaser Trenches - Ypres
Wartime

Fort de Loncin- Liegi
Wartime

Spanbroekmolen mine crater memorial
Wartime

Battlefield- Messines
Wartime

Battaglia di Passchendaele
Wartime

Fort de Boncelles- Liegi
Wartime

Fort Steendorp - Antwerp
Wartime

2.1.2. The preventive fortification of Switzerland

Historically, Switzerland maintained its declared neutrality for centuries through a tight military control able to counter any possible enemy invasion, using its advantage the deep and detailed knowledge of the morphology of its Alpine territory. The introduction of new weaponry and military tactics used by French forces during the Revolution, however, managed to take the Swiss defense lines by surprise, leading in 1798 to establish the controversial Helvetic Republic.[28] Although the total independence had been fully restored and recognized by the Congress of Vienna in 1815, this experience deeply marked the country, which from that moment gave life to new and intense fortification activity to protect its borders, to prevent any future enemy incursions. This desire was strengthened by the annexation of the Valais Canton and the opening of the Simplon road, desired by Napoleon, which transformed Switzerland into a strategic place for connections between Italy and France.[29]

To protect this new road axis, the narrow gorge formed by the Rhone River near St. Mauritius was identified as an advantageous orographic position from a defensive point of view. From 1815 to 1829, Colonel Hans Conrad Finsler organized the operational planning of the federal army, including plans to militarize the position around St. Mauritius. However, the construction of these garrisons only began in 1831 with Finsler's successor, Chief of Staff General Guillaume-Henri Dufour, who planned the construction of Vauban-type fortifications with the addition of bastions.

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28 Official name (franc. République helvétique, ted. Helvetische Republik) of the state body took over the old Confederation on 12.4.1798 and was dissolved on 10.3.1803. This political entity and its period are also simply called "Helvetica". This political entity and its period are also simply called "Helvetic". It was a political regime imposed by France and little accepted by the local population, because of this had a very short duration, only five years. The birth of the Helvetic Republic marked for Switzerland the end of the Ancien Régime and the beginning of modernization. It was a process that had begun with the French Revolution, but only in a small part can it be seen as the result of internal political struggles against the ruling urban oligarchies. According to studies, however, French politics prevented the autonomous Swiss Revolution, especially at the economic level. Some of the reforms were enacted without knowledge of the structures. A context that resulted in the "Bastioni War" (federalist uprisings) of 1802 and the end of the Helvetic Republic.

29 "Among the many great works ordered by the Great Napoleon I, Emperor of France and King of Italy, there is the marvellous Simplon Road, leading from the Kingdom of Italy to the French Empire: marvellous to be sure, because, set among those high mountains, deep and intertwined valleys made that passage almost impossible and very dangerous, now (through the work of the good Italian and French experts) made in a few years vast, comfortable and carriageable even in the bowels of the mountains themselves, struggling however to the embellishment of such a great work, forming the admiration of the Universe [. ..]". Cf. PAGANO, 2006.

General Dufour had the merit of setting up the modern Swiss defense system, which recognized the need to guard the main access points to the country with fortresses conceived and designed in close connection with the morphology of the territories, but also the identification of a "safe zone," the so-called "Swiss National Redoubt" (Pic.2 .7), in the most inland flat part of the country, in which, protected by the Alps, the government of the Confederation, the Armed Forces and most of the civilian population could have survived in case of invasion while waiting for an international intervention to defend the violated Swiss neutrality.[30]

Road and rail transport, calling into question the role of valuable and sufficient natural barrier against foreign invasions played by the Alpine arc up until that moment. The railways, symbol of the seemingly unstoppable progress, and the new construction technologies that allowed to pierce the mountain massifs realizing connections unthinkable until then were rapidly changing the connection networks of the whole Europe, and Switzerland was no exception. If the ease of associations and movements favored large-scale trade, with evident and positive implications from the economic point of view, it also increased the vulnerability of the country itself to attacks and potential enemy invasions. In particular, the work on the new Gotthard railway line (Pic.2.8), begun in 1871 and completed in 1882, Italian irredentism and the birth of the Triple Alliance between Germany, Austria, and Italy gave the necessary impetus for the systematic and operational start of these fortification plan.[31]

Therefore, the Swiss strategy was to maximize the defensive potential of the Alps and the Jura massif, reinforcing the pre-existing fortified garrisons and to design a series of large fortresses set within the mountains, connected by a dense network of underground tunnels, armored observatories, and numerous cave batteries.

Developed the fortified positions around three strategic nuclei: the fortress St. Mauritius, to block any eventual attack. The main fortifications developed around three strategic cores: the St. Maurice fortress, to stop a possible French advance from Savoy or around Lake Geneva; the St. Gotthard fortifications, including the fortified positions in the sectors of Airolo and Andermatt, the Oberalp, Furka, and Grimsel passes; the fortress around Sargans, to control the Rhine valley near Luzigsteig and thus prevent the Germans, Austrians and Italians from crossing into Swiss territory through the canton of Grisons (but at

30 The "Swiss National Redoubt" was conceived in the 1880s following the opening of the Gotthard Tunnel, but became particularly famous during the Second World War, when the various works were modernised and strengthened. See MALATESTA, 2013

31 KAUFMANN, 2014; REISS, 1988; REISS, 1993; REISS, 1998; REISS, 2004.

that time built only a few fortifications and a tower, while created the significant fortifications from the 1930s onwards).

From the technical-constructive point of view, the fortifications proposed by General Dufour had a traditional Vauban-type structure. Therefore, as happened all over Europe, they soon became obsolete and ineffective, especially after the appearance of the howitzer mine in 1885. To solve these weaknesses, also considering the scarce experience in the construction of fortifications, the Swiss tried to acquire more technical-constructive knowledge directly from the three nations that were experimenting the new technologies in the field, in particular by now consulting General Daniel Salis-Soglio, engineer and fortress builder of the Austro-Hungarian Empire[32].

As happened in all European countries almost at the same time, the pre-existing fortifications were reinforced (and the new ones built) with concrete walls, at first unreinforced and then reinforced, instead of masonry, and also with steel, to better resist the destructive effects of the new firearms. In this period were born, for example, the armored forts, consisting precisely of a concrete floor just protruding from the ground, with casemates in barbettes, steel turrets, and secure shelters for ammunition. In Switzerland, these new construction techniques were tested in every fortified sector, from the fortress of St. Maurice, with the construction of forts Dailly and Savatan, to the garrisons on the Gotthard massif, in particular with the construction of the Airolo fort (1886-1889), one of the first examples of an armored fort in Europe, but not with iron but with a resistant shell made of granite in the shape of a tortoise.[33]

The protagonist of this new fortification season after the Dufour era was Colonel Hans Herzog (1819-94), who led the Commission for Fortifications from 1873 to 1894, the key period in which started the

32 Colonel Baron Daniel von Salis Soglio (1826-1919) played a central role in constructing fortifications in anticipation of the First World War, not only for the Austro-Hungarian Empire but also as a consultant for other countries such as Switzerland. He was appointed director of the fortification of South Tyrol between 1867 and 1871, while a few years earlier, he had played the same role in the fortification of Galicia. See FONTANA, 1999.

33 The Airolo fort was located in a strategic position and had the task of protecting the Gotthard tunnel. The project was drawn up by the Austrian general Daniel von Salis-Soglio while the workforce employed was largely Italian and Austrian. The plan included three levels in which there was a wing for combat, accommodation, and side tunnels. It was built partially underground, surrounded by a moat protected by three caponieres and covered by granite blocks more than a meter high. The works, which required an investment of 3.5 million francs, began in 1986 and lasted until 1889, employing 800 workers. A 1 km long tunnel led from the fort directly to the entrance of the Gotthard railway tunnel: this would have allowed to close the portal of the southern tunnel and supply the fort from the north through the railway tunnel. Now a museum, the Airolo Fort was downgraded to a military facility in the early 1960s.

great construction sites for the fortification of the Gotthard massif (Fort Airolo, garrisons around Andermatt and on the Oberalp and Furka pass) and the defensive posts around St. Maurice (in particular Fort Dailly and Savatan).

In the first years of the 20th century, all forts were modernized in their structures and plant components (for example, electric generators). At the same time, at the planning level, the new technical-constructive possibilities were more and more used to transform the alpine territory from a simple "place suitable to be militarized," as it had been since ancient times primary component of the fortified system itself. As much as the Austro-Hungarian military engineers planned in their territories (for example, the Marmolada in the Saliente Trentino-Tyrolese area), the Swiss mountains were transformed into real strongholds, excavated, engraved, inhabited, and changed, in which every fortified post, observatory, cave battery, ammunition depot or shelter for the soldiers represented the indispensable constituent elements of the mountain-fortress organism.[34] At the outbreak of war, the Federal Council reaffirmed its neutrality, but at the same time, not to be caught unprepared and suffer a fate similar to that experienced by Belgium, under the leadership of General Conrad Ulrich Sigmund Wille, mobilized about 450,000 men to guard the borders and keep the enemy beyond them.[35]

This action was designed primarily to discourage France and Germany from violating neutrality and enter the Swiss territory; they moved much of the army to the northwestern border. In these places, six divisions of soldiers were concentrated. They fortified the border with provisional and field works, trenches, and firing positions, on the first line, modest constructions in concrete or dug inside the mountains themselves, to form a more backward line of defense.

On the northern border, a place of particular importance was undoubtedly the so-called "Km 0", the area around the river Large where the French, German and Swiss borders faced each other, the starting point of the

34 KAUFMANN, 2014; REISS, 1988; REISS, 1993; REISS, 1998; REISS, 2004.

35 In the first days of the conflict, while expressing fear of the threat to the Confederation, the newspapers invited their readers, with a conviction that was also hoped, to trust in the efficiency of the Swiss army. On August 3, 1914, the "Corriere del Ticino" wrote: "In this clash of hatreds, of aspirations, of passions, other minor states are overwhelmed: Belgium and Holland, and Switzerland. Belgium, against which Germany declares war because it did not want to bend and assist neutrally to the passage of German troops from its territory, is now paying the price of its separation from Holland [...]. Switzerland is instead safer because it is stronger. Switzerland, which represents the neutral nation par excellence in Europe, has nevertheless given its army perfect preparation. And proclaiming today, in the opening of the conflict, its neutrality, it is the case to defend it effectively with the mobilization of a numerous, disciplined and combative army". Cfr. BINAGHI, 2008.

long western front developed up to the Belgian coast. To regain Alsace, absorbed by the German Empire in 1871 after the Franco-Prussian War, in 1914 the French managed to advance as far as the city of Mulhouse but were soon repelled by a diligent German counterattack that led to stabilizing the front lines along the river Large, leaving the French in control of the village of Pfetterhouse[36]. From that moment on, the front remained essentially stable until the end of the war, while the fiercest battles took place about a hundred kilometers to the north, in the Vosges mountain range. Starting from "km. zero," the German army built a long network of bunkers that extended as far as the North Sea, while the French-built Villa Agathe, the first French construction in concrete intended to house two machine guns, which represented at the same time the entry point of a vast underground network of trenches and tunnels designed to connect the field station with the planned, but then not realized, station of Pfetterhouse.[37]

They fortified the adjacent Swiss territory with field posts, observation bunkers, and barbed wire fences to mark the frontier to avoid possible, even involuntary, crossings by German and French patrols during the day and at night. From a construction point of view, usually built these bunkers with wooden structures covered with sheet metal and earth since they were not designed for an active defense/offense of the front, but rather as sentry posts and shelters to protect against occasional bullets fired in the wrong direction. The ability of the Swiss to use their centuries-old knowledge of the territory to their advantage and to design works related to offense and defense in close relation to it was also evident here, where to effectively camouflage themselves in the dense forest that covered the areas around Pfetterhouse they built real observation towers raised in wood, at tree level.

As for the southern border, they sent some soldiers to Saint Maurice (Valais) to protect possible French incursions from Savoy or Lake Geneva, while other soldiers were deployed on the St. Gotthard, in a more central position. However, these last fortifications did not allow to sufficiently protect the Canton Ticino, which had always been a bulwark disputed with the Kingdom of Italy.[38]

36 BURTSCHY, HEYER, 2001; DUBAIL, 2011.

37 DUBAIL, 1977.

38 A minority among minorities, at the turn of the 20th century, Ticino was suffering from a severe economic crisis. The St. Gotthard railway tunnel opening, welcomed with great hopes, had finally connected the Canton more firmly to the rest of Switzerland, but it had not had the desired effects. Its nationalization, moreover, had not reduced, as the Canton had hoped, the unique mountain tariffs that burdened Ticino's goods. The tariff policy applied by the Federal Railways to Ticino's products seemed unreasonable since the goods coming from Italy, the financer of the tunnel, were given preferential treatment. The paradox lay in Ticino's products, although Swiss, suffered discriminatory

For this reason, built reinforced defensive positions around Bellinzona and built a series of field fortifications throughout the Canton. Posts, strongholds, military roads, mule tracks, trenches, shelters, ammunition depots, walkways, flanking batteries, and cannon batteries dotted the entire southern line of defense that stretched from Verzasca along the northern shore of Lake Maggiore to Cima di Medaglia, Carnoghè, and San Jorio. These works were built based on economic means and materials, mainly using wood, stone, and soil, with construction solutions designed both to be quickly and easily reproducible and blend in effectively with the surrounding landscape to not be immediately recognized by the enemy. In this case, too, these fortifications were classified as "field" fortifications, temporary works designed to try to block possible incursions without the pretension of being able to repel them in toto, but rather conceived to represent a well-organized obstacle to allow the internal troops to gain time and reorganize in a more structured way to face the enemy on the Bellinzona-San Gottardo line. The Ticino device was essentially conceived to prevent the Italians from crossing into Switzerland to reinforce the German troops in the region of Schaffhausen and Basel. Still, with Italy's entry into the war on the Allies' side, stabilized the front on the Stelvio, and the fortifications of Ticino became secondary. Despite this, during the war, the Italians themselves began to fortify the border towards Switzerland with a defensive line more than 80km long, the so-called Cadorna Line, to be able to block an eventual German incursion from the north, violating the Swiss neutrality as had already been done with Belgium to attack France.[39]

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treatment on the Swiss market concerning Italian products. The Canton had therefore not succeeded in becoming a full part of the Swiss economy. Switzerland began a policy of internal nationalization to respond to the pro-Italian tendencies of the conflict, but the population of the Canton tried to resist this phenomenon of "Germanization". The situation in the mid-nineteenth century was in turmoil.

39 The Cadorna Line is a system of fortifications to protect the border between Italy with Switzerland. The work was carried out between 1916 and 1918 for fear of possible Austro-German aggression through Switzerland, and the promoter was General Luigi Cadorna, chief of staff of the Italian army until 1917. The defensive line, which initially included a dense network of roads, military mule tracks, trenches, artillery emplacements, observers, and various logistical structures, is now a complex of military archeology, protected as historical and cultural heritage. When Italy entered the war on the side of the Allies, the commander Cadorna decided to order the construction with the utmost urgency of a powerful and permanent defensive line from the Valley of the Gran San Bernardo to the Orobic Alps, for a total of 72 km of border, to prevent a possible German incursion through Switzerland, as had happened to Belgium the previous year. This barrage, designed by the technical office of the Supreme Command, included 88 cannon emplacements, 11 of which were in caves, several kilometers of trenches, about 300 kilometers of truck roads, and almost 400 kilometers of cart roads and mule tracks. It involved twenty thousand workers and cost 105 million liras at the time.
As an example, Pic.2.9-2.10 show the project drawings of the fortified positions to be

Italy's entry into the war against Austria-Hungary shifted the attention to the eastern border, particularly the impervious peaks of Stelvio-Umbrail. This position was strategic, even if morphologically tough to fortify and garrison, but indispensable to intercept the enemy troops near the border and delay their advance, so that the Swiss contingents stationed in Val Müstair had sufficient time to organize themselves and set up a more systematic defense on the forest line near Plan Teal and in the defensive position of Ova Spin, on the road to the Ofen Pass.[40]

In the first year of the war, the front in these places was practically inactive, so much so that during the winter of 1914-15, the troops did not even stay in the defense posts (very hard living conditions due to the climatic conditions), but with the declaration of war by Italy on May 23, 1915, the situation changed abruptly, and immediately began a lively activity of construction of posts, shelters, entrenched camps and walkways that continued until the end of the conflict. Despite the strategic position, the difficult conditions of accessibility of the place and the availability of building materials made particularly challenging the process of fortification of the Umbrail pass and its maintenance during the conflict (Pic.2.11-2.12). In particular, the very harsh winter weather conditions made it necessary to obtain large quantities of firewood to heat the shelters at high altitudes (estimated at 100 hectares of forest area for the four years of the war), which were obtained by felling the woods that covered the mountain slopes up to about 2000 meters above sea level. This is a clear example of how the building of entrenchments, firing posts, and cave shelters and the deforestation plans represented essential components of the long process of "construction" of the wartime landscapes.[41]

In synthesis, therefore, organized the situation of the Swiss fortifications about First World War on two levels in close mutual connection: the first one structured on the main systems of permanent fortifications, related to the fortresses developed on the positions of Saint Maurice and St. Gotthard; the second one constituted by a dense network of field and temporary defensive apparatuses that garrisoned the outermost border

built on Monte Piambello, where even today, there are the remains of a fort belonging to the Cadorna Line (Pic.2.9-2.10).
The works continued uninterrupted, and in 1917 the Cadorna Line reached its maximum extension. In reality, the fortifications were never directly affected by the war events and were gradually dismantled. In 1933 they were partly exhumed to integrate them into the emerging Alpine Wall, but even during the Second World War, the defensive line was not affected by the war operations, as the battles took place on other fronts. After the war, starting from 1950, the Cadorna Line was abandoned entirely. Cfr. BINAGHI, 2008; BOLDRINI, 2010; TROTTI, 2011.

40 BELLOTTI, 2004.

41 KAUFMANN, 2014; REISS, 1988; REISS, 1993; REISS, 1998; REISS, 2004.

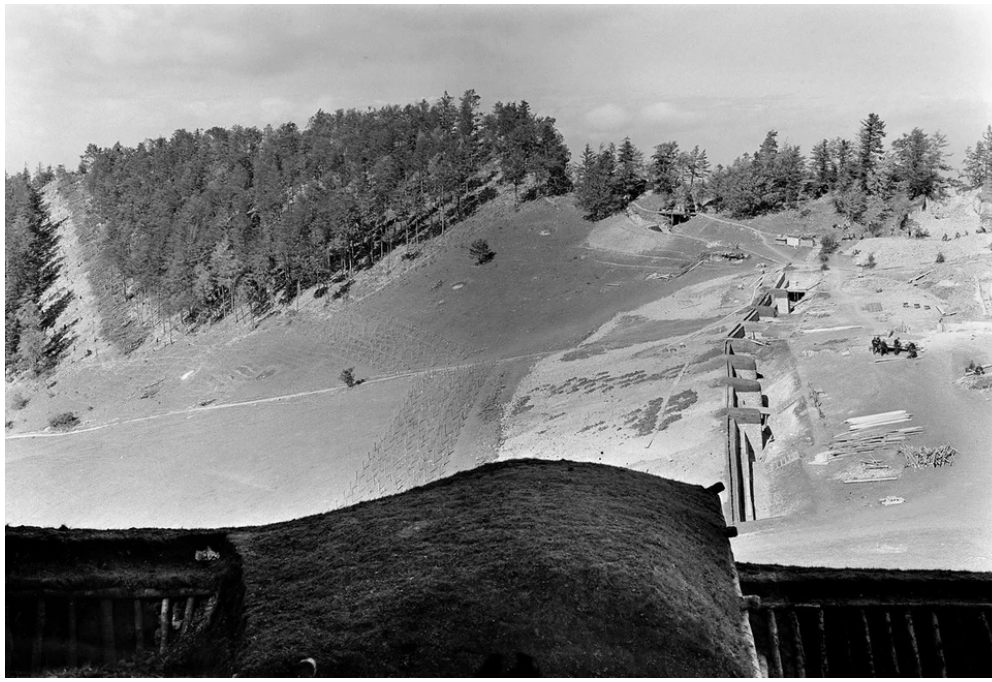
lines making the best use of the morphology of the alpine territory, such as the fortifications of Canton Ticino, those on the northern border in the area of Pfetterhouse and on the eastern side, at the Stelvio-Umbrail pass.

After the First World War, the Swiss fortifications were repeatedly strengthened and enlarged, especially with cave structures and reinforced concrete bunkers, totally or partially buried, especially around the time of the Second World War, during which the Swiss National Redoubt became more and more important and central, but also during the Cold War period, when added about 360,000 underground bomb shelters to the Redoubt.

Over time, however, the purpose of this dense network of vestiges belonging to different eras but built with the same intention has changed, concerning the evolution of varying defense strategies adopted by the country over the years, about the changing threats. In particular, since the '90s, the Swiss government has begun a long process of decriminalizing most of these works, thus initiating various interventions of recovery and proposals for multiple new uses.

Entrenched systems - Monte Ceneri
Wartime

Entrenched systems - Monte Ceneri
Wartime

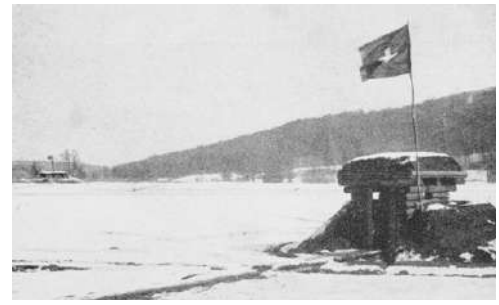


Giura Mountain Fortifications
Wartime

Fort Stöckli - Oberalp Group- St. Gottardo
Wartime

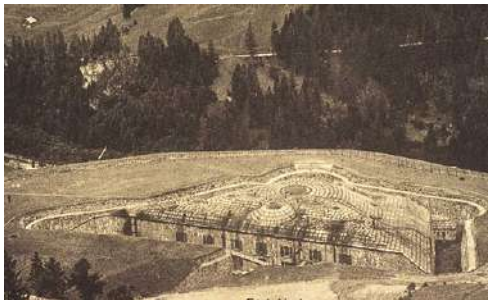
Fortifications at Km Zero
Wartime

Fortifications at Km Zero
Wartime



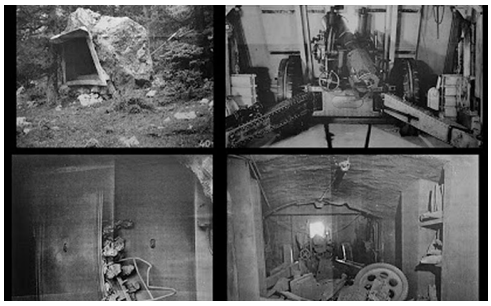
Fortifications at Km Zero
Wartime

Entrenched systems Giura Mountain
Wartime



Fort Airolo - Airolo
Wartime

Fort Airolo - Airolo
Wartime



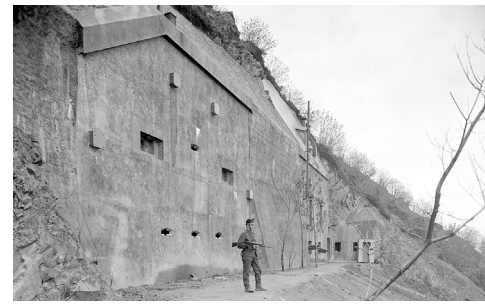
Fort Dailly - Saint Maurice
Wartime

Fort Buhl - Andermatt - St. Gottardo
Wartime

Entrenched systems - Monte Spina
Wartime

Entrenched systems - Alpe Gesero
Wartime

Monte Ceneri
Wartime



Fort Spina
Wartime

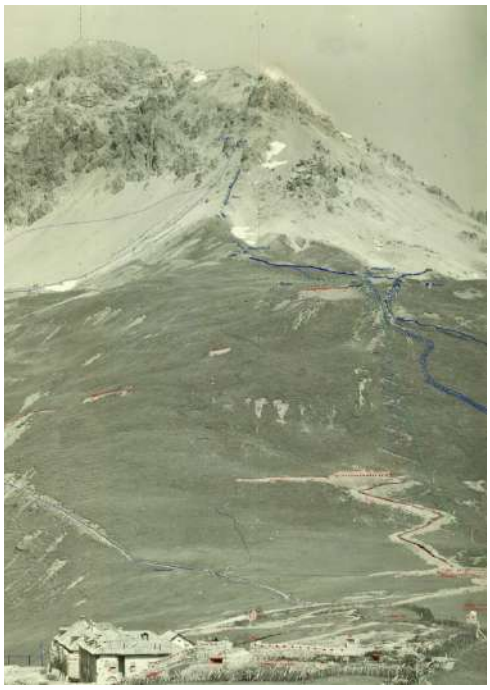
Fortifications at Km Zero
Wartime

Fortifications at Km Zero
Wartime

Fortifications at Km Zero
Wartime

Fort Stöckli - Oberalp Group- St. Gottardo
Wartime

Fortifications at Stelvio Umbrail border
Wartime



Fortifications at Stelvio Umbrail border
Wartime

Stelvio Umbrail fortifications
Wartime

Stelvio Umbrail fortifications
Wartime

2.1.3. The evolution of the fortification projects of the Prussian School

At the dawn of the Great War, the whole of Central Europe was almost entirely controlled by the Triple Alliance formed by the great empires of Prussia and Austria-Hungary, also flanked by Italy. Despite having extensive territories to garrison and therefore borders on both the western and eastern fronts, these countries enjoyed a rather strategic position. When the two "historical enemies" of Prussia, France in the west and Russia in the east, signed an alliance pact at the beginning of the century, it became clear that the upcoming conflict would engage Austro-Hungarian and German troops on both fronts. Compared to Austria-Hungary, naturally surrounded and protected by several mountain ranges, Prussia was more exposed in all directions. Despite this, the Austro-Hungarian Empire did not live a happy and peaceful period, particularly because of internal problems related to the problematic social cohesion between the different populations that made up the great Empire (Slavs, Austrians, Hungarians, and many other ethnic groups). After the Turks began to lose control of the Balkan Peninsula gradually, Austria and Russia began to contend for these territories, encouraging more and more that climate of tension that gradually led to the outbreak of the Great War.

At the beginning of the 20th century, therefore, Austria-Hungary had two fronts to fight on. At the same time, there seemed to be no possible reason to defend itself in the south since the Triple Alliance with Italy was still in place, even though, as we know, this was not the case. When Italy allied with France and England, Austria-Hungary's "uncovered" fronts to defend became three: the Italian line, the Balkan front, and the eastern one. On one side, the mountain ranges represented a natural obstacle for the offense; on the other side were not easy to cross to establish quick connections between the different sides (for example, between the central areas of the Empire and the Balkan area, separated by the Carpathian chain). On the contrary, Prussia had an impressive connecting infrastructure that connected all parts of the Empire at its disposal. Still, the great distances between the fronts practically determined two completely different histories.[42]

To better understand the evolutionary history of Prussian fortifications, it is necessary to go back to the beginning of the 19th century and contextualize the Central European situation in the aftermath of the Congress of Vienna.

Between 1815 and 1860, Prussia faced mainly two opposing enemies, by whom it was territorially surrounded, namely Russia to the east and France to the west. For this reason, beginning in the 1920s, lines of fortifications began to be built on the frontiers, gradually forming what

42 KAUFMANN, 2014

was later called the "Prussian System of Fortifications," i.e., a hybrid polygonal system (Pic.2.13). From a typological-constructive point of view, these fortifications were essentially based on a polygonal system that provided for the insertion of bastions and pincers with polygonal forts equipped with caponieres to defend the moats, scarp and counter-scarp walls that, within a gorge wall very often made of masonry, housed redoubts or casemates. The key figures in the development of this Prussian system were General Ernst Ludwig von Aster and his assistant von Rauch, under whose control the fortifications at Wesel, Julich, Koln, Koblenz (Pic.2.14), Minden, Erfurt, Wittenberg Torgau (in the central part) and Posen and Thorn on the eastern border were built.[43]

In 1816 General von Astor began the re-fortification of the cities of Koblenz and Cologne. In the first, he rebuilt the Prussian fortification extending it to both the Rhine and Moselle banks, dividing it into three sectors, using a pincer system for the new walls, and forming a stronghold through the construction of several polygonal forts with caponieres and redoubts.[44]

As for the city of Cologne was built 14 separate forts, some of them arrow-shaped (four sides and a gorge), others polygonal in shape, while others only made others in the second half of the century.

In the following years, they decided to transform the city of Mainz into a fortress, entrusting the project to the Austrian colonel (then general) Franz von Scholl,[45] who designed the fortified system applying precisely

43 FORSTER, 1960; ROLF, 2000; ROTTGARD, 2010.

44 Fort Ehrenbreitsein is particularly interesting in this respect. It was a kind of exception in that it included bastions, was triangular in shape and occupied a plain in which the land itself was part of the defence system, since it faced the Rhine on a steep slope. See KAUFMANN, 2014.

45 Franz von Scholl began his military career in 1796 when at only 24 years old, he was appointed cadet of the Corps of Engineers. Between 1796 and 1815, he was several times in Italy, France, and Germany. He participated in the Rhine campaigns, the blockade of Venice, the Battle of Leipzig, and other important war events of his time. In Venice, he distinguished himself particularly for his fortification projects in 1805, and in 1814 he was appointed director of fortifications. In Vienna, he taught in the school of Engineering, where he was assigned the chair of Art of fortifications. In 1821 he was sent to Milan and then moved between 1824 and 1830 in Frankfurt to supervise the construction of the stronghold of Mainz. In 1833, with a resolution, the Austrian Empire decreed the restoration of the fortifications of Verona and the Mincio line. At that time, Scholl was already in Verona as director of the Imperial Royal Office of Fortifications, and therefore, the War Council of Vienna entrusted him with the construction of the works. The principal promoter of this resolution was Field Marshal Josef Radetzky. As the architect, Lino Bozzetto, an expert in military architecture and a profound connoisseur of the magisterial walls, describes him, "Von Scholl was one of the most brilliant and active military architects of the Habsburg 19th century". A genius expressed in works of great architectural complexity, inserted in a military defensive

the indications of the Prussian Mixed System. In the following years, many other German cities, including Bavaria, were fortified, such as Germersheim and Landau, where Vauban-style fortifications existed and were modernized.[46]

Also gave particular attention to the fortification of the cities of Ulm, Rastatt Ingolstadt that were transformed into authentic fortresses, perhaps the strongest in Central Europe, second only to Verona. It may seem strange that the German Confederation invested a lot of effort in defense of Ulm and Ingolstadt, although these cities were further back to the borderline, but must remember that these works were carried out when Austria and Prussia represented the two dominant powers of the Confederation and both feared an invasion by France through the territory of the Rhine, which would have facilitated access to the region of the Danube and then pass to Vienna.[47]

The fortifications on the eastern border were classified as fortifications of secondary importance. In addition to the town of Köninsberg, whose defensive systems were modernized based on plans drawn up by von Aster in the style of the Prussian system, other defensive systems were implemented on the coast to the north and near the town of Marienburg.[48]

Prussia also created new fortifications in the Polish territory: at Thorn (Torùn) on the Vistula, in a strategic position to block a possible Russian advance and confine such potential offensive to the eastern part of the country (Pic.2.15);[49] further north near Graudenz, and finally at Posen (Pic.2.16), which became perhaps the most strategically important city on the Prussian-Russian frontier. Posen lay between Warsaw and Berlin and soon became the capital's main defensive position. General

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context that also included several forts, such as the Rivellino di San Giorgio and in the design of the extension of the magisterial walls adapted to the new war requirements of the time, always with great respect for the work done by his predecessors such as Sanmicheli. Franz von Scholl was considered the main exponent of the school of military architecture of Austria for his ability and innovations. His work was strongly influenced by the works of Marc René de Montalembert.
Sulla figura di Franza von Scholl si veda Franz von Scholl. Österreichs Vauban, "Österreichischer Soldatenfreund: Zeitschift für militärische Interessen", 6. Jahrgang (1853), nn. 53, 54, 55, 56, 57; WURZBACH, 1876; BOZZETTO, 1993.

46 Adjacent to Prussia, Luxembourg came under the control of the Confederation in 1816 and the Prussians began building new forts based on the polygonal system on the south and east sides, and some old forts were also modernised with the addition of caponieres and redoubts. The fortifications were abandoned in 1867 when Luxembourg became independent with the Treaty of London: the old forts were destroyed leaving the country without any fortified systems.

47 ZUBER, 2004.

48 EHRHARDT, 1960

49 For an in-depth study of this stronghold, see the Schedules developed in Chapter 4.

von Grolman began the project in 1815, aiming at the fortification of Winiary hill, a project that realized in 1828 with General von Brese. Fort Winiary was conceived as a fortress, a fortified system more articulated and consistent than the typical permanent fortifications, as demonstrated by the layout itself, consisting of three bastions and four ravelins connected by caponieres and arrow-shaped like some of the forts of the polygonal system. The fort also included a dam, which formed an integral part of the fort's defense. Fort Hake and Fort Roon were built in the territories further south from the city center, while the central core of Posen's defense consisted of six bastions and two forts connected by earthworks. They completed the entire defense system in 1860.[50] In fortifications and related construction techniques, the American Civil War represents an important "turning point" from the point of view of technological innovations, also given the Great War.[51]

Even before, the Crimean War had demonstrated the conclusion of the dominant era of smoothbore cannons and old muzzle loading guns as the principal offensive tools, compared to the introduction of rifled artillery and heavy mortars. Concerning these developments and innovations in offensive technologies, a sort of "race against time" began to modernize the existing fortifications to make them resistant to the new destructive powers.

First of all, at a typological level, it was immediately realized, as claimed by the Russian military engineer Todleben himself, that detached forts and forts' belts were the only effective answer to the increase of artillery range: in fact, the more distant such detached works were from the cities

50 ROLF, 2000; KAUFMANN, 2014.

51 The American War of Secession, also known as the American Civil War, was fought from April 12, 1861, to June 23, 1865, between the United States of America, led by Abraham Lincoln, and the Confederate States of America, a political entity that arose from the confederal gathering of states seceding from the Union. In the 1860 presidential election, the Republicans led by Lincoln supported the prohibition of slavery in all U.S. territories, a proposal that the southern states accepted as a violation of their constitutional rights. The Republican Party, which was dominant in the north, secured most electoral votes, and Lincoln became the first Republican U.S. president. Before his inauguration, seven southern states, whose economies were based on cotton plantations and the cheap labor of slaves who worked there, formed the so-called Confederacy in February 1861, seceding from the Union. On March 4, 1861, Lincoln declared that his administration would not start a civil war in his inaugural address. But efforts to find a compromise failed and both sides prepared for war.
The American Civil War was one of the first industrial wars, in which railroads, the telegraph, steamships, and mass-produced weapons with technological innovations that multiplied their destructive power were widely employed. The impact of industrialization in the American war was an example to begin to understand, already in the mid-nineteenth century, the importance of developing new construction technologies for fortifications and resisting the new firearms.

they protected, the lower was the risk for the same to be bombed.[52]

In the same way, understood that the polygonal system was more convenient than the bastioned one. From a strictly technological-constructive point of view, however, during the American Civil War, the rifled artillery and the new mortars highlighted the main weaknesses of the existing masonry fortifications, in which the parts that resisted best were the earthworks.[53]

Even the Danish war of 1864 confirmed this observation; however, in a few months, the Prussian and Austrian troops defeated the Danish ones at Duppel; these fortifications built in earth and wood fell more for lack of men than for structural collapse.

The Franco-Prussian War of 1870-71 saw the Strasbourg fortress fall in less time than the Danish fortress at Duppel due to the increased range of rifled artillery. The Prussian victory with the annexation of the territories of Alsace and Lorraine led to numerous revisions of the military fortification plans: first of all, the French fortress of Strasbourg passed into Prussian hands, as well as the first fortified works of Metz, which the Germans completed.[54] Military engineers continued to use caponieres and other masonry features even though artillery advances had demonstrated their weakness: the highest protection continued to be the terrain.

France came out from the Franco-Prussian war defeated and humiliated, and only a further war could have redeemed it. For this reason, Prussia began a process of strengthening its borders, paying particular attention to Alsace and Lorraine, understanding that in those territories would be concentrated the eventual French action. The fortifications of Strasbourg were strengthened with 12 more forts, including Fort Moltke, Roon, Veste Fronprinz, Baden, Bismark, and Kronprinz von Sachsen and Bitche, in addition to the completion of the ring of forts around Metz, already started by the French.[55] All buildings were continually subject

52 BOGDANOWSKI, 2004.

53 For further details on this subject, please refer to the following paragraphs and chapters, in particular Chapter 4 (filing of fortifications) and Chapter 7 (in-depth study of construction technologies).

54 At the outbreak of the Franco-Prussian War in August 1870, only four of the Metz forts were completed - forts St Julien, Queuleu, Diou and Plappeville. Two earlier forts that belonged to the original enceinte, Bellecroix and Moselle (renamed Steinmetz and Voigts-Rhetz), were upgraded with the addition of artillery cavaliers and casemated batteries. Construction had just begun on three other forts - des Bordes due east of Metz, St Privat to the south-west, and St Eloi to the north, which, after the outbreak of war served as intermediate gun batteries. Cfr. DONNEL, 2011.

55 German fortress engineers built the Moselstellung in three major periods of construction: The first period (1871-81) saw the improvement of the ex-French forts and the addition of new forts and intermediate batteries; the second period (1885-

to modernization as artillery continued to develop.[56]

In this regard, the most important innovation was the high-explosive shell, developed in the mid-1880s, which consisted of an ormal torpedo-shaped cast-iron body filled with a new high explosive called melinite, capable of penetrating masonry and ground fortifications with terrific impact.[57] In this regard, the most important innovation was the high-explosive shell, developed in the mid-1880s, which consisted of an ormal torpedo-shaped cast-iron body filled with a new high explosive called melinite, capable of penetrating masonry and ground fortifications with terrific impact. The various military Genii began to do multiple experiments on the existing structures to verify their resistance to elaborate adequate countermeasures.[58] France and Prussia concluded that the best way to protect the existing fortifications was to cover them by alternating layers of the earth with a layer of cement in between to obtain a sort of "sandwich" stratification resistant and effective to dissipate the destructive power of these bombs. One of the solutions involved the insertion of a new layer of cement called "burster layer," i.e., a layer of bursting able to absorb the destructive action of the bomb's bursting without making it reach the fort itself. Another solution was introducing armor on the forts, both on casemates and turrets, which became armored domes.[59] All the various military

99) saw the reinforcement of the existing forts with concrete, and construction of the first armoured batteries and interval shelters; the third period (1899-1916) saw the development of the western and southern flanks with the addition of the new Feste design. Cfr. DONNEL, 2011.

56 FONTBONNE, 2006; DONNEL, 2011.

57 The British created another type of bomb not using melinite but lyddite (picric acid).

58 The development of fortification techniques has followed, like any other branch of military art, a continuous evolution, corresponding to that of tactical procedures deriving from the progress obtained in the means and methods of offense and defense. For this reason, even before the outbreak of the First World War, the various countries developed a sort of competition between the invention of new construction techniques capable of resisting the renewed destructive power of armaments. In order to understand the actual resistance of both the traditional stone and brick walls according to which the forts had been built up to that moment and the new reinforced concrete structures, various experiments were carried out to quantify the different resistances. Based on the results of experiments carried out in the years 1877-78 in Gavre, near Châlons, to ascertain the effects of explosive-laden projectiles on concrete constructions and to deduce the dimensions necessary for resistance, certain unavoidable necessities were deduced, such as the use of concrete wall thicknesses varying from 3.50 to 4.00 meters, protected by layers of sand, gravel, and crushed stone to delay the penetration of the projectiles, so that they would not explode near the wall. Cfr. ISGRO', 2019.

59 Naval experience was important in understanding the advantages of armour, and the first to build armoured forts were the British, followed by the Germans, French and Belgians.

Geniuses developed proposals and technologies to counter these new weapons' new destructive power. An important contribution was given by the Belgian general Brialmont, as already explained in the previous paragraphs.

In addition to what has already been said, should be remember that the Belgian engineer was entrusted with designing the new defensive system of the city of Bucharest, as Romania had its independence after the Russo-Turkish war of 1878. This aspect is particularly significant concerning the evolutionary history of the Prussian fortifications since, in this context, began a sort of "competition" between Prussians and French to provide the new Romanian forts with the best artillery and armor.[60]

The German company Gruson of Magdeburg brought to Bucharest a mushroom-shaped dome designed by Schumann. In contrast, the French company St. Chamond got a cylindrical armor developed by Major Henri Mougin. There were several tests, prototypes, evaluations, but the Romanians opted for the German solution because it was more effective due to its curved shape.[61]

Between 1890 and 1914, the Prussians invested heavily in the construction of new fortifications and the reinforcement of existing ones: if the French had relied heavily on iron turrets and armor components before switching to steel, the Prussians seemed to be very much at the forefront of using the new material. The first two turrets the German army mounted were two Grusons at Fort Kameke in the fortified walls of Metz.[62]

General Alexis von Biehler replaced the polygonal fort (or "Prussian style") with a new type designed by him (Pic.2.17), very similar to the previous one except for some differences in distribution and form, such as the presence of casemates in counterscarp which often took the place of the caponieres. Von Biehler gave more priority to the defense on the western front, focusing on the reinforcement of the strongholds of Metz and Strasbourg and the support of Cologne with an additional dozen forts (Pic.2.18a-b). Commander Von Brandenstein replaced von Biehler and introduced different positions to connect the 2-4 km that separated the detached principal regiments. Von Brandenstein focused not only on the western front but also on strengthening the Konigsberg fort, which used a new cement-based material for the first time. In addition to the new concrete and earth layers, engineers installed hermetically sealed armored hatches to protect against gas propagation. Nine of Posen's old

60 KAUFMANN, 2014; ISGRO', 2019.

61 ISGRO', 2019.

62 DROPSY, 1995.

forts were subsequently rehabilitated, in addition to adding nine more intermediate structures.[63]

In 1892 the Prussians completed the construction of the fortress Konig Wilhelm I, which, unlike other forts, had scattered armored batteries. This type of fortification took on the name "Feste," including separate artillery and infantry positions, and intended to distinguish itself from the earlier types of Festung.

Later, Kaiser Wilhelm II took part directly in designing the new system of forts, introducing essential innovations in typology, as he was dissatisfied with the lunette shaped forts designed by Von Biehler since 1870 then undertook ita long debate that led to the design of a new typology called "Model of unity," very similar to that developed in the Austro-Hungarian context, which included both works for infantry and artillery.[64] The selected scheme was similar to the Brialmont model triangular forts, while counterscarp galleries and casemates replaced the caponieres used by von Biehler. At the end of March 1893, they decided to establish new standards for modifying old forts and new ones: the new principles combined Colonel Schimann's idea of a large "unit fort" with General von Sauer's idea of smaller forts with scattered defenses. These new triangular forts included counterscarp tunnels connecting casemates, which served to save complexity and expense. In the spring of the first fortress named such began near Mutzig, located near the Vosges mountains to protect the Alsace plain.[65] Interestingly, in the preceding years (1870-1880), armored Gruson turrets had not yet been installed in Germany, although there was a great demand for them abroad. The first Gruson armored dome was installed in Fort Ost in Mutzig for 150mm howitzers. The armored batteries in Mutzig became Fort Kaiser Wilhelm II in 1894: in addition to Fort Ost, it also included Fort West, three troop barracks, numerous infantry shelters, and other separate batteries, all of which were armored with howitzers and were connected by a dense network of concrete trenches. In the same period and the following years, installed different turrets and batteries in the fortified walls of Metz, Graudenz, Thorn, and Thionville[66] (created after Metz and wanted by Schlieffen) having planned the attacks through Belgium, the inner strongholds such as Mainz, Koblenz, Cologne, etc..

63 FORSTER, 1960; ROLF, 2000; ROTTGARD, 2010; KAUFMANN, 2014.

64 See the development of fortification art in the Austro-Hungarian Empire in the next paragraph.

65 BOUR, 1992.

66 Further north, the Germans built another stronghold in the area of Thionville, about 16km from the Lothringen fortress, which connected to the one in Metz to form the Moselstellung. In Thionville there were 3 main forts: Fort Obergentringen, Illingen, Konigsmachern. See DROPSY, 1995.

remained in the rear and were used as support for the front. The same fate befell Fortress Konigsberg on the Eastern Front. At the outbreak of the war, Prussian troops invaded Belgium to carry out the Schlieffen plan that, as already introduced in the previous paragraphs. However, leading to the fall of the main Belgian strongholds did not give the desired results, as the Germans were blocked before the siege of Paris, with the battles on the Marne, and were therefore forced to retreat to the front on the Aisne. At the end of 1914, aware of the prospect of a long war of position, the Germans began to implement a defensive strategy based on the fortification of their lines. They immediately began to place their jobs on favorable terrain, which is why, for almost the entire length of the front, the Allies found themselves at a disadvantage, either at the foot of high ground or in humid areas prone to stagnation.[67] In contrast, they still convinced the Allied troops of the lightning war, and they intended to break through the enemy lines as soon as possible and force a decision in the resulting open terrain. The German response to this strategy was to continue the strengthening of their defenses relentlessly. The effectiveness of the German system was tragically demonstrated during the British offensive on the Somme when, in July 1916, German soldiers survived a massive week-long preliminary bombardment unscathed. Drawing the obvious conclusions from the failure of the Allied offensive during the last battle of the Somme, the German General Staff decided to build a new line of defense that was to represent the ultimate achievement in German military construction on the Western Front. The Siegfriedstellung, known as the Hindenburg Line, was established about 15-50km back from the front. By retreating to a shorter and more easily defensible front, the German army could better utilize its troops and avoid the huge losses it had suffered at Verdun. On the Somme, losses it would not be able to sustain in the long run. Structurally, it was a series of fortified areas linked together by defensive works that extended from the North Sea to the city of Verdun.[68]

The defensive works included deep trenches (5 m deep, 4 m wide)

67 An example of this is the construction of the defence post near Ypres, Bayernwald Trenches, on high ground in relation to its surroundings. The orographical location was important not only for strategic purposes, but also from a technological-constructive point of view, since in damp places and below sea level, water infiltration was frequent and the need to build walkways made of sheet metal or wooden planks was common and served to prevent possible landslides.

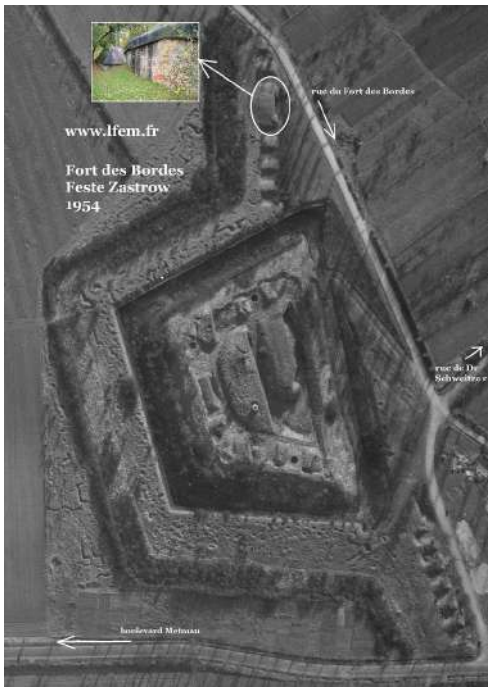
68 The Hindenburg line comprised five operational zones, or Stellungen, named after figures from German mythology (from north to south): Wotan, Siegfried, Alberich, Brunhild and Kriemhild. The most powerful of these sections was Siegfried, which stretched 160 kilometres from Lens to Reims. It was built in just five months thanks to a massive workforce of more than 500,000 workers, including German civilians and Russian prisoners of war.

and trenches with bands of barbed wire at least twenty meters wide in front of the front line. The casemates and shelters were protected by reinforced concrete and steel plates. In addition, a line of more lightly defended built outposts about two miles in front of the mainline to slow down any Allied attack. The actual battle zone was about two kilometers deep, was covered by a massive bank of large guns and machine guns perfectly positioned to eliminate any advancing infantry. The Hindenburg Line constituted the most crucial example of Prussian fortification planning during wartime and was only conquered in 1918 with the massive use of tanks.[69]

69 The point system was used to build the fortress around Linz, which consisted of 32 maximum towers located radially about 2.5 km from the city centre, at a distance of no more than 650 metres from each other. They were circular towers with a diameter of about 34 metres, built on three levels with walls up to 2 metres thick. The basement level housed the storehouses, the garrisons the upper level and the artillery on the upper level. See KAUFMANN, 2014.

Fort Blumenthal- Strasbourg
Wartime

Fort Kirchbach- Strasbourg
Wartime



Fort des Bordes - Metz
Wartime

Fort Kaiserin - Metz
Wartime

Fort Kaiserin - Metz
Wartime

Fortifications of Saint-Quentin - Metz
Wartime

Fort Diedenhofen - Thionville
Wartime

Fort Guentrage - Thionville
Wartime

Fort Diedenhofen - Thionville
Wartime

German Trenches - Western Front
Wartime

German Trenches - Western Front
Wartime

German Trenches - Western Front
Wartime

German Trenches - Western Front
Wartime

Siege of Metz
Wartime

Fort Jeanne d'Arc - Metz
Wartime

Battlefields - Thionville
Wartime

Fort Driant - Metz
Wartime

Fort Driant - Metz
Wartime

2.1.4. The Austro-Hungarian "war machine"

Following the dissolution of the Holy Roman Empire by Napoleon in 1806, as described above, began a bitter competition between the Austrian Empire and Prussia for the control of the central areas of the old continent, and this led to the need to strengthen the new borders of the empire, and consequently to develop new fortified systems. At that time, the main fortifications existing in the territories of the Austrian empire consisted of continuous defensive perimeters, mainly with a bastioned front, realized under the clear influence of the French fortification school of Vauban. In addition to these, however, between 1820 and 1840, the Austrian military engineers developed a punctiform fortification system based on specific circular works, the Martello or Massimiliane towers, named after Archduke Giuseppe Massimiliano d'Este, who promoted their widespread use (Pic.2.19).1 Although some shooting experiments had shown how these towers were vulnerable to any heavy artillery attacks, in addition to the construction of the fortress of Linz, they were built in many other fortresses, often with simplified forms, as in Krakow, Verona, Venice, Pula, Ragusa.[70] In response to the technological advances of the artillery, the central area of the empire gradually modernized come of the existing fortifications with additional works, such as the fortress of Olmütz in the Chech plains where two new forts were built, adopting the most modern polygonal system promoted by the neo-Prussian school[71], in response to the technological advances of the artillery, the central area of the empire gradually modernized come of the existing fortifications with additional works, such as the fortress of Olmütz in the Chech plains, where built two new forts, adopting the most modern polygonal system promoted by the neo-Prussian school. In contrast, others lost their effectiveness and were therefore downgraded, such as the fortresses of Leopoldstadt, Theresienstadt, and Josepstadt.

The main representative of the Austrian School in the first half of the nineteenth century was undoubtedly Field Marshal Franz von Scholl.[72]

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70 HILLBRAND, 1985; BOGDANOWSKI, 2004.

71 See the previous section on the evolutionary history of Prussian fortifications.

72 See footnote 40.

The main representative of the Austrian School in the first half of the nineteenth century was undoubtedly Field Marshal Franz von Scholl, who in 1830, after having participated in the development of the new defensive system of the fortress of Mainz, was sent to Italy to monitor the territories conquered by the Austrians after the Napoleonic wars.[73] Since the French had almost destroyed the previous fortifications, von Scholl took charge of drawing up new plans for the militarization of the southern territories of the empire, providing for the construction of new fortresses in Verona and along the Mincio line on the south border (Pic.2.20).[74] In the north, instead, he planned the construction of the

73 After the Congress of Vienna, the Austrian Empire had acquired the Lombardy-Venetia region, and thus also the fortresses of the famous Quadrilateral formed by Peschiera, south of Lake Garda, Mantua, on the River Mincio, Verona and Legnano, on the banks of the Adige.

74 Between the end of the eighteenth and the beginning of the nineteenth century, the city of Verona was disputed between two powers: Napoleon Bonaparte's France to the west and the Habsburg Empire to the east. In this period, Verona changed hands several times between these two contenders, until in 1801, following the Peace of Luneville, it was cut in half by the river: the French on the right bank of the Adige and the Austrians on the left. In 1814, the city passed definitively into Austrian hands, a good part of the magisterial walls on the right bank of the Adige, designed by the architect Michele Sanmicheli, together with the main defensive structures, had been demolished or tampered with. In 1830, the revolutionary movements in France overthrew the monarch Charles X. For this reason, the Austrians, fearing the spread of liberal-national ideas beyond the Alps, sent a large army to Lombardy-Venetia, led by Marshal Radetzky, with the order to provide for the updating of the region's fortifications. In 1831 General Franz von Scholl began to work on transforming the defenses of Verona's defenses according to the principle of active defense integrated by a system of external forts (entrenched camp) organized around the city more responsive to changing needs and military techniques. At the end of this process, which lasted more than thirty years, Verona became the cornerstone of the fortified region between Peschiera, Mantua, and Legnago, the famous Quadrilateral. Initially, for reasons mainly economic, the plan of von Scholl was executed only in part. Between 1833 and 1842, it was provided at first to the restoration of the magisterial walls in the points damaged by the French and the restoration of Castel San Felice, then proceeded to the construction of the first works detached: the Massimiliane Towers and forts Biondella, San Leonardo, San Mattia and Sofia on the hillside near the city, the forts Gazometro and Procolo at the two ends of the magisterial walls near the river. It was only in 1848, with the First War of Independence and the Battle of Saint Lucia, which saw the Piedmontese army a few steps from the city, that it gave full implementation to the plan of the now-deceased General Franz von Scholl. In the arc of ten years, twelve forts were built in the plain around the city: Chievo, Croce Bianca, Spianata, San Zeno, San Massimo, Fenilone, Santa Lucia, Porta Palio, Porta Nuova, Tombetta, Santa Caterina, San Michele. A cyclopean work that turned out to be inadequate to protect the city from enemy bombardments when, during the Italian Wars of 1859, were introduced the new artillery with rifled core, with greater range, precision shooting, and destructive power. It proceeded immediately to the construction of the second fortified belt, seven new forts: Battery at the Castle of Montorio, Preara, Lugagnano, Dossobuono, Azzano, Tomba, Parona. In 1866, two more were built in a great hurry during the war campaign: Ca' Bellina and Ca' Vecchia. On 16 October, the city of Verona was annexed to the newly formed Kingdom of Italy. Cfr. MENEGHELLI, VALDINOCI, 2010; KAUFMANN, 2014; FONTANA, 2016.

Nauders barrage in the Vinschgau valley and of the famous Franzenfest just south of Brixen, a first-rate fortress designed to guard the Brenner pass (Pic.2.21-2.22).[75] At this time, instead of the traditional continuous systems with bastioned fronts, von Scholl began to introduce a new defensive perimeter capable of accommodating a large number of artillery pieces for both far-flung and close-range defense.[76] Along the fronts were built bomb-proof casemates inside, which could be housed the cannons and ammunition. At the same time, the ditches surrounding the fort with steep counter-slopes served to prevent the enemy from storming the position easily. In this way began to shape Reduit Forts, real fortified citadels set on a continuous plant with a mixed front (bastioned and polygonal), which gradually replaced the previous Maximilian towers, very often incorporated within these new defensive walls.[77] The first examples of the application of this new type of fortification were the Sofia Fort north of Verona, and many works of the fortified walls of Krakow, in Galicia.

In 1850 was established the Austrian Imperial Fortifications Commission, chaired by Field Marshal Heinrich Freiherr von Hess, to reorganize the entire empire's militarization, identifying the most fragile positions and then the priorities of intervention.

75 Towards the end of March 1830, studies were carried out that confirmed the Brixen area's choice as the most suitable choice for the construction of a first-rank stronghold. The project of the large entrenched camp from Brixen extended towards Varna (to the north), controlled the Isarco valley near Col dei Bovi, and finally developed on the ridge of Sciaves and Elvas "closing" the wall again on Brixen. There were 38 permanent fortified positions with casemate batteries and a depot on the Sciaves plateau. However, Archduke Johann was not satisfied with the plan, and after further studies and proposals, a new site was found to construct the northern barrier in the Isarco Valley at Höhen Brücke near the village of Aica (Fortezza). The Franzensfeste project envisaged a pervasive fortified structure divided into three blocks: the upper blockhouse or "citadel" was located on the rise and served as a support and defense point with a flanking shot for the barrage below (to which a long underground tunnel connected it), the blockhouse at the bottom of the valley consisted of a "protection" fort to the north and the nucleus of the entire fortress located on a rocky spur from which the casemates branched off. A last independent blockhouse was in control of the bridge over the Isarco river. Cfr. HACKELSBERGER, 1985; FONTANA, 2016;

76 In this sense this new fortification solution declares a clear inspiration from the polygonal system proposed in the same years by the Neo-Prussian school, of which von Scholl was aware after his experience in Mainz. This solution can be considered as a transition phase of the Austrian school from the exclusive use of bastioned fronts to the increasing implementation of polygonal systems. See KAUFMANN, 2014.

77 Austrian military historian Kurt Morz de Paula divides the development of Austrian fortifications in the 19th century into four periods. The first period (1820-1841) characterized by the Maximilian towers; the second (1841-1850) with the Reduits Forts developed around strategic places; the third period, until 1885, with the Walled Forts; the last period (until the end of the century) with the Einheits Forts. Cfr. KAUFMANN, 2014.

In the Danubian area, identified a strategic position in Komorn, whose pre-existing fortifications were implemented to construct a punctiform belt of external forts positioned a few kilometers from the city. At the same time, on the southern border, strengthened the fortress of Verona with the construction of Fort Santa Caterina, a pentagonal Reduit Fort with caponieres. If the works were built following the new polygonal system in this last case, more effective to resist the artillery attacks of the time, the seven forts built to support the Komorn fortress were realized using the traditional bastioned system. Therefore they soon proved to be obsolete, as they could not respond effectively to the new artillery and military strategies. For this reason and following the Russian-Turkish war of 1877-1878, these forts gradually lost importance and were downgraded to simple deposits.[78] Given the presence of the most important Austrian naval base in the city of Pula, the Imperial Commission also identified the need to strengthen better the Dalmatian coastline between Venice and the Istrian peninsula. Therefore, proposed to improve and expand the ports along the coast and build defensive walls to protect them inland: the fortresses of Ragusa and Cattaro were constructed for this reason (Pic.2.23).[79] At the same time, the Zentralbefestigungskommision classified the entire territory north of

78 After the Crimean War the importance of the bridgeheads in the Danube area diminished considerably as the Russians abandoned Romania and the Turks lost some territories in the Balkans.

79 A few years after the occupation of Bosnia and Herzegovina in 1878, the Austro-Hungarian Empire began an ambitious program of building a vast system of fortifications.
Only a few of the already existing fortifications from the Ottoman period were reused to set up the new Austro-Hungarian fortified system. The pre-existing fortifications, however, influenced the development of the new militarization processes, in particular the presence of fortified cities, i.e., protected by walls reinforced by bastions and gate towers (such as the old city of Sarajevo and the walls of Trebinje and Zvornik), and the set of several small independent fortifications called Kula (in Serbian, Karaula). These small tower-like objects with two or more levels, erected between the 17th and 19th centuries, were built of local stone and rarely of wood.
When the Austro-Hungarian army conquered Bosnia and Herzegovina in 1878, most fortifications were in a very poor state of preservation, so they were massively reinforced by the Austrians, particularly to improve the defenses along the southern border to Italy. In order to secure the approaches to Carinthia and the city of Trento, new fortifications were built with the techniques of the time, both in inland and coastal positions. For example, the sea defenses of the main naval port at Pula in Istria were reinforced by three armored coastal forts. All mentioned were the first armored fortifications built by the Austro-Hungarian Empire. In addition to this, work was gradually begun to construct a new defensive wall to the north against a possible attack by the Russian Empire. Eventually, Bosnia, Herzegovina, and southern Dalmatia were transformed into a fortified region comparable with the Quadrelatero formed by the fortresses of Peschiera del Garda, Mantua, Legnano, and Verona. Cfr. KAUFMANN, 2014; FONTANA, 2016, PACHAUER, 2018. Cfr. ÖStA/KAW ZSt KM Präs 15-5/11 ex 1885, supplement 2, 1885.

the Carpathian Mountains as Manovriergebiet, defining the need for militarization. Concerning the orographic possibilities, we identified the most favorable positions. In this way, a fortification plan for Galicia was elaborated, based on the organization of three operational strongholds of primary importance, interspersed with two intermediate connecting fortresses (Pic.2.24). The main positions were located in Krakow, on the Vistula, in Przemysl along with the San and, further east, in Zaleszczyki on the banks of the Dniester; the Zwischenpunkte were instead located in the city of Tarnów (between Krakow and Przemysl) and Lviv (between Przemysl and Zaleszczyki).[80] From a purely typological-constructive perspective, the construction of the two main fortresses of Krakow and Przemysl was used in profoundly different systems. For Krakow, the militarization plans provided to complete and strengthen the existing earthworks designed by Tadeusz Kosciuszko at the beginning of the century and to allocate the ancient fortified complex of Wawel to the function of a defensive citadel. In addition, following the theories of Rogniat.[81] built four external forts, two in the shape of a lunette, following the typology of the Reduit Forts, previously explained, and two with an irregular plan, conforming to the peculiarities of the terrain.[82] In the years immediately following, also in response to the tensions due to the Crimean War, 27 Feuerschanz were inserted between the four outer forts, field works for artillery built-in earth and wood, surrounded by a moat and usually heptagonal (50m wide), of which the seventh front had a dovetail and formed a gorge crossed by a wooden bridge. These important field works define a semi-permanent point perimeter surrounding the central noyau at a distance of about 2-3 kilometers.[83] As for the fortifications of Przemysl, instead, a wide entrenched field with a continuous perimeter was realized, with long and jagged sides towards the outside, also composed by more than thirty field and semi-permanent works (trenches, bastions, cuts, artillery emplacements), mainly placed in correspondence of the

80 BOGDANOWSKI, 2004; FAIT, 2016; FONTANA, 2016; PEZDA, PIJAJ, 2016; ZADRA, 2017.

81 Rogniat's entrenched camp is a fortification theory developed at the end of the 18th century by Joseph Rogniat, Inspector General of the French Corps of Engineers, based on the completion of the body of the square with four detached works, about 2/3km from the enclosure and at a maximum distance of 4/6km from each other. See BOGDANOWSKI, 2004.

82 Fort Kosciuszko, with its massive strut-shaped wedges, and Fort Krakus, No. 33.

83 This type of perimeter with detached forts was a variant of Rogniat's theory, quite rare at the time, and was similar to the fortified system around Linz. This system represents one of the first examples of a small entrenched field fortress, which would be increasingly developed in the following years. BOGDANOWSKI, 2004; FAIT, 2016; ISGRO', 2019.

most weak points of the main dam.[84] A significant change of pace in the art of fortification occurred after the Franco-Austrian war of 1859 when used rifled artillery for the first time, a fundamental innovation that made it possible to considerably increase both the length of the range and the explosive potential of the weapons, as well as to have greater stability during launch and therefore a relative increase in the precision of the shots.[85] In response to this, it soon became evident that the Reduit Forts could not counter the new weapons and that it was necessary to protect the central noyau trying to move the offensive actions away from them. To do this, they began to build new rings of outer fortifications, at a distance of about 5 km from the center and spaced with steps designed concerning the range of their weapons.[86] These works, the so-called "artillery forts," gradually replaced the Reduit Forts and were characterized by a high concentration of cannons for the far defense, deployed in open-air positions on the dam. Their location at a considerable distance from the central body contributed to the definition of a new advanced defensive line, typical of the system of detached forts that would be established in a few years.

Following this line of reasoning, between 1859 and 1866, built external fortified walls of the fortress of Verona were made, consisting of 9 forts with a similar plan, based on the exclusively polygonal system, with the presence of caponieres to protect the ditches, redoubts, casemated traverses for the artillery.[87] In the same way, also the stronghold of Krakow was reorganized on the project of the general August von Caboga integrating the polygonal system, more effective for the protection of the more vulnerable front to the north (the so-called bastions II, III, IV, V), with the bastioned system applied along with the other less dangerous directions (bastion VI to the east; bastions VIII, IX, X to the south; bastions I, I ½ to west).[88] In addition to these considerations, after the armistice of Villafranca in 1859 and the consequent loss of Lombardy in favor of Piedmont, a new front was opened for the Austro-Hungarian

84 BOGDANOWSKI, 1984; BRZOSKWINIA, WIELGUS, 1991; BRZOSKWINIA, 1994; BOGDANOWSKI, 2004; FAIT 2004.

85 See Chapter 7 for more details.

86 The experience gained in the siege of Sebastopol also suggested important changes in the configuration of the defensive lines and above all stimulated a general reflection at European level, which involved all the most important military strategists of the time, from Todleben to Brialmont, from Caboga to Salis Soglio.

87 See note nr.66.

88 The northern front bore strong similarities to the solutions adopted by the Belgian general Brialmont in the construction of the contemporary Antwerp fortress, demonstrating how there were innumerable similarities and mutual references between the different fortification schools. See DEMEL, 1957; BOGDANOWSKI, 1984; BRZOSKWINIA, WIELGUS, 1991; BOGDANOWSKI, 2004; FAIT 2004;

Empire to be fortified on the southern border, which until that moment had represented a backward line. The Austrian military authorities decided to reinforce all the walls of the south of Tyrol, exploiting the alpine morphology of the territory to their advantage to obtain the arrest of the enemy troops with numerically contained military forces and lay the foundations for possible counter-offensive actions. Therefore, the foundations for active defense of the territory were laid, with the elaboration of an excellent fortification plan organized in two main lines of the barrage to be strengthened by constructing armed road cuts, barbette constructions, and warehouses in the rear.[89] General Huyn proposed the construction of the first line of "external" defense parallel to the Lombardy border, from the Stelvio to Lake Garda, to close the main lines of attack (with the construction of the forts of Nago, San Nicolò, Strino, Lardaro, and Gomagoi), and a second barrage in a more backward position, entrusting the fortifications of the city of Trento, together with the forts of Rocchetta, Buco di Vela, and Doss di Sponde, with the internal protection of the Adige Valley.

Other important changes occurred after the Austro-Prussian war of 1866 and the annexed Third Italian War of Independence when Prussia became the dominant power in Central Europe, and the Austrian Empire lost control over both the northern Germanic regions and over Venice and Veneto, areas that had remained firmly under Austrian rule even after the Unification of Italy in 1861. In the years immediately following, after having smoothed out the internal difficulties due to the problem of making different ethnic groups live together with a constitutional reform that led to the birth of the Austro-Hungarian Empire,[90] it became necessary to reorganize the defensive assets along all the new borders to prevent any enemy incursions from the south, moved by the Italian nationalists, but also to counter the Russian expansion from the east and Prussian to the north.[91] In this period began numerous plans for militarization, but due to the lack of economic availability, they built very little until the early 80s. The Saliente Trentino, for example, assumed more and more the value of "strategic bastion" to

89 TABARELLI, 1990; PIVA, ZADRA, 2003; FONTANA, 2019;

90 Unlike Prussia, which was made up of different states but belonging to the same ethnic group, the Austrian Empire was made up of an eclectic mix of different ethnic groups: the Germanic Austrians were joined by Italians, Slovaks, Hungarians, Czechs, Poles, Croats, Slovenes, Serbs and Bosnians. The difficulties of controlling and bringing together peoples with different cultures, traditions and customs were resolved by recognising the existence of two distinct and equal kingdoms (Austria and Hungary), although they were governed by the same sovereign. The Austro-Hungarian Empire was born in 1867 with the so-called Ausgleich ("compromise") between the Hungarian nobility and the Habsburg monarchy, with the aim of reforming the previous Austrian Empire born in 1804. See KAUFMANN, 2014; FONTANA, 2016.

91 FAIT, 2004; DALLEMULE, FLAIM, 2014; ZADRA, 2014; FONTANA, 2016.

be defended and fortified, and therefore began a series of studies and projects that lasted for many years and proposed different solutions for the permanent and field fortification of South Tyrol, but always confirming the strategic position of the stronghold of Bressanone[92] and Trento, as well as the need to defend the Giudicarie valleys and the area around Riva del Garda. Concerning the provincial capital, in Lieutenant Colonel Salis-Soglio's project, the area around Trento was once again confirmed as the center of gravity around which to build the double defensive walls commonly known as the "Fortress of Trento." For the time being, they did not implement these fortification projects. Still, they were primarily taken over by Lieutenant Field Marshal Franz Thun-Hohenstein, to whose firmness we owe the actual construction of the Trento fortress a few years later (Pic.2.25).[93] In 1878, at the end of the Russo-Turkish war, the Congress of Berlin allowed the Austro-Hungarian Empire to occupy Bosnia-Herzegovina, thus regaining part of the Balkan Peninsula. This, however, introduced at the same time another vulnerable front that, like the South Tyrol, could not be fortified due to lack of funds, and at the same time brought attention back to the Galician region, on which the expansionist aims of the Russians shifted, by now ousted from the Balkans.

Starting from 1880 were finally resumed the work of fortification of the strongholds of Krakow and Przemysl under the supervision of General Daniel Salis Soglio,[94] in the awareness that the renewed importance of portable weapons in defense of forts made it necessary to implement the infantry positions within the standard installations of artillery forts. As already happened before, the Austrian school developed a new model of fortification, taking suggestions and solutions elaborated by the French school as well as by the Prussian school, arriving at defining two new declinations of the previous artillery forts: forts with two ramparts, of which the one for artillery in the form of an obtuse corner open on the back and located above the barracks of the gorge, and with a single elongated rampart, with alternating infantry and artillery emplacements.[95] In addition, the first armored turrets began to

92 With regard to the stronghold of Brixen-Schabs the project of Major General Heinrich von Scholl, sent to Vienna on 20 January 1871, stands out. The project included the blocking of the Pustertal road, the use of the Fortress of Franzensfeste for the northern border and the construction of permanent and field fortifications in the south between Elvas and Varna. In addition to the permanent fortifications, a series of field fortifications, entrenched lines, road barricades, auxiliary batteries and casemates were planned. See DALLEMULE, FLAIM, 2014; FONTANA, 2016.

93 See further information on the Trento stronghold in Chapter 4.

94 Si veda nota 26.

95 The French school theorised a fort with two embankments with infantry positions on the lower embankment and artillery positions on the upper embankment. The German

be introduced in some fortified works in Galicia.[96] Considering these new typological-constructive developments, in Cracow and Przemysl, an intense transformation activity began to reinforce the pre-existing noyau and build a new and considerably advanced line of forts further out. In Przemysl, in particular, Salis Soglio transformed many of the small polygonal bastions previously built into realistic artillery forts, mainly with two embankments.

In the mid-1980s, the appearance of torpedo grenades (mine-action projectiles) and the adoption of double-effect and delayed-action fuzes, as well as the use of high-explosive substances, imposed a further general reorganization of the existing fortified systems and a necessary adaptation of the structures. This opened the way to the use of concrete and steel armor to protect the external fronts of the fortifications, stimulating a heated debate between the different schools of fortification.[97] In the Austro-Hungarian context, introduced essential innovations in the technological-constructive field, which led to the elaboration of a new model of fortification called Einheitsfort, designed to perform a practical action for defense both far and near. These new "unitary forts," or "integrated armored forts," provided for a general strengthening of the geometric structure of the artillery forts of the previous period (albeit with rounding of the perimeter) with armored turrets and caponieres placed in the moat of the gorge and often equipped with traitor posts, as well as the introduction of steel casemates for cannons and machine guns, and rotating domes.[98] As in the rest of Europe, cement concrete was increasingly used both for the roofs and in the load-bearing skeleton of new constructions. According to this model, built new forts in the main fortresses of Galicia,[99] as in the rest of Europe, cement concrete was increasingly used both for the roofs

school, on the other hand, in addition to the two-embankment fort, proposed a single-embankment fort with elongated embankments in which both artillery and infantrymen would be positioned. This model was also followed by the Russian and Belgian schools.

96 In Fort 38, known as 'Skala', a Gruson type dome with two 12cm cannons was installed for the distant defence. Hermann Gruson, owner of an industrial foundry near Magdeburg, Germany, succeeded in shaping high-quality iron plates that could effectively resist artillery fire. See KAUFMANN, 2014; FONTANA, 2016; ISGRO', 2019. See Chapter 7 for more details.

97 See Chapter 7.

98 As already explained, such domes had already been introduced in some fortifications of the previous period in the stronghold of Krakow, but from this moment they were used in a massive way. The production of domes, but also of armor, was carried out by industries under the direct control of the monarchy: the first supplies were entrusted to four different Bohemian steel mills (including Witkowitz and Skoda). Cfr. KAUFMANN, 2014; FONTANA, 2016; ISGRO', 2019.

99 Two new forts were built in Krakow (47a+49a) and two more in Przemysl (IX and XIII).

and in the load-bearing skeleton of new constructions. According to this model, built new forts in the main fortresses of Galicia. At the same time, Colonel Julius Vogl applied these principles in the militarization of the Trentino-Tyrolese salient, defining in this way the first generation of armored mountain fortresses of the empire, known as "mountain forts" or in "Vogl style".[100] Ultimately, all fortification projects developed by the Austro-Hungarian school until the early years of the twentieth century were conceived following a substantially defensive function. This vision changed radically with Lieutenant Field Marshal Franz Conrad von Hoetzendorf as Chief of Staff of the Austro-Hungarian Army. To avoid a possible Austro-Hungarian war involvement on two fronts simultaneously (in Galicia and with Italy), he developed the idea of a rapid defensive attack against the militarily weaker opponent, i.e., the Kingdom of Italy. With this objective, he elaborated several plans for the militarization of the Trentino-Tyrolese salient, particularly to guard the possible access routes to the region: Vallagarina to the south, Vallarsa, the plateaus of Folgaria and Lavarone, and the lower Valsugana to the west.[101] From a typological-constructive point of view, the fortifications projected by Conrad resumed and improved the "forts of unity," increasing the use of concrete in which large iron girders were drowned, the use of armored rotating domes where to house the artillery and the covering of the uncovered parts of the roofs (usually made with concrete thickness not less than 2.5 meters) with thick protective zinc plates. For this reason, these works took the name of "armored forts." In the years immediately preceding the outbreak of the Great War, the Austro-Hungarian school developed a new generation of fortifications, designed in strict relation to the morphology of the Alpine territories and the need for camouflage in the landscape of insertion. In this way, the "apogee forts" were born: real "war machines" dug inside the mountains, creating caves, galleries, tunnels, lookout posts, and any other element typically present in any additional fortification. Realized a famous example of this type of construction on the southern front of the Saliente Trentino-Tirolese with the realization of Fort Pozzacchio-Valmorbia, called, just for the reasons mentioned above, an "unfinished war machine entirely dug into the mountain."[102]

100 A technician of the highest calibre, he was appointed Chief of Engineers in Innsbruck in 1881.

101 TABARELLI, 1990; PIVA, ZADRA, 2003; MALATESTA, 2009; DALLEMULE, FLAIM, 2014; FONTANA, 2019;

102 Fort Pozzacchio is the last of the Austro-Hungarian fortresses built between the nineteenth and early twentieth century on the border of Trentino with the Kingdom of Italy. The fort represents the most advanced stage reached by the Austro-Hungarian military engineering. The project was entrusted to Lieutenant Stephan Pilz, who, for reasons of economy and, at the same time, to cope with the destructive effects of 30.5 cm mortars, designed a fortification built almost entirely in a cave. In 1912 the access

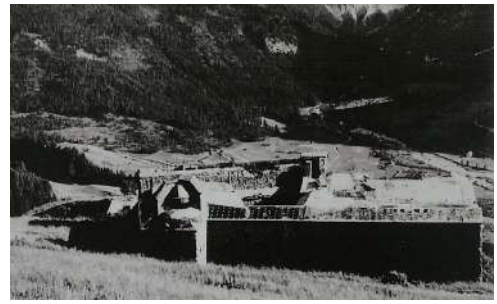
As discussed later, the evolution of these different fortification modalities openly declares a way of operating in close relationship with the landscape, and not only the insertion of specific works within it.

Therefore, for this very reason, it is evident that it is not possible to identify a unique and shared model of fortification within the Austro-Hungarian Empire at the dawn of the Great War. The multiple presences of different landscapes and the foreign relative orography of the terrain determined the development of diversified constructive typologies, leading to the realization of a heterogeneous palimpsest of works spread over the entire breadth of the Empire (Pic.2.26).

road was built; in 1913, the barracks, the aqueduct, and a cableway for the transport of materials were built. The works for the realization of the fort began at the end of 1913 with the excavation of the ditch and the leveling of the top of the hump that would host the fort. The yard, directed by Lieutenant Alexander Ottopal, employed about 200 workers. The work continued even after August 1914, to complete the work by July 1915. The lack of manpower and Italy's entry into the war in May 1915 prevented the conclusion of the work. Abandoned by the Austro-Hungarian army, on June 3, 1915, it was occupied by Italian soldiers. With the offensive of May 1916, the fort returned to Austrian hands and remained there until the conflict's conclusion. Already strongly damaged from the bombardments, it came utterly stripped of the metallic parts in the postwar period. The recent restoration, promoted by the Autonomous Province of Trento and designed by the architects Francesco Collotti and Giacomo Pirazzoli, has made the structure open again. Cfr. TABARELLI, 1990; PIVA, ZADRA, 2003; MALATESTA, 2009; DALLEMULE, FLAIM, 2014; COLLOTTI, 2017; COLLOTTI, 2018; FONTANA, 2019.

Entrenched system in Galizia
Wartime

Fort Corte
Wartime



Fort Mitterberg
Wartime

Fort Heideck
Wartime

Fort Gomagoi
Wartime

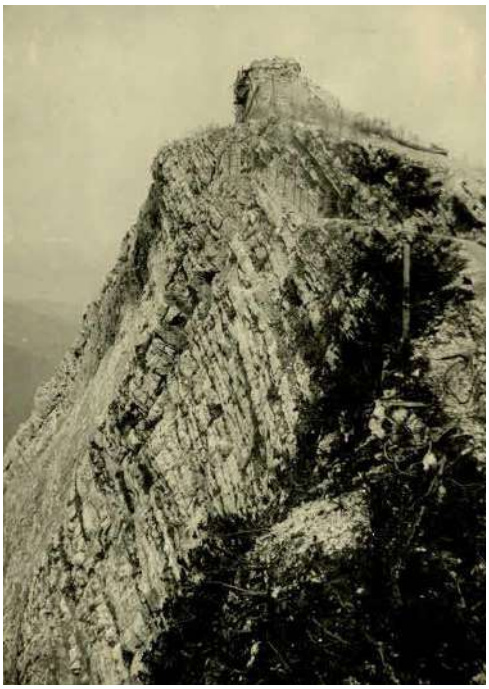
Fort Hensel
Wartime

Fort Tonale
Wartime

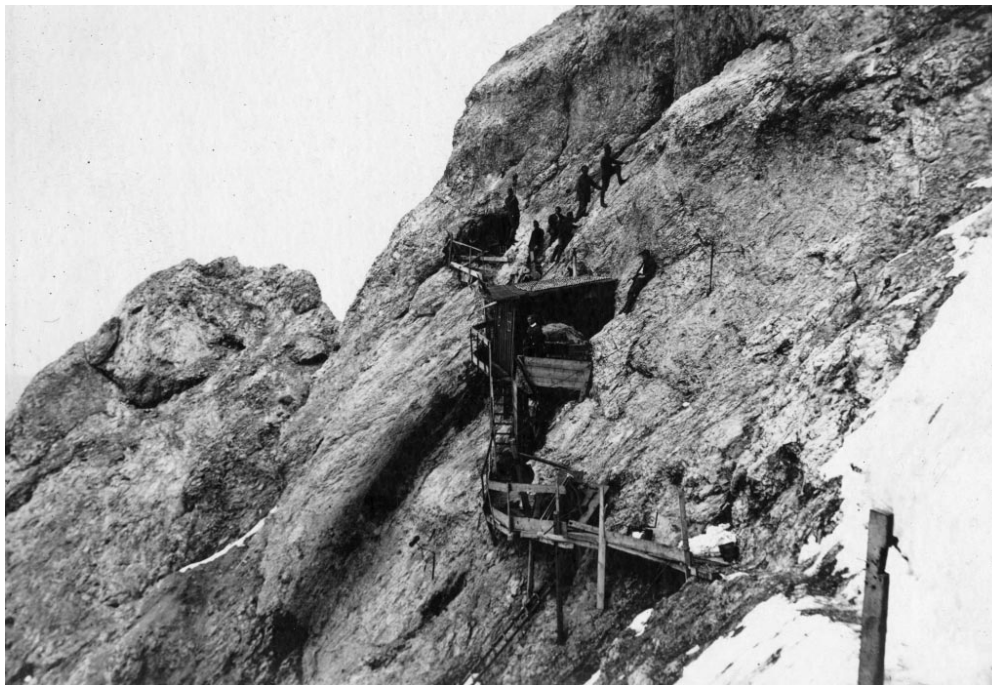
Fort Danzolino
Wartime

Fort Cherle
Wartime

Field Fortifications at Mitterberg
Wartime



Forte Spitz Verle
Wartime



Mountain defensive systems - Marmolada - *Wartime*

Permanent fortification - Przemysl - Wartime

Fort Busa Verle
Wartime

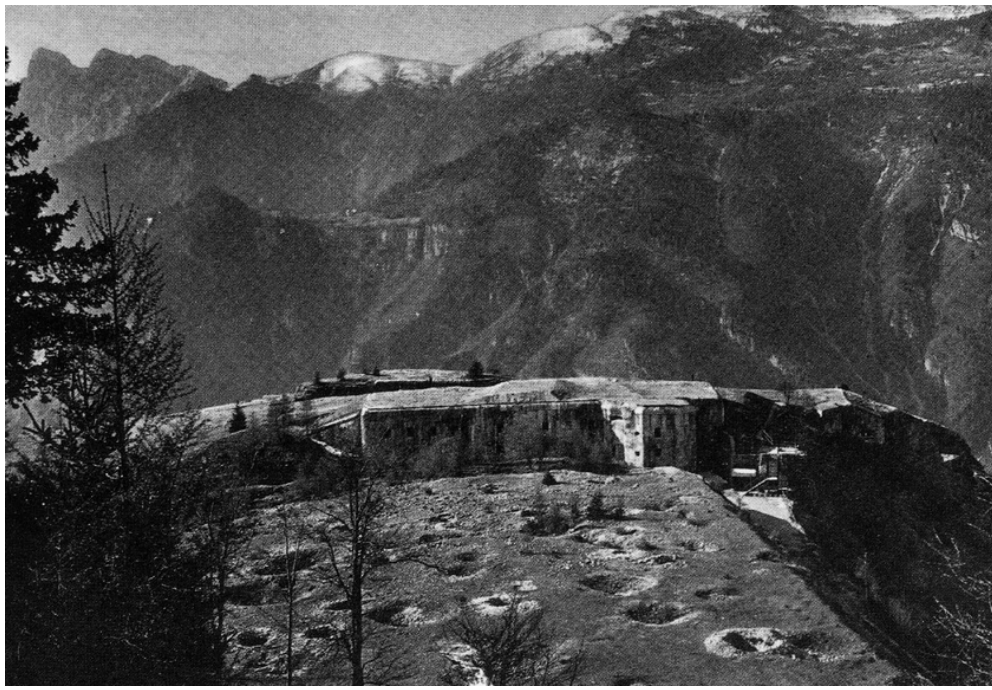
Fort Mero and defensive systems
Wartime

Fort Salis Soglio - Przemysl
Wartime

Fort Cadine
Wartime

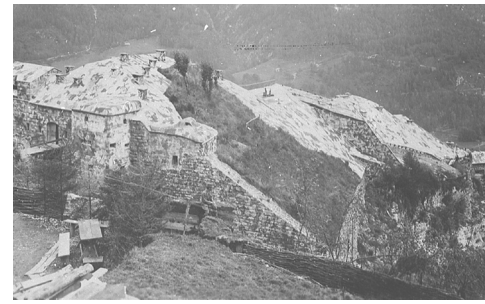
Alpine trenches
Wartime

Fort Presanella
Wartime

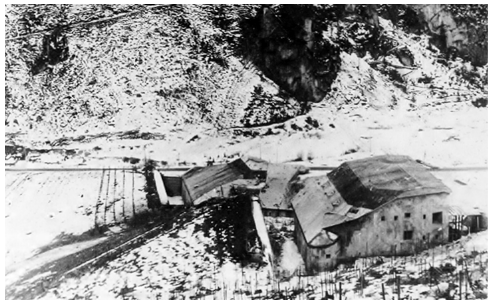


Fort Belvedere
Wartime

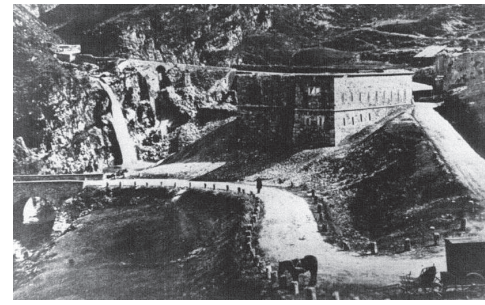
Fort Lusern
Wartime



Fort Corno
Wartime

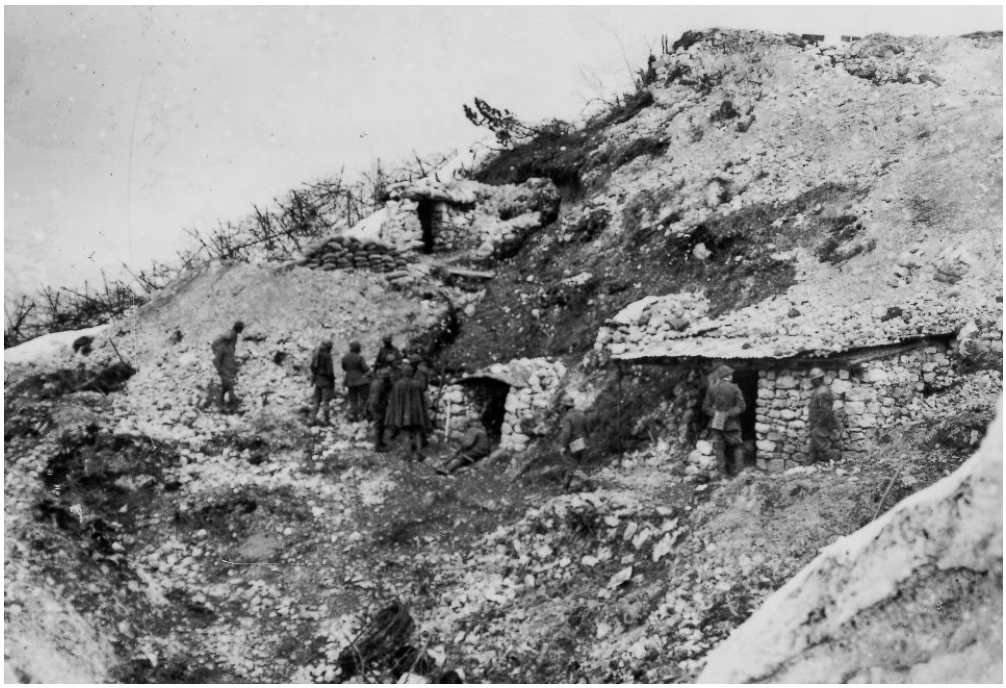


Fort Landro
Wartime



Fort Ampola
Wartime

Fort Pozzacchio - Wartime



Defensive systems - Monte Zugna - Wartime

Entrenched system - Monte Zugna
Wartime

Fort Ruaz
Wartime

Fort Rocchetta
Wartime

Entrenched system around Busa Verle Fort
Wartime

Fort Strino - Wartime

Monte Pasubio
Wartime

Fort Cherle
Wartime

2.1.5. The French defensive line "Sere de Riviers".

After the defeat against the kingdom of Prussia in May 1871, France found itself with almost defenseless borders, with a disorganized army and citadels that in the past were impregnable and at that time were utterly obsolete compared to the important innovations of the time in the field of heavy offensive artillery.[103] To Prussia had to be given the city of Metz and the territories annexed by Louis XIV in 1681, that is, the departments of Haut Rhin, Bas Rhin, and Moselle. In contrast, only the part of Belfort remained French, notably thanks to French troops' courage during the siege of Belfort. In exchange for this, however, France had to surrender a good part of the department of Meurthe and some territories in the Vosges mountains.

Parallel to the evacuation of the last German troops of occupation, the Comité de Défense was created in office from 1872 to 1888, whose task was the defensive reorganization of all French borders, both land, and sea. It was necessary in the first place to fill the breach left by the loss of the strongholds in the northeast, to modernize the most antiquated structures that had proved inadequate during the last conflict, and to build new fortifications adapted to recent combat techniques, especially the advances in artillery.

The committee was established by presidential decree on July 28, 1872; it had nine members at its inception, including the Minister of War and representatives of the Artillery and Engineer Corps.

General Séré de Rivières, commander of the Engineer Corps of the II Corps at Versailles, was appointed secretary of the committee in 1873; on February 1, 1874, he was promoted to head of the Engineer Service at the Ministry of War. During these years, Séré de Rivières was the "thinking mind" of the committee, having all the necessary skills to impose his ideas and carry them forward without real opposition. Construction began in 1874.[104] After Vauban's construction, French

103 Until the Franco-Prussian War of 1870-71, the French fortification situation was still characterised by the presence of the fortified installations set up by the Marquis and military engineer Sébastien Le Prestre de Vauban, usually known only as Vauban, in the 17th century. He is responsible for numerous examples of modern fortification, of which he is the greatest exponent. Twelve of Vauban's works, grouped together in the Fortifications of Vauban, were inscribed on the UNESCO World Heritage List on 7 July 2008. See footnote 4 for more details.

104 Cadet of four brothers, originally from Languedoc, he studied in Paris; admitted in 1833 to the École Spéciale Militaire de Saint-Cyr, he preferred to give it up, to continue studying law. He then entered the École Polytechnique in 1835, from which he left in 1837 with the rank of second lieutenant. He then attended the School of Application of Artillery and Engineering in Metz, where he learned the basics of permanent fortification. Finally, in 1839 he was assigned to the 2nd Regiment of Engineers in Arras, where he perfected his knowledge, inspired by the Marquis de Montalembert. In 1870, he was commanded to control the urban insurrection of Lyon

fortifications had hardly evolved during the 19th century (Pic.2.27-2.28). During the fighting of 1870, they quickly showed their limits: the principle of the "impregnable citadel" could not withstand the war. This led to a rethinking of the stronghold concept, trying to adapt it to the progress of artillery. No more citadels encompass the cities, but the forts had to be distant from them, a dozen kilometers or more from the urban center, to keep the enemy artillery far enough away. Therefore, a belt of forts was created around the stronghold, only a few kilometers apart, to cover each other.

Soon it was shown how this type of stronghold was easily attacked and could be circumvented. Séré de Rivières thought to build, between the main strongholds, other secondary fortified lines, the defensive redoubts, with the specific purpose of mutual protection between the permanent works, creating a real continuous defensive curtain that exploited to the maximum the orographic potentialities of the territory, also leaving "open" and unprotected some passages, with the intent to convey in these points possible enemy incursions, counterattacking laterally by surprise.[105] In this regard, for example, the interruption

and put the city in a state of defense; his work earned him a promotion to the rank of brigadier general in October of the same year. In the fall of 1871, Séré de Rivières was at the head of a reconnaissance campaign of the French defensive situation on the border with Italy. In June 1873, he had the post of secretary of the Comité de Défense. In contrast with General Frossard for a doctrinaire diatribe, he had the opportunity to explain his thoughts about the reorganization of the protection of the borders, conceived as defensive and offensive, fixed and mobile. It was based on a linear fortified system, tending to channel the enemy towards a specially constituted breach and garrisoned by an arresting army; it took into account the evolution of armaments and was primarily concerned with keeping any enemy away from Paris. This conception, inspired by Vauban's, was in part guided by the defeat of 1871: the Vauban-style fortifications, while they had excelled in their time, had proved on that occasion not to be able to stand up to modern weapons and had to be modified. He summarized the doctrine in two writings: "Considérations sur la reconstitution de la frontière de l'Est" (presented to the Comité on June 21, 1873, unanimously adopted and published the following November 15) and "Exposé sur le système défensif de la France" (presented on May 20, 1874, the following July 17 the law on the improvement of the defenses on the eastern frontier was promulgated). In 1874 Séré de Rivières became director of the Engineer Service at the Ministry of War, in charge by General du Barail of constructing a defense system between Dunkirk and Nice. The northern and northeastern frontier was divided into four zones, namely the fortified group on the Jura, fortifications on the Vosges mountains, the works built around the Meuse, and the group to the north between Montmédy and Dunkirk. On the Italian frontier, the old mountain fortresses, those of Lyon and the strongholds of Nice and Toulon, were rebuilt. Replaced for political reasons by General Cosseron de Villenoisy on January 10, 1880, Séré de Rivières saw his successor continue his program, without significant changes, until 1885, when 196 forts, 58 barrages, and 278 batteries were built on the borders and strategic points of the country, at an estimated cost of 450 million francs in construction alone, and 229 million in armaments. Cfr. GABER, 2003; http://www.fortiffsere.fr.

105 GABER, 1994; LE HALLÉ, 2001.

of Charmes located in the Vosges between the strongholds of Toul and Epinal was to direct the enemy on the well-equipped defense of Langres.[106] In addition to all this, a whole series of isolated fortifications called "halting forts" were built, destined to control obligatory points of passage and sensitive objectives, as well as a series of obstacles, i.e., mighty isolated fortresses, scattered in the path of the invaders, to slow down their progression allowing them to obtain a sufficient advantage to field troops in charge of the counter-attack (Pic.2.29).[107]

In June 1874, Séré de Rivières became director of the Ministry of War's engineering department, which allowed him to approve his plan of fortification and release the credits for its construction.

The forts abandoned the principle of the bastion, which had also become obsolete in the face of the evolution of armaments. Could simplify their layout into a polygon surrounded by a moat protected from the fire of flanking bodies called caponieres (evolution of the bastion) organized the forts, built-in brick, and stone around the barracks used to house the garrison and protect it from bombardment. The artillery pieces were placed on the roof of the fort, often in the open. In addition to several strongholds distributed along the borders and a large number of coastal artillery positions, particularly along the Franco-German border were built defensive redoubts (a line of forts joining the strongholds), and a whole series of isolated fortifications called "stop forts," designed to control points of passage and sensitive targets. Examples include the strongholds of Verdun, Toul, Épinal, Belfort in the northeast, Paris, Brest, the two defensive redoubts of the Meuse (joining the strongholds of Verdun and Toul), and the Upper Moselle (from Épinal to Belfort through the Vosges). A third redoubt had been proposed between Dijon and Chagny, with an advanced position at Autun, all to constitute the fortified area of Morvan, but did not realize it. As far as the forts of arrest are concerned, we can mention that of Manonviller (Meurthe and Moselle) to protect the railway Saverne-Paris and Bourlémont (Vosges).

Thanks to the consistent and interesting information found, the examination of the fortified works of the Séré de Riviéres Line allows us to introduce some general considerations concerning not only the planning choices at a territorial scale, adopted concerning the different orographies of the militarized places but also the typological-constructive and distributive assets of the forts themselves. This allows a multiscalar approach to understanding how these peculiarities, common and repeated, highlight the character of repetitiveness that distinguished the fortifications, which by nature were "war machines"

106 GABER, 2003.

107 For a specific discussion of the Sere de Riviers line, see the Schedules in Chapter 4.

and, as such, built according to precise models, adaptable to the places but essentially reproducible. These reflections will be taken up and deepened in the following chapters, in particular in chapter 7. Still, at this time, it is interesting to present the main typological characteristics of these permanent works, which, in reality, were essentially very similar to the fortifications built by other military units.

Like all the defensive works built internationally during the second half of the nineteenth century, in fact, also the French fortified systems experienced a double phase of construction, determined by the introduction of important innovations in the field of artillery around 1885. In the first instance, therefore, will be presented the constructive typology of the forts of "the first generation," built precisely from 1874 until 1885 and similar to the Brialmont and Rocchi models, while subsequently will be evidenced the important modifications that interested such works in the last fifteen years of the XIX century.

The forts of the first generation, not modernized, were mainly made of thick stone walls, covered by thick layers of earth (from 2 to 5 meters) and surrounded by a ditch, 6 meters deep and about 12 meters wide, delimited by a scarp wall towards the inside, to contain the mass of the fort, and by a counterscarp wall towards the outside. Some of these walls were equipped with loopholes for the defense of the moat, entrusted to flanking bodies called "caponiere," built at the ends of the fort, at the level of the bottom of the moat, sometimes simple (one direction of fire), or double (two directions of fire, to defend two portions of the moat). The entrance to the fort was generally from a mobile bridge. Inside the fort's perimeter, there were one or more semi-underground barracks, often built on several levels and intended for the accommodation of the troops, equipped with kitchen, drinking water tanks (fed by rainwater, springs, or wells), and sometimes ovens for baking. Another important place of every fortification was the powder magazine, which centralized the storage of different explosives in a room closed by two triple-lock doors and built to isolate as much as possible the dust from moisture and fire. Often this environment was buried under a large thickness of soil. Thanks to the presence of all these rooms (bakery, kitchen, cisterns, food stores, powder magazines, etc.), the forts conceived by General Sere de Riviers were designed to have an autonomy of a few weeks, to withstand prolonged sieges. The artillery of the forts was most often deployed in the open air, on firing platforms interspersed with reserves, small underground rooms for the storage of materials necessary for the operation of the pieces and the ready-to-use projectiles. The shooting platforms could be located on the barracks' roof or in masonry or armored casemates (Mougin casemates), in other forts in turrets (Mougin turrets). The infantry personnel was composed only by the fort's garrison, able to deploy in specially

prepared positions overhanging the moat. To prevent the assaults of the enemy infantry, this type of fortification abandoned the system of bastions in favor of a polygonal system, that is, surrounding the forts with a dry moat, defended by cannons positioned in the caponieres.

Going into detail about the specific constituent elements of these fortifications, forts built in lowland contexts were usually protected from enemy infantry assaults by the presence of dry moats (not with water), consisting of scarp and counter-scarp walls of approximately 4-10m in height, defended by artillery casemates placed on the angles of the fortification, the caponieres (Pic.2.30).

The entrance to the fortifications was often placed on the side least exposed to enemy invasion, towards the center of the gorge, at the bottom of the moat or the level of the outer ground abandoned the first solution because of the rigidity of the ramp necessary to reach the inside of the fort and for the problems that a central entrance caused in case of /internal bombardment. It was often preferred a solution of isolated and independent entrance, such as Fort de la Drette in Nice or Longcham in Epinal, or an entrance integrated into the structures of barracks or caponieres, as in other coastal structures in Nice or the stronghold of Epinal. In this case, the entrance became a real building with rooms that served as guardhouses with fire ports, armored doors, gates and metal bridges to cross the moat. Before 1886, except for a few exceptions such as the fort of Mont-Vaudois near Belfort or Tamié near Albertville, every fortification had a single entrance, without planned escape routes, but in the following years were introduced other entrances/exits of security called “entrances of war” and placed at the bottom of the moat, built in concrete to better resist bombing. To cross the moats a drawbridge was always inserted, consisting of a mobile part that bent against the entrance using balancing guaranteed by several counterweights (Pic.2.31).[108] The powder magazine is an essential part of the fort where black powder is stored, which is the main explosive for artillery, at least until 1885. The sizing is based on the type and number of artillery pieces in the structure. The warehouses were built in stone

108 There were various models of operation including: lower oscillation (Uxegney fortresses, Great Hague, Vaux ....); lower oscillation improved by General Tripier (Drette Forts, Tamié ...); the Devèze system (Sanchey battery, Girancourt, Troyon, Blénod forts . ...); the Poncelet system (Trondes, Saint-Michel, Domgermain, Tournoux forts ...); the Ardagt-Pilter system (Villey le Sec northern battery, Lucey fort ....); the Ardagt system (Mont-Chauve de Tourette fort). The lateral slide bridge was instead a typology often found inside the entrance building and consisted of a mobile part that moved on rails and lowered to a depth of about 4/5 metres, creating a sort of pit. Examples of this type were included in the Forts of Parmont, Fly, Saint-Priest. The longitudinal bridge, on the other hand, ran through the entrance passage and thus opened up a space above the moat (as in the Forts of Gondreville, Vancia, Feyzin...). See GABER, 2003; http://www.fortiffsere.fr.

and consisted of a dry storeroom, an entrance, two ducts parallel to the storage chamber, and an underground space below the warehouse. All this was functional to create a decompression space in case of accidental explosion and ensure excellent natural ventilation (black powder could not stay in damp places, even today, powder magazines are often dry places). Furthermore, every smallest detail was designed to avoid accidental explosions: the oak floor was raised to promote air circulation, the door hinges and metal parts were made of bronze, to prevent any spark could be fatal, there were two security doors with different locks, lighting was designed only with the use of mirrors to bring sunlight into the building, while at night lighting was provided by lamps running on rape oil, protected and closed behind windows and glass 2 cm thick.

As already introduced, the polygonal fortifications were protected by dry moats, which, in turn, were defended by casemate constructions placed at the bottom of the moat itself: the caponiere had precisely the task of defending the moat, on one side or both sides. The outer part was usually surrounded by a moat in which inserted obstacles. At the same time, it connected the inside of the caponier with the central structure of the fortification through galleries.

In the forts of the first generation (until 1885), at the center of the fortification, there were the residential rooms, or barracks, built-in masonry with massive walls of great thickness, even more than 1 meter. They were often underground constructions, in which the floor was covered by a layer of earth ranging from 2 to 7 meters thick, whose task was to cushion the impact of any bombing. The casemates were continuous and the facades less exposed to enemy fire often had openings to ensure a minimum of lighting and natural ventilation. The same gaps were then closed and masked through the use of railway sleepers and wooden planks, according to different types of shielding to avoid both bombardment and the entry of rubble (Pic.2.32). At night or during combat, lighting was provided by oil lamps or hanging lamps. Soldiers' rooms had to be about 6 meters wide, with length varying according to the number of men they were to contain. The cots were in pairs on two floors, arranged in two rows (about 2m long, 1.5 wide, and 2.10 high) with a central corridor of at least 2 meters. In the center of the room, a module-bed was left free to insert a regular stove or a unique heater, both for heating and ventilation. Usually, the length of the rooms was about 16 meters (52 men) or at most 18.30 meters (60 men) (Pic.2.33-2.34). In addition, it somewhat protected buildings from infiltration through cementitious or asphalt screeds to evacuate water to downstream areas and otherwise to the back walls.

These aspects, explicitly concerning the French fortifications designed by General Séré de Riviéres, denote particular attention to the

technological-constructive elements to guarantee, as far as possible, acceptable conditions of habitability and healthiness for the soldiers who were to live there. Even though the technological solutions sometimes differed, the same measures were also adopted by the other Military Geniuses to construct the fortifications of other countries, which is testified to by the project documentation conserved in the Historical and Military Archives.[109] The strongholds of the Sere de Riviers line were genuine fortified citadels inside. As already mentioned, there were not only the soldiers' rooms but also some activities more related to the life of the community of soldiers. Inside the casemates, there were the soldiers' rooms and the various laboratories, the infirmary, the prison, the command post, the telegraphy, the kitchen, the food stores, the bakery, and the stables.

The bakery was divided into two parts: bread was made and baked, and the other stored bread for at least three days before could eat it. Each fort had an oven for production, except for a few places where one range served multiple forts (as at Epinal). The size of the stove depended on the number of soldiers present in that particular fort. It counted the bread in "rations" (1 ration = 2 soldiers): the most many ovens could produce 380 rations per day or feed about 760 soldiers. From a constructive point of view, the stove was made of refractory bricks (with a high percentage of alumina), covered by a layer of sand, and closed by a cast iron lid. The baking of bread very often made it possible that heating water for various other uses of the bakery.[110] Prepared garrison meals in one or more kitchens, which were located in the barracks of the fortifications, were equipped with a sink, a countertop, a coffee pot, and one or more kitchen appliances. These rooms were usually close to food stores supposed to supply provisions for the garrison for a three- to six-month post. There was mainly flour stored in 50 kg bags in these stores for the works equipped with a bakery, legumes (beans, split peas, lentils) in 80 kg bags, refined sugar in 185 kg boxes, war cookies in 50 kg boxes, and rice in 60 kg bags. Naturally, all these rations had to be stored above ground protected from moisture... In addition to these foods, there was salted meat, canned bacon, barrels of wine, oil, and brandy.

If the site permitted, it supplied water by creating wells, estimating consumption of about 5 liters per day per soldier and 35 liters per horse. If the water table was too deep, it was not possible to dig and build a well, so the water had to arrive by rail, while always was provided an ingenious system of recovery of rainwater. If there was a surplus of

109 Some of these aspects will also be explored in Chapter 7, specifically, for example, in relation to the fortifications built by the Austro-Hungarian Empire.

110 After the torpedo crisis, the (brick) ovens also became vulnerable to bombardment, and so in many cases portable sheet metal ovens were built, of which practically no trace remains today. See http://www.fortiffsere.fr.

water available, it had to be stored in tanks for possible needs or to ensure water during the siege for at least 3-6 months. To keep this water in good condition, it was filtered by a laboratory using filters with sand, gravel, and activated carbon, and then stored in masonry tanks (before 1885), except at Fort de la Grande Haye at Epinal and Fort Liouville near Commercy, where metal tanks were placed.

As far as latrines were concerned, they were usually located inside the central building but in a defiladed position concerning the lodgings, to avoid odors and to guarantee a better salubrity of the environments, which also implemented with the insertion of fans for air changes after what happened in Liege and Namur (Pic.2.35-2.36). But, unfortunately, there was no sewage system to avoid destruction during the bombings and the consequent lack of use of the same: the restrooms, therefore, discharged directly into pits sized for about one cubic meter/man, which were periodically emptied about every three months.

Between 1883 and 1885, the already mentioned revolution in the field of artillery with the introduction of new materials, notably the rifled barrel in the cannons and the invention of picric acid (melinite), highlighted how all the fortifications built until then were inadequate to resist the destructive power of the new weapons.[111] While waiting for new solutions and economic support, some forts were partially reinforced by placing a layer up to 2.50m thick of concrete on the bodies of the barracks, placing the heavy artillery pieces outside the buildings, and decentralizing the ammunition, previously stacked in the central powder magazines, in various external deposits deeply buried to be safe from the most potent bullets.

Towards the end of the century, a new solution for reinforcing the permanent works became increasingly popular, developed thanks to discovering a special cement that offered sufficient resistance to the new explosives. The decision was made to choose some of the forts already built and to modernize them with this new "structural skin" in reinforced concrete (for example, the strongholds of Verdun, Toul, Épinal, Belfort, and Maubeuge), and to downgrade others. Some forts began to be covered with concrete to protect essential structures such as barracks. The buildings started to be increasingly buried, especially the powder magazines, a susceptible point in the forts of the first generation. In some cases, they built new concrete barracks next to the existing masonry ones (Pic.2.37). The caponieres, judged too fragile, were replaced by counterscarp tunnels (Pic.2.38); less exposed than the caponieres, these tunnels were part of the counterscarp wall itself and

111 The bricks were no longer strong enough, and the artillery pieces placed on the superstructures had become extremely vulnerable. A response to these new threats had to be sought. See previous sections and Chapter 7 for more details.

led to the fort using an underground tunnel that passed under the moat. Thanks to the constant progress of the iron and steel industry, various types of metallic armor began to appear more and more frequently, and these were often used to protect the artillery pieces positioned on the roof.[112] Although reduced in the number of pieces, the forts maintained all their firepower: one amount under turret alone was equivalent to an entire battery, or four parts in the open air. Retractable turrets also reinforced the infantry armament for machine guns and searchlights; the observers were also placed in armored positions.

From a typological point of view, the main fortifications were adapted with the construction of new entrances, called the "war entrances," made of concrete resistant to new bullets and, positioned at the bottom of the moat, often equipped with a drawbridge or a side gate that had no fixed part (fixed bridge). This bridge crossed a small moat of obstacles that served to prevent access to enemy infantry. These entrances also had an armored door and a guardhouse and were protected by the moat artillery bunkers, i.e., caponieres and other emplacements.

After 1885, complex interweaving of barbed wire and wire netting consisting of metal "pig-tail" elements and barbed wire began to be constructed around each to create obstacles that could block enemy infantry assaults. In addition to this, numerous defensive grids designed to be impassable and to resist bombardment for as long as possible were inserted. These grids were often placed to protect the fort's entrance, the top of the ditch artillery casemates (caponieres or counterscarp casemates), or replace the escarpment wall. While before 1885, only

112 In 1875, with the work of, among others, Commandant Mougin, the armour plating took shape. The first to be installed were the laminated iron casemates (Mougin system); built in groups of four in three of the forts of the Upper Moselle redoubt, they were designed to house a 138 mm Reffye cannon and were armoured to withstand field guns. Rolled iron proved somewhat weak against the new armaments and especially against siege artillery, so Mougin proposed an evolution of his casemate, built of cast iron and designed to resist siege artillery; ten examples were installed, equipped with 155 mm L Mle. 1877. But even cast iron showed its limitations in the face of the new weapons; attempts were made to modernise some turrets, but most remained as they were originally, quickly outdated. The use of cast iron was abandoned in 1882.
From 1885, serious consideration began to be given to the problem of armour plating, and a number of prototype armour plating (essentially turrets) were built using the steel developed by Schneider & C. at that time. Of all the prototypes, the turret finally adopted was the Modéle 1890 for two 155 mm long-barreled cannons designed by Captain Galopin. This turret, technically very complex, proved to be highly efficient. However, only five were installed due to the very high cost of manufacture. Nevertheless, we can note that the prototype turrets developed for the various tests were kept and installed in different forts of the Sistema Séré de Rivières. Because of the cost of the two-barrel Galopin turret, the inventor developed a smaller and cheaper version, adopted in 1907, for a 155 mm cannon with a shortened barrel. Twenty-two were to be installed before 1914, but only twelve were ready when war broke out. Certainly effective, this turret sported the best armour of its era. See GABER, 2003; http://www.fortiffsere.fr.

a few forts had counterscarp casemates at the bottom of the ditch. Later, when the caponieres became vulnerable to new projectiles, such concrete counterscarp constructions for extreme ditch defense began to be built more often. These structures were nothing more than artillery casemates built into the counterscarp walls, usually connected to the fort by underground passages under the moat. The concrete-built quarters included rooms for men, officers, and non-commissioned officers with the necessary accessories of living quarters, kitchen, lavatory, cistern, and well. But, unlike the old barracks that could receive the entire garrison, these structures involved a considerable expense and therefore, very often, were designed to accommodate only 1/3 of the garrison or in rare works, as in the forests of Great Hague, Douaumont, or Vaux, 2/3 of the soldiers. After 1900, the capacity of the concrete barracks increased in a large number of works, and this was done by no longer using, for example, four single beds, but by setting up dormitories in which fixed, beds were not even assigned. The various entrances of the concrete buildings, which led to the outside, were closed with important armored doors that had to resist explosion and shrapnel. So, at night or in combat, the rooms' lighting with oil lamps hung from the vaults. They connected these lanterns to zinc chimneys that evacuated the exhaust gases to the outside to avoid contaminating the air of the rooms. Although the heating and ventilation of the rooms were similar to the old barracks, ordinary stoves provided them.

In the light of the above considerations, one can understand that particular organized the western front of the French border with defensive works that made the attack very complicated. Precisely for these reasons, in fact, at the outbreak of the Great War, the forces of the Triple Alliance decided to bypass these works and to launch the attack through Belgium following the Schlieffen plan, invading a neutral country that had the support of the United Kingdom, the leading fleet in the world.

As previously explained, the beginning of the war saw the Belgian forts fall one after the other under German artillery pieces of huge caliber (420mm), with a much stronger destructive power than the class of resistance envisaged by Brialmont (max 270mm). To make matters worse, moreover, the Germans used to blow up entirely the forts under attack to make the French believe that the destructive power of their weapons was even stronger than it was. After the fall of the strongholds of Liege and Namur, the Germans advanced towards the north of France, where the forts of Reims, Laon, La Fère, Hirson, and many others, downgraded for several years, were not able to slow down the German advance that, on the contrary, continued decidedly taking possession of these structures to want to use them as strongholds and reference posts for the passage. After the German army was repulsed before arriving in Paris began a period of stasis in which the entrenchment of the

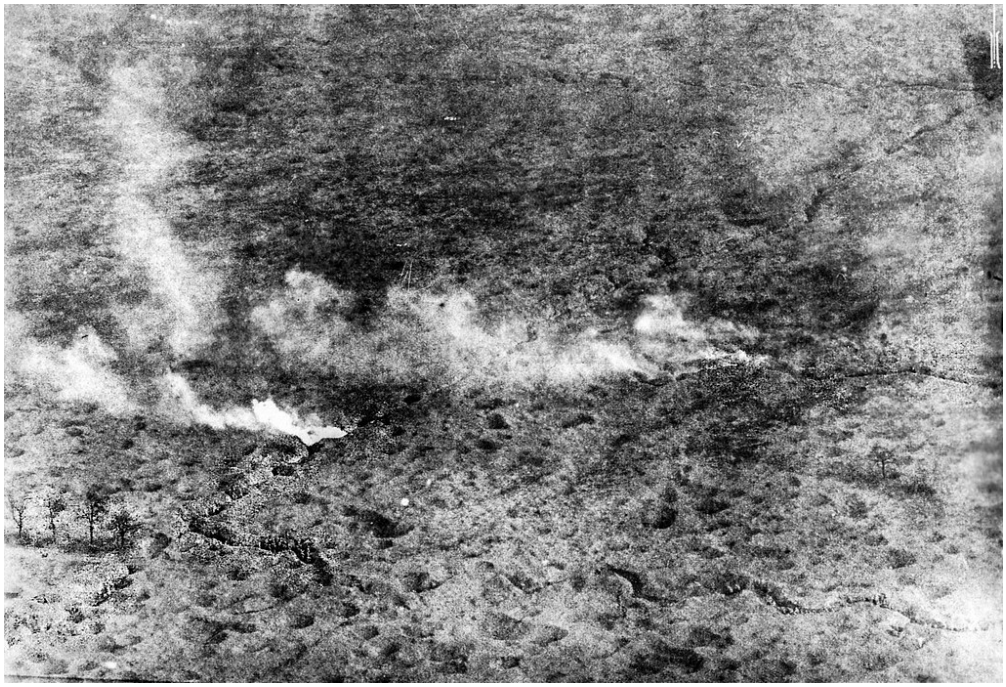
battlefield began, from war of movement to war of position. The whole situation led to the decision, in 1916, to undertake a new decisive battle at the stronghold of Verdun, an entrenched field very dear to the French.

The battle of Verdun was one of the bloodiest of the entire conflict, during which the Germans fired almost 2 million bullets for two consecutive days using 1225 artillery pieces, including 542 large-caliber howitzers:[113] the two principal forts of the stronghold, Fort Douaumont, and Fort Vaux, quickly fell after fighting even hand-to-hand inside the structures. Also, other works attacked, such as the forts of Vacherauville, Moulainville, Laufée, and many others, demonstrated an exceptional defense, despite the German artillery made life impossible and even managed to pierce the thick layer of concrete. Nevertheless, the various bombardments of the enemy had devastating effects on the fortifications, whose masonry structures could not withstand bullets over 210mm, and even facilities modernized with special concrete or reinforced in general could only withstand bullets up to 305-380mm, collapsing under heavier artillery. The effects of bombardment with 420mm bullets, in fact, systematically perforated the reinforced concrete if it was less than 1.60m thick. At the same time, it could meet with more excellent resistance if the particular concrete bank rested on a meter of sand.

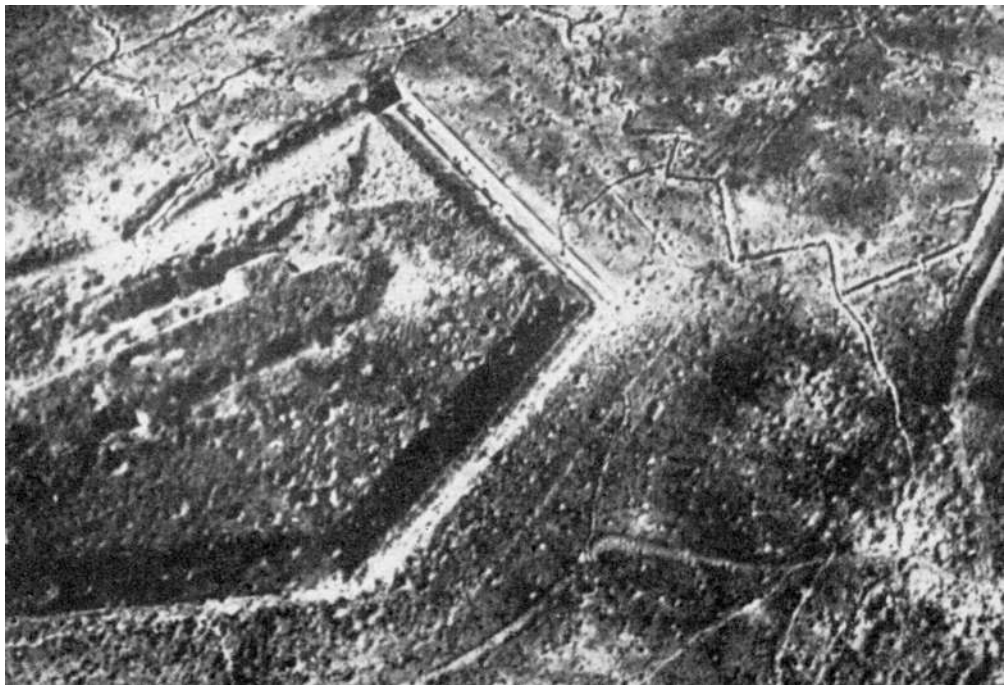
In any case, the troops, worried about the resistance of the concrete, began to entrench themselves by creating vast networks of tunnels under each fort to connect the various parts undercover and use them as lodgings. New entrances to the forts were opened, further back and less exposed, and machine-gun posts were set up protected by light armor (Pamard casemates). These works were called "works of '17" (because they were primarily carried out in that year). They foreshadowed the evolution of the fortifications towards the "all underground" of the 1930s and the Maginot line.

113 MONTACIE, 1997; DONNEL, 2011; KALUZKO, MEYER, 2014.

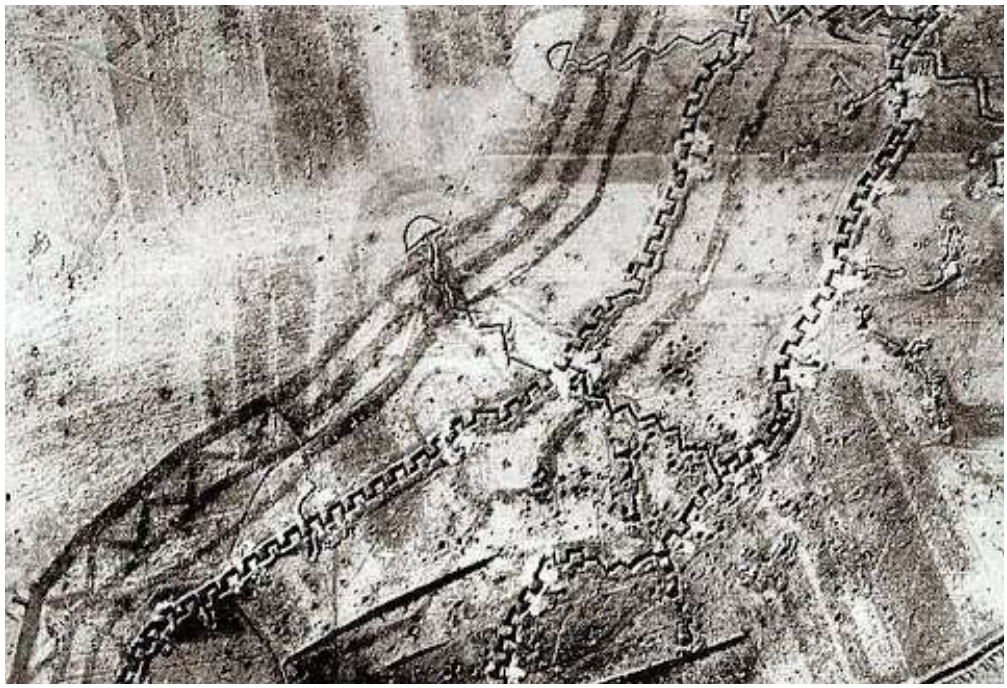
La Somme Battlefield
Wartime



La Somme Battlefield
Wartime



Fort Dauaumont - Verdun -Wartime



Cambrai Battlefield - Wartime

La Marna Battlefield
Wartime

Fort Souville
Wartime

Fort Vacherauville
Wartime

Fort Saint Michael
Wartime

Fort de Trondes
Wartime

2.2. From the "risk of loss" to the "need for care": analysis of the status quo of design, places, and artifacts

As presented in the previous chapter, one hundred years ago, the "signs" of the conflict that were stratified on the territories of the whole of Europe were reciprocally interrelated by an articulated connective tissue of physical infrastructures but also of visual connections that, as a whole, substantiated the functioning of the great "war machine." Since the post-war period, new traces and meanings have been stratified on these networks of relations, thus contributing to the definition of what is now universally recognized as a "fragile and highly complex cultural heritage":[114] massive and potent works, evidence of the most modern developments of the fortification culture, and more fragile and minute signs in terms of physical consistency, but of no less strategic and symbolic importance.

To better understand this heterogeneous heritage, it was necessary to focus on a complete picture of the status quo of places and artifacts and the different methodological approaches adopted in the various projects and interventions carried out, concluded, or in progress.

To understand how the heritage of the Great War can continue to narrate its "being in time" and also be a concrete and active resource for local economies, this general survey has been an important opportunity not to advance criteria of judgment concerning what has been done so far, but to identify potentialities and weaknesses on which to reflect to develop future strategies.

In this sense, some interdisciplinary projects promoted by the European community on the occasion of the Centenary were first briefly outlined. Then some summaries of a representative sample of fortified works belonging to the various countries involved in the conflict were elaborated.

To outline an overall picture of the current state of these relics, planning and protection interventions on specific assets have not been examined in detail in this first phase but have been analyzed in their essence through a general reflection of synthesis on the diversity of "attitudes" adopted concerning the criteria of intervention on the pre-existing structures.[115]

114 BATTAINO 2006; QUENDOLO, 2014; QUENDOLO, 2017; ALDRIGHETTONI, QUENDOLO, 2019.

115 If by Restoration we mean "that specific area of architectural culture aimed at disciplining interventions on urban and environmental building resources, with the primary purpose of guaranteeing their historical and cultural integrity and physical protection, the ways of understanding the implementation of this <guarantee> have historically proved to be different and sometimes completely opposed". See LA REGINA 1992.

2.2.1. The "Great War Centenary " as a breeding ground for interdisciplinary initiatives

The general framework of the initiatives promoted at an international level one hundred years after the outbreak of the First World War is rich and varied, studded with interdisciplinary research, memorial initiatives, and didactic activities, developed individually by individual countries on a global scale and by their mutual collaboration. This articulated archipelago of initiatives, regardless of their specificities, has, first of all, had the great merit of re-establishing, albeit ideally, a dense system of relations at the international level, very similar to those visual and intangible networks that substantiated the fortification projects of Europe a hundred years ago.

On the occasion of the centenary of the Great War, the network has increased numerous sites regarding the conflict in its diversity of historical, political, socio-economic, and anthropological aspects and those explicitly concerning the nature of the physical remains of the war.[116] Before going into the specifics of the projects that have dealt with the restoration/recovery/enhancement of these vestiges, here is a brief list of some international and community projects of particular relevance.

- Europeana Collections 1914-1918;
- Europeana 1914-1918 - untold stories & official histories of WW1;
- European film gateway;
- 1914-1918. The Great War and the Shaping of the 20th Century;
- 14-18. La Mission Centenaire
- World War One at Home;
- First World War at the National Archives
- Great War
- Centenary News
- First World War Centenary
- 1914-1918-online - International Encyclopedia of the First World War
- Centenary 1914-1918
- Great War RAI
- 14-18. Documents and images of the Great War
- WW1- inside the Great War
- Trentino Great War
- The Great War +100
- Veneto Great War
- 1915-1918. The memory of people in the Great War
- 100 hundred years Great War

116 Cfr. PADOAN 2015; CORAZZA, 2016.

Just as an example, some of these projects are presented below.

The Europeana Collections 1914-1918 project, started already before 2014, represents a valuable digital collation of more than 400,000 documents related to the Great War in digital format (leaflets, videos, newspapers, books, photographs) made available by the archives of ten national libraries, veterans' associations and other partner institutions of European countries participating in the conflict (at the Italian level, the participating institutions are the Biblioteca Nazionale Centrale di Roma, the Biblioteca Nazionale Centrale di Firenze and with the Istituto Centrale per il Catalogo Unico delle biblioteche italiane). The initiative provides scholars and enthusiasts with the opportunity to conveniently access online a series of rare and fragile materials that otherwise could only be consulted in person in the various reading rooms of the institutions themselves. The digital collection includes specific books, newspapers and trench diaries, maps, fortification projects, posters, propaganda leaflets and pamphlets, and an extensive period photographic archive.

Europeana 1914-1918 - untold stories & official histories of WW1 is instead a database that combines documents from libraries and archives all over the world with "family histories", memories and personal heirlooms made freely available thanks to the spontaneous and voluntary participation of families who, directly or indirectly, experienced the war. The project's objective is to try to reconstruct a narrative thread that focuses on the private dimension of history, collecting a rich set of written testimonies, diaries, letters and photographs kept by the individual families of veterans or soldiers who sacrificed their lives during the conflict.

The European Film Gateway project consists of a portal through which scientific researchers and film enthusiasts can quickly access hundreds of thousands of historical film documents preserved in European archives and film libraries: photos, posters, programs, periodicals, censorship documents, rare films and documentaries, newsreels and other materials. Once again, the European initiative is based on the participation of national archives and institutions, associations and other partner institutions from the European countries that participated in the conflict (in Italy, the Cineteca dell'Istituto Luce in Rome, the Cineteca di Bologna and the Cineteca del Friuli are partners in the project).

The Mission Centenaire is the official French website of the Centenary and has as its central objective the coordination and systematization of the commemorative initiatives planned until 2018 throughout the country. The site is also a platform rich in documents and articles about the Great War in France and the world, with links and connections to other areas of interest and archival collections (such as RetroNews.fr, a group of newspaper articles about the First World War). In addition, the site has a page dedicated to seminars and conferences, as well as a space dedicated to educational initiatives. The themes presented are varied, but no particular section devoted to civilians and women emerges.

World War One at Home is a site of the BBC has dedicated a vibrant section of documents, constantly updated. We find articles on various topics and a rich calendar of programs devoted to the commemoration of the Great War. In addition, with the collaboration of the War Imperial Museums group and the Arts and Humanity Research Council, the site offers audio and video materials of various types and collected by themes, including: technology, refugees, recruitment, wars

in the air and sea, the role of women, children, horses and other animals in battle, and civilians. It thus appears to be a more balanced site and not exclusively devoted to events at the front. The very title given to the site, World war one at home, is intended to emphasize the effects on the home front and civilians (men, women, children, animals) in the United Kingdom.

The predominantly historical-anthropological character of the projects presented may seem distant from the specific interest of this research project, but worrying about the fate of the works of human endeavor and the preservation and protection of its value of testimony, can only move from a deep and as complete as possible knowledge of the complex set of works of which we want to "take care". In other words, this means analyzing the different "war landscapes" from different points of view and being willing to integrate knowledge and theoretical-operational contributions also coming from other disciplinary fields, to build a solid cognitive base from which to elaborate and set future intervention strategies in terms of protection, valorization and transformation. In this perspective, therefore, it is evident how all the initiatives previously presented have increased the possibility of drawing on a wide and articulated information basin of varied documentary sources, essential to be able to build this path of knowledge.

With the same objective, a representative sample of fortifications was selected for each country and analyzed to elaborate a reference case study to begin to understand the different approaches and attitudes adopted regarding the different criteria of intervention on the pre-existing structures. However, before entering into the details of examining this "sample case study", it is necessary to make a general reflection to frame the normative horizon within which the different projects have been able to take place.

2.2.2. Reference framework: from the international scale to the "Italian case".

All the initiatives that have concerned the "testimonies linked to the territory," both on a national and European level, represent the point of arrival of a long and articulated cultural journey that began immediately after the war and developed over time, according to different approaches, methods, and evolutions from country to country.

If in the aftermath of the Treaty of Versailles, the need to create forms of memory and celebration in honor of fallen soldiers was a widely shared priority, with time, the pain inflicted by the conflict went more and more to fade, replaced by the other tragic events that marked the years of World War II. After World War II, a new attitude towards the remains of the Great War began to take shape, based on recognizing the value of historical evidence of the theater of the conflict as "places

of memory."[117] Therefore, the first historical paths of memory began to be conceived and realized with a vigorously evocative character, aiming at letting tourists and visitors get in touch with the experience guarded by the remains through experiential paths that crossed the original front lines, the trenches, the battlefields, the cemeteries built in situ.[118] This trend has had the great merit of starting an intense and fruitful cultural journey at the international level, which has been characterized by a growing demand for knowledge and conscious use, driven by the concern for the "risk of loss" of heritage as vast as it is full of values. This has stimulated the acquisition of a growing awareness of the "value of testimony" embodied in the remains of the Great War and the consequent need to "take care of it" with protection interventions and, at the same time, enhancement.[119] Unlike many European countries, where this awareness has been translated into the inclusion of any recovery/restoration/enhancement interventions within the scope of common urban protection practices or landscape authorizations, in Italy, this vibrant and active cultural climate has prepared the ground for the promulgation, in 2001, of a specific law (nr.78) on the "Protection of the historical heritage of the First World War": an essential legislative document that recognizes the "historical and cultural value of the remains of the First World War" and promotes the recognition, cataloging, maintenance, restoration, management and enhancement with a light, low-regime approach to protection.[120] The fact that Italy was the only country to elaborate a normative act of national scope for the safeguard and protection of this group of works is particularly significant and certainly linked to the innate predisposition, all Italian, to adopt cautious or at least analytical attitudes in the act of approaching the "objects of the past." The objectives proposed by the indications of law 78/2001 and by the relative "technical-scientific criteria," in fact, essentially refer to non-alteration and minimum

117 The concept of "place of memory" derives from the French "lieu de memories", a term extensively studied by P.Nora in his work Les Lieux de Mémoire, Paris, Gallimard, 3 vols. 1984-1992 in which he associates this term with a series of real and symbolic places, monumental or linked to the landscape. Over time, the concept of "place of memory" has developed according to geographical and disciplinary contexts, becoming a fundamental aspect for preserving the vestiges of the Great War. For a specific study of this theme, see Chapter 5. Cf. NORA,1984-19.

118 These include, for example, all the routes of remembrance along the entire front line, but especially in Flanders, Belgium and France, on the fields where the main battles of the First World War took place, such as the Ypres salient, the Meuse line, the plains near Verdun and the Somme, to name but a few.

119 See Chapter 3.

120 A specific analysis of this national law will be proposed in the following paragraph. See RAVENNA, SEVERINI, 2001; BERNINI, 2015.

intervention criteria, clear repercussions of the theoretical debate of the current discipline of architectural restoration at a national level.[121] In confirmation of this, the elaboration of the first interventions of recovery for museum purposes of some places of the Great War[122] began in the '70s, at the same time as the "Copernican revolution" that invested the discipline of the protection of monuments, promoting a growing interest in material culture, recognizing in the matter signed in time and space. Informative potential to be preserved and transmitted to the future.[123] Therefore, the examination of Law 78/2001 is of central importance not only to understand the horizon of meaning in which the different projects on the tangible heritage of the Great War have been elaborated on a national scale, but also because the analysis of the principles and processes that have stimulated its promulgation outlines the theoretical-disciplinary observatory in which the research presented here develops, and defines the lens through which an analytical-critical

121 The advisability of altering the authentic work of art as little as possible, already expressed in the field of painting in the 17th and 18th centuries, was extensively argued, with reference to architecture, by the English critic John Ruskin who, in 1849, without formulating a rigid axiom, called for the maximum containment of restoration work to guarantee the greatest material permanence of the work. Fully adopted by the theories of restoration in the late nineteenth century and the first half of the twentieth century, the concept of minimum intervention has particularly oriented scientific research since the 1960s and 1970s, while it has been contested by the late proponents of restoration and by some designers of the new, both indifferent to the persistence of the material datum of ancient buildings. FIORANI, 2010;

122 This theme will be further analysed in the chapter dedicated to memory/remembrance... now we focus exclusively on recovery/restoration/valorisation projects.

123 In the 1970s the discipline of monument restoration was characterised by the development of a new current of thought that recognised the "conservation of material consistency" as a necessary act to safeguard the value of historical testimony of a given artefact. While continuing to recognise the monument as an "unrepeatable document", as was the case in the field of critical restoration, from this moment onwards the physical location of the "signs of the past" to which the object bears witness is identified as its material consistency. In other words, the material becomes the tangible place in which the signs carrying messages are deposited, in a unique and unrepeatable way, and which must therefore be conserved in order to preserve the "possibilities of knowledge". Architecture is thus considered a testimony to history, not of a particular moment or a well-defined formal expression, but a "stone document" to be safeguarded in all its complexity. This logic also radically changes attitudes towards restoration work, which from this moment onwards gives greater importance to "material culture" and aims to recognise and conserve its multi-layered nature, reflecting the experience of the building itself, opening the way to possible respectful work and projects that do not penalise the existing structure but establish a dialogue with it. See LORUSSO, CARBONARA, GENTILE, 2002; QUENDOLO, 2006; SETTE, 2006; DOGLIONI, 2008; SETTE, 2009; DI BIASE, 2010; NIGLIO, 2013; SETTE, 2018; QUENDOLO, 2018.
This attitude within the discipline of architectural restoration is also reflected in the attitude adopted towards the relics of the Great War, as will be further explored in Chapters 3 and 5.

approach of the remains has been set up also on a supranational scale.

Briefly reviewing the context of reference that led to the promulgation of this law, it is necessary to start from the immediate post-war period, when the Italian Ministry of Defense was concerned with identifying "some of the most conspicuous areas for glory of the theater of war 1915-1918" with the Royal Decree-Law issued by the Government in 1922 was the first legislation to address the protection of war sites, recognizing that the four areas of Pasubio, Grappa, Sabotino, and San Michele had the fundamental value of historical testimony and collective memory to be protected and preserved. Almost half a century later, once the Second World War commemorations were over, the law of June 27, 1967, no. 534.[124] Briefly reviewing the context of reference that led to the promulgation of this law, it is necessary to start from the immediate post-war period, when the Italian Ministry of Defense was concerned with identifying "some of the most conspicuous areas for glory of the theater of war 1915-1918" with the Royal Decree-Law issued by the Government in 1922 was the first legislation to address the protection of war sites, recognizing that the four areas of Pasubio, Grappa, Sabotino, and San Michele had the fundamental value of historical testimony and collective memory to be protected and preserved. Almost half a century later, once the Second World War commemorations were over, the law of June 27, 1967, no. Five hundred thirty-four resumed the discipline introduced by the decree-law of 1922, recognizing the character of "monumentality" to the area of Castel Dante in Rovereto, to Mount Cengio and Mount Ortigara, and entrusting the perimeter to a decree of the Minister of Defense to be issued, however, with the collaboration of the Minister of Education, that is the figure in charge of the protection of cultural heritage at that time. This was an essential sign of the awareness reached in recognizing the remains of the Great War as significant works belonging to the "historical and artistic heritage of the Nation," as it will be defined in the following years.[125] The law of 1967 was further extended by the law of December 5, 1975, n.719, which recognized the application of

124 Law No. 534 of 27 June 1967, Recognition of the area of Castel Dante in Rovereto and the areas of Monte Cengio and Monte Ortigara as "monumental" under Royal Decree-Law No. 1386 of 29 October 1922, converted into Law No. 985 of 16 June 1927.

125 With this formulation, the Constitution alludes to both public and private property, which must be protected and enhanced for the cultural and artistic memory of the nation. Article 9 of the Italian Constitution states: 'The Republic promotes the development of culture and scientific and technical research. It protects the landscape and the historical and artistic heritage of the Nation", i.e. the cultural assets, which are all those movable and immovable assets that are of artistic, historical, archaeological, ethno-anthropological, archival and bibliographic interest and the other assets identified by law or on the basis of the law as evidence of the value of civilisation.

the royal decree also to the area of Punta Serauta of Marmolada.

However, it is only since the '70s that, to cope with the fragile state of preservation due to the natural degradation of the materials. In addition, to the real massacres carried out by the recovered men, the first interventions of recovery, for museum purposes, of some essential war contexts began (such as the work campaigns in the area of Ortigara and Mount Cengio, or the realization of the "Path of Peace") in a completely new perspective, focused more on the historical preservation than on the sacralization so common in the years after the First World War. Therefore, with time, the interest in the recovery of a memory of the Great War based not on commemorative rhetoric manipulated for political purposes but on the preservation of the remains' authenticity has increased more and more. This has also been achieved thanks to the different specific regional regulations (such as in Veneto, Trentino, and Friuli Venezia Giulia) and the media and cultural reverberation committed to numerous conventions, research, and projects, and recovery activities that followed one another with varying intensity[126] In this regard, a first significant contribution was made by the law of the Autonomous Province of Trento, February 14, 1980, no. 2 (New provisions on the cataloging of the historical, artistic, and famous heritage of Trentino and its inventory).[127] However, the first organic and structured intervention is that of the law of the Veneto Region December 16, 1997, nr. 43 (Interventions for the census, recovery, and enhancement of the Great War's particular historical, architectural, and cultural heritage)[128] which represents the most direct precedent of the state law no.78, promoting the identification, census, cataloging, recovery, and valorization of the assets related to the First World War, and containing an indicative list of the types of assets to which the discipline had to be applied (forts, strongholds, field fortifications, tunnels, entrenchments, etc.) of an illustrative and non-exhaustive nature, to include all the traces left on the territory by the front line. This passage, which will later include in the national legislation, is of fundamental importance as it introduces the overcoming of the criterion linked to the particular importance of the single good, recognizing

126 MALATESTA, ANZOIDE, 2009; QUENDOLO, 2014; FONTANA, 2015; ZADRA, 2015; LEONI, 2017.

127 This law, designed to promote the cataloguing of Trentino's historical, artistic and popular heritage, expressly indicated the "assets having a historical relationship [...] including the large military fortifications up to the First World War".

128 In the Veneto region, the first attempt to draft legislation for the protection of historical memories of the First World War dates back to 1995, when an initial text was approved but stopped by the Government, which assumed that its own competences had been infringed, and was then re-approved with the appropriate amendments two years later.

the importance of every material trace instead as an integral part of a system characterized by a value of deserving testimony protection. The Venetian law was followed by the laws of the Autonomous Region of Friuli-Venezia Giulia May 8, 2020, no. 10 (Interventions for the protection, preservation, and enhancement of the fortified architecture of Friuli-Venezia Giulia) and July 21, 2000, no. 14 (Rules for the recovery and enhancement of the historical and cultural heritage and sites related to the First World War).[129] In this scenario, therefore, an essential point of arrival and at the same time the beginning of a renewed way of recognizing the historical and cultural heritage of the Great War, is represented by Law n.78 of March 7, 2001, regarding the "Protection of the historical heritage of the First World War (also called Monticone Law from the name of the proponent, the then-Senator Alberto Monticone). Law n.78/2001, which defines the general framework of reference, was then flanked in 2002 by the enactment of Legislative Decree 283/2002 concerning the "technical and scientific criteria," in which the legislature defines in more detail the recognition, cataloging, maintenance, restoration, management and enhancement to be implemented on the set of relics defined by lawn. 78/2001.[130] Since 2010 is in force the D.lgs. nr 66/2010[131] which regulates the organization, functioning, and tasks of the military defense and the Italian armed forces, grouping the various previous norms into a single code, including the multiple laws identifying monumental war zones and Law 78/2001.

Law 78/2001: critical examination and reflections

Article 1 effectively condenses the general principles introduced by Law no. 78/2001, which recognize the vestiges of the First World War as having a "historical and cultural value" to be protected from any intervention to "alter their material and historical characteristics."

First of all, the introduction of the word "vestige" reflects the significance that is recognized to this articulated set of "objects" listed

129 Both laws are well-constructed and organic and present interesting profiles not only in terms of the wide range of interventions that the region is called upon to support, but also for the variety of institutional instruments and the rich interweaving of values (protection of heritage, enhancement of the territory and communities, tourism, education) that come into play.

130 He decides to distinguish between maintenance, conservation and restoration, although the definition of conservation given corresponds to that of restoration within the Italian Charter for Restoration.

131 Legislative Decree 15 March 2010, n.66: Code of Military Order.TITLE II, Chapter VI ''monumental war zones, historical heritage of the First World War[...], Section II '' Historical Heritage of the First World War ''

in article 1, paragraph 2: transcending the etymological meaning of the term vestigium as "sign left on the territory by walking," and therefore synonymous with a footprint, trace, marker sign, the expression vestigia, in the plural, metaphorically refers to prints as "traces of the passage," tangible evidence of a past that is now gone but that has signed a form as evidence of its presence. With this complex meaning, therefore, the law identifies all the assets, movable or immovable, created for the war activity of the Great War or for its memory, remembrance, or documentation, as well as every place connoted as "particular theater of events of that conflict." The reason for the need to safeguard and protect these relics lies in the express recognition of their "historical and cultural value," endangered both "by the wear and tear of time and atmospheric agents" and "by the curiosity and interest not always correctly oriented of men," as explained in the report of the bill AS 4447.[132] These first considerations inevitably lead to conceptually approach the idea of vestiges to that of "cultural heritage" intended as "material testimony having a value of civilization," as defined in 1967 by the Franceschini Commission[133] and it was included in Title I of the legislative decree of 29 October 1999, no. 490 (Testo unico delle disposizioni legislative in materia di beni culturali e ambientali), which represented the main legislative reference point at the time of the promulgation of Law 78/2001 for the protection of the cultural and environmental heritage.[134] The expression "vestige" actually

132 House Bill No. 4447, 14th Legislature. Bill C4447 was examined, pursuant to Article 120, paragraph 5, of the Rules of Procedure of the Chamber of Deputies, together with Senate Bill 2512 (FINANCIAL STATEMENT 2004) and Senate Bill 2513 (BUDGET), in reference session at the 5th Commission, on 5, 6, 11 and 13 November 2003).

133 The "Franceschini" Commission takes its name from its president and was established by the Italian Parliament under Law 310 of 26 April 1964, on a proposal from the Ministry of Education. The Commission's work lasted from November 1964 to March 1966 and led to the adoption of 84 declarations and 9 recommendations addressed to the Government and Parliament. It was carried out by setting up a series of study groups coordinated by eminent scholars such as Prof. Massimo Pallottino for archaeology, Prof. Giuseppe Vedovato and Senator Carlo Levi for works of art and objects of historical and cultural interest. The study group for the revision of the protection regulations was composed of Prof. Massimo S. Giannini, Prof. Feliciano Benvenuti and Prof. Eugenio Cannada Bartoli. The Hon. Prof. Roberto Lucifredi was also a member of the Commission as a parliamentary member. Thanks to this Commission, the expression 'cultural heritage' entered the Italian legal language. Quoting the text: 'All goods having reference to the history of civilisation belong to the cultural heritage of the Nation. Subject to the law are assets of archaeological, historical, artistic, environmental and landscape interest, archives and books, and any other asset that constitutes material evidence of the value of civilisation". See FRANCESCHINI, 1967; GIANNINI, 1976; CHINI, 1998.

134 In 2004 it was included in the Code of Cultural Heritage and Landscape, but at that time that was the Code in place..

expresses the same significant charge as "material testimony," since in both cases, the value that makes the "thing" worthy of protection is explicit, given the relationship that the object induces with a universe of civilization. In addition, the norms of Title I of Legislative Decree 490/1999 protect not only works of historical-artistic interest, but also works of exclusively historical interest, and precisely "immovable things which, because of their reference to political or military history [...] have been recognized as being of significant interest", as explained in article 1, paragraph 1, letter b). Precisely for this reason, therefore, it could conclude that law 78/2001 treats a value very similar to that made explicit in Legislative Decree 490/1999, in that it would connect the significant interest of the remains of the Great War to the global scope of that war universe that they represent. In reality, however, the question is more delicate and profound.

A specific reflection on the relationship between these two regulations becomes of fundamental importance not only to contextualize the substantial difference between the regime of Law 78/2001 and the previous regulations on a national scale, but also to define the main features of the observatory from which to re-read, and therefore better understand, the complexity of the interventions carried out on and for the relics on an international scale.

In fact, in addition to some formal differences, including the period of reference (law 78/2001 refers exclusively to the history of the Great War) and the nature of the works in question (law 490/1999 concerns only real estate), what differentiates the two rules, at a substantial level, affects the criterion of obligatory intervention by the public administration to subject the asset in question to the application of one or another law.

In other words, if for the D.lgs. 490/1999 the essential requisite to protect a work was that it was previously subject to a measure of constraint issued by the public administration, then following activity of administrative evaluation, the necessary and sufficient condition to include an asset in the field of protection of law 78/2001 consists in its being a trace (vestigium) of the Great War, or that there is an evident connection with it. Therefore, it is clear that law 78/2001, still in force, does not provide for the prior release of the "protection bond," with a noticeable reduction in terms of administrative burdens and functions. Operationally, this means that the protection and safeguard proposed by law 78/2001 are systematic and environmental and extend to the entire connective tissue of the remains of the Great War scattered throughout the national territory.

From the differences presented above, also derive profound differences in the legal regime: in fact, if the historical interest protected by the

legislative decree 490/1999 always presupposed an administrative procedure to be carried out with the defensive guarantees of the cross-examination, and often implied a more robust and more intelligent conservative intervention on its ownership regime, for law 78/2001 the ascertainment is ex lege, without the need for participation and cross-examination, and the power that is introduced on the assets is prevalently one of promotion without substantial repercussions on the right of ownership. This difference in approach reflects a considerable difference in the legislation on cultural assets, distinguishing cultural assets in the strict sense (protected by Legislative Decree 490/1999 and subsequently by the Code of Cultural Assets and Landscape) from the so-called "minor cultural assets." These "minor goods" are recognized as evidence of a universe of civilization. Still, for them, the problem of unrepeatability does not arise: in essence, therefore, the distinction between one and the other category is represented by the quantitative data of rarity, that is, the scarce entity of the material availability.

In the light of this consideration, it is evident how the vastness of relics scattered throughout the national territory (throughout Europe, but the normative focus is on a national scale) cannot but include them in this class of "minor cultural assets," for which the norm provides a light type of tutelary approach, in which public intervention is expressed with interventions of protection "at a low level."[135]

This type of approach also reverberates in the field of action of the typical activities promoted and defined by the law itself in Article 1, paragraph 1 and Article 2, paragraph 1: "recognition, cataloging, maintenance, restoration, management and enhancement of the remains of the First World War."[136] If for cultural assets in the legal sense, "recognition,

135 Public intervention is placed at a more modest level than for the major cultural assets bound by the Codice Beni Culturali (2004). In this sense, the elaboration of lighter interventions implies the involvement of administrations more in terms of "service provision" than in terms of planning and direction, with the aim of obtaining more support than limitation with respect to the projects in question.

136 Maintenance and restoration are not to be understood in the same sense as the building renovation work of the same name referred to in Article 31 of Law 457 of 5 August 1978, but in the sense of the legislation on cultural heritage. In fact, art. 29 paragraph 3 of the Cultural Heritage Code defines "maintenance" as the set of activities and interventions aimed at controlling the condition of the cultural asset and maintaining the integrity, functional efficiency and identity of the asset and its parts. Paragraph 4 of the same article defines "restoration" as the direct intervention on the good through a set of operations aimed at the material integrity and recovery of the good itself, at the protection and transmission of its cultural values. In the case of real estate located in areas declared to be at seismic risk according to current legislation, restoration includes structural improvement. These definitions clearly show the influence of the "1972 Restoration Charter" and the idea of "programmed maintenance" of the cultural heritage, developed in the wake of Cesare Brandi's proposal on "preventive restoration" by Giovanni Urbani (1925-1994), director of the Central Institute for Restoration for ten

cataloging, maintenance, restoration" constitute actions of protection exercised exclusively by the State and by entities designated by it (Superintendencies), for the "minor cultural assets," the distribution of these activities is inspired by the principle of subsidiarity, horizontal and vertical, as expressed in Article 2 of the law itself.[137] In this way, moreover, the "low-regime protection" guarantees that, concerning these assets, more incisive manifestations on private property are not exercised, which are typically instructed instead concerning cultural assets understood in the strict sense (constraints, coercive interventions, takeovers, etc.).

The themes linked to the "management and valorization" of paragraph 2 of article 1 will be dealt with in more detail in Chapter 6. Still, to better understand the sample case histories of interventions presented in the following paragraph, it is helpful to briefly illustrate the concept of restoration, as addressed by law 78/2001.

Paragraph 5 of article 1 is evident in stating that "interventions that alter the material and historical characteristics of the things mentioned in paragraph 2 [list of remains] are forbidden". The modification of both the physical consistency and the historical connotation is therefore not allowed. Still, it is also important to underline the awareness that

years (1973-1983), who proposed not only to improve restoration tools, methods and techniques, but also to link restoration more closely to the overall system of protection of the cultural heritage, without actually receiving much attention from the political world. See "Codice Beni Culturali e del Paesaggio, 2004; URBANI, 2000; ZANARDI, 2011.

137 According to the definition in the Enciclopedia Treccani, the principle of subsidiarity is explained as follows: ""In general, the principle of subsidiarity concerns the relations between the different territorial levels of power and implies that, on the one hand, public functions should be carried out at the level closest to the citizens and, on the other hand, that these functions should be attracted to the territorially higher level only when this is able to carry them out better than the lower level (vertical subsidiarity)". It is therefore a principle that relates to the relations between the various territorial levels of power. In other words, the exercise of public functions intended for citizens follows a hierarchy that starts at the bottom, i.e. at the level closest to the citizens. The higher levels intervene only in cases where there are needs for improvement that cannot be managed or supported by the lower hierarchical levels. Art. 2 of law 78/2001 reiterates this principle by specifying the various subjects empowered to "provide directly" for the interventions described in the previous Art. 1, highlighting the basic approach of this law, which places private and local initiative in the first order. In fact, it is suggested not to subvert but to give an accommodation to the observation of what has happened in the last years, in which the diffusion of interventions for the recovery of the heritage of vestiges has been mainly supported by spontaneous and private initiatives. Therefore, in application of the principle of horizontal subsidiarity, the first category of subjects mentioned is that of private individuals ("in individual or associated form, including communities, rules, committees and associations, including unrecognised ones"), while only later are local authorities, park authorities and other public bodies mentioned; finally, the regions and autonomous provinces; and lastly the State (vertical subsidiarity). SEVERINI, 2002; ROCCELLA, 2011.

there is no reason to apply the rigid canons of restoration prescribed "for things of art, monuments and archaeological things" to the vestiges in as much as the same, being "minor cultural assets," are not characterized by the unrepeatable nature of the work of art, and therefore not subject to protection in the strict sense. This affirmation enunciated in the law dangerously exposes the side to the triggering of a series of somewhat "nonchalant" interventions, that is, actions that, legitimized by the possibility of realizing a project not only "not strictly conservative," but also "not philological of how presented that single artifact" can potentially substantially alter not only the authenticity but also the truthfulness of the vestigium.[138] In this regard, some considerations regarding the materials and related techniques to be used for interventions and concerning how to involve communities through projects shared with associations of volunteers and other private entities are particularly relevant.[139]

In the light of the considerations presented above, the awareness of the substantial difference between law no. 78/2001 and the other regulations for protecting cultural heritage become the essential key to analyzing, with proper knowledge of the facts, the interventions developed and implemented at the national level. Moreover, expanding this point of view to a supranational scale, the same awareness is a necessary prerequisite to outline the horizon of meaning from which to observe and analyze the different planning and decision-making/implementation dynamics also at the European level, where the regulations concerning the remains of the Great War reflect the Italian situation before law 78/2001.

2.2.3. "State of the art" of places and artifacts: general reconnaissance at European level

After having framed the regulatory context that regulates the projects related to the recovery/restoration/enhancement of the vestiges of the Great War, now a first general survey of the "state of the art" of places

138 For a more detailed discussion of authenticity, see the considerations in Chapter 3. For an in-depth analysis of the issue of authenticity, please refer to the reflections in Chapter 3. For an example, please refer to the files in the next paragraph and the detailed information in Chapter 4.

139 The issue of the involvement of communities and voluntary associations is of fundamental importance, as introduced by the principle of subsidiarity mentioned above. Chapter 6 will develop this issue further, also with reference to the developments and proposals put forward by the recent Faro Convention, the framework convention that, at European level, overturns the very idea of cultural heritage and its value for society, sanctioning a new "bottom-up vision" that expands the methods of protection and enhancement in a far-sighted way, interweaving the legal but also moral-educational competences and responsibilities of the different stakeholders involved.

and artifacts is presented to begin to better understand the heterogeneity and complexity of the works interested by this research.

For the main countries involved in the conflict, a representative sample of fortifications was selected and, although, at a general level, they were analyzed to understand more closely the status quo of places and artifacts and to identify the different approaches and attitudes adopted regarding the different criteria for intervention on the pre-existing structures.

After an initial distinction to understand whether they are public or private ownership, attention was focused on their state of preservation, and the functions/uses carried out in them. In this regard, specific descriptive categories have been identified, even though we are aware of the semantic simplification that this subdivision entails.

Specifically, the categorization developed was useful primarily to distinguish:

- the vestiges that, while retaining a memorial value, are currently in a state of abandonment and present worrying forms of material and structural degradation that, if not resolved, may compromise the very future of the asset;
- the works recovered with a particular "care" concerning the preservation of the informative/evocative potential guarded by the materiality of the places/manufactures, many times transmitted to the community through new museum routes;
- the vestiges subject to significant transformations that have led to the inclusion of new uses and functions with related changes in the original morphological-distributive structures, altering in part (recovery) or almost entirely (high level of transformation) the memorial value of the asset itself;
- places of commemoration, such as war cemeteries and landmarks built after the conflict for memorial purposes[140].

In the light of the emerged information, the data obtained were processed into some useful summary graphs to outline the general situation of the vestiges in the various analyzed countries and thus begin to understand in more detail the critical and priority issues to be reflected upon.

140 Because of the heterogeneity of the works analyzed, it was particularly difficult to identify absolute categorizations within which to include each object of analysis, so it was decided to classify each "vestige" according to the prevailing state of preservation/use and more easily recognizable based on the bibliography of reference, the documentary sources available and the inspections/survays carried out. This categorization will be taken up and refined in Chapter 4.1.1, to which we refer for further details. In addition to this, it is appropriate to point out that the categories "Commemoration place" refer specifically to war cemeteries and memorial monuments built after the conflict with the function of memorial lankmark.

State of the art
Military Landscapes - WW1
Belgium

Fort de Embourg- Liegi
Recovery

Fort de Loncin- Liegi
Recovery

Fort de Lantin- Liegi
Recovery

Fort de Pontisse- Liegi
State of abandonment

Fort de Evignee- Liegi
High level of transformation

Fort de Liers- Liegi
High level of transformation

Fort de Flemalle- Liegi
Recovery

Fort de Fleron- Liegi
Destruction/loss

Fort de Hollogne- Liegi
Recovery with care (Museum)

Fort de Chaudfontaine- Liegi
Recovery

Fort de Barchon- Liegi
Recovery

Fort de Boncelles - Liegi
State of abandonment

Dodengang - Diksmuide
Recovery

Sanctuary Wood - Ypres
Recovery with care (Museum)

Yorkshire Trench- Ypres
Recovery with care (Museum)

Hill 62 Memorial - Ypres
Commemoration place - Memorial

Fort Kessel - Antwerp
Recovery with care

Hooge Crater Cemetery - Hooge
Recovery with care

Fort von Lier - Antwerp
Recovery

Bayernwald - Heuvelland
Recovery

Menin Gate - Ypres
Commemoration place - Memorial

Hill 60 - Zillebeke
Recovery with care

Caterpiller Mine Crater - Zillebeke
Recovery with care

Craterland The Bluff - Zillebeke
Recovery with care

Fron Line - Zillebeke
Recovery with care

Fort Sint-Katelijne Waver - Antwerp
High level of transformation

Pool of Peace - Heuvelland
Recovery with care

Fort Koningshooikt - Antwerp
State of abandonment

Fort de Evegnee- Liegi
High level of transformation

Fort Sint-Marie - Antwerp
High level of transformation

Fort Walem - Antwerp
State of abandonment

Fort Breendonk - Antwerp
Recovery with care (Museum)

Fort Liezele - Antwerp
Recovery

Fort de Cognelèe - Namur
State of abandonment

Fort d' Emines - Namur
State of abandonment

Fort de Machovelette - Namur
High level of transformation

Fort de Maizaret- Namur
State of abandonment

Fort d'Andoy- Namur
State of abandonment

Fort de Dave - Namur
State of abandonment

Fort St. Heribert - Namur
Recovery

Fort de Malonne - Namur
Recovery

Fort de Suarleè- Namur
State of abandonment

Artillery Wood Cemetery - Ypres
Commemoration place - Cemetery

Hollandstellung - Antwerp
State of abandonment

Hollandstellung - Antwerp
State of abandonment

Fort Stabroek - Antwerp
Recovery

Fort Ertbrand - Antwerp
State of abandonment

Fort Braaschaat - Antwerp
State of abandonment

Fort Schoten - Antwerp
High level of transformation

Fort Merksem - Antwerp
Recovery

Fort Gravenwezel- Antwerp
High level of transformation

Fort Oelegem- Antwerp
State of abandonment

Fort Broechem- Antwerp
Recovery

Fort van Steendorp - Antwerp
Recovery

Fort de Bornem - Antwerp
High level of transformation

Fort Haasdonk - Antwerp
State of abandonment

Fort Kuibeke- Antwerp
Destruction-loss

Public/private initiative

☐ Only public ☒ Volunteer involvement

Project scope

☐ Local-Regional ☐ Interegional-National ☒ Inter-national

Commonwealth War Graves Commission (CWGC) Cemeteries

Project description

La Commonwealth War Graves Commission (CWGC) è un'organizzazione intergovernativa composta da sei indipendenti Stati membri la cui principale funzione è quella di identificare, registrare e conservare le tombe, ed i luoghi di commemorazione, del personale delle forze armate del Commonwealth che morirono durante le due guerre mondiali. La Commissione venne fondata da Fabian Ware, costituita tramite un Royal Charter nel 1917 ed originariamente identificata come Imperial War Graves Commission per mutarla definitivamente, nel 1960, nell'attuale designazione.
Dalla sua istituzione la CWGC ha costruito approssimativamente 2500 cimiteri di guerra e numerosi monumenti alla memoria. In Belgio i moltissimi cimiteri disseminati nei luoghi teatro di atroci battaglie sono curati da questa associazione, che si occupa della pulizia e del riassetto organizzativo di ogni cimitero.

Chester Farm Cemetery - Zillbeke
Commemoration place - Cemetery

Hooge Crater Cemetery - Hooge
Commemoration place - Cemetery

Messines Ridge - Mesen
Commemoration place - Cemetery

Bedford House Cemetery - Ypres
Commemoration place - Cemetery

Bill Cross Cemetery - Ypres
Commemoration place - Cemetery

Artillery Wood Cemetery - Ypres
Commemoration place - Cemetery

In Flanders Fields Museum
In-side/open-air Museum, research activities

Public/private initiative

☐ Only public ☐ Volunteer involvement

Project scope

☐ Local-Regional ☐ Interegional-National ☐ Inter-national

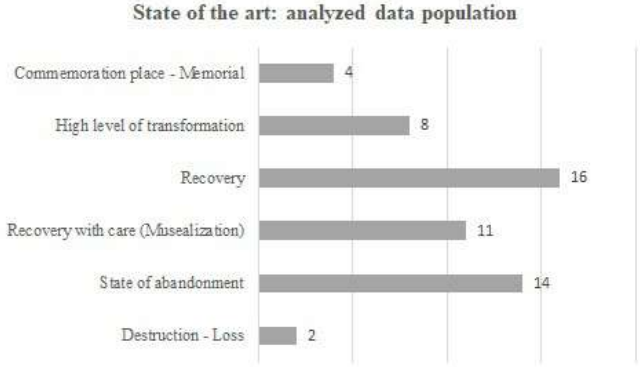
Project description

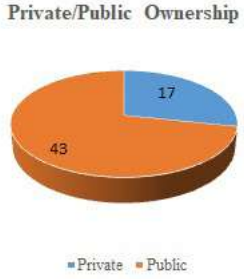
Con sede nella centro di Ypres, il museo In Flanders Fields rappresenta il principale promotore di un arcipelago di progetti e attività di ricerca che non si limitano alla gestione della filiera della musealizzazione (in senso tradizionale, al chiuso, ma anche declinata nei numerosi "musei nel paesaggio" che incarnano essenzialmente l'idea del "museo diffuso"), ma investono a tutto tondo il mondo della ricerca e della promozione culturale e sociale. Il museo considera la presentazione della storia della Grande Guerra nel Saliente di Ypres come una missione per diffondere una cultura della pace universale e contemporanea, da ottenere attraverso il coinvolgimento e la partecipazione delle comunità, delle scuole, degli enti di ricerca in un virtuoso circuito di politiche gestionali.
Nell'intero Saliente di Ypres sono state avviate e concluse numerose progettualità che, a diverse temperature, hanno condiviso l'obiettivo comune di restituire alle comunità il "sacro" paesaggio di guerra su cui migliaia di giovani europei hanno sacrificato la loro vita. Il riconoscimento del valore di testimonianza incarnato nel paesaggio, anche se con una consapevolezza forse non così evidente come si potrebbe affermare in ambito italiano, ha indirizzato interventi prevalentemente conservativi, in cui i "segni" del conflitto sono stati messi in sicurezza per garantire un minimo livello di accessibilità/percorribilità, resa possibile anche grazie all'inserimenti di puntuali presidi utili a "facilitare l'esperienza". I progetti si sono articolati essenzialmente

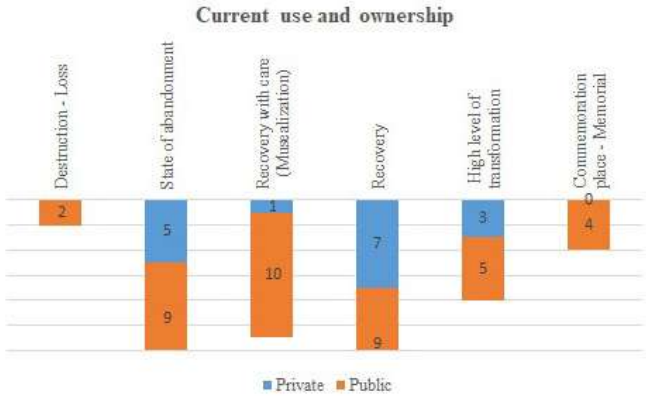
In Flanders Field Museum - Ypres
Musealization - Reearch activities

		Ownership		*Current state*						
		Private	Public	Destruction - Loss	State of abandonment	Recovery with care (Museum)	Recovery	High level of transformation	Commemoration place - Cemetery	Commemoration place - Memorial
1	Fort de Barchon		1				1			
2	Fort d'Evegneè	1						1		
3	Fort de Fleeron		1	1						
4	Fort Chaudfontaine	1					1			
5	Fort d'Embourg	1					1			
6	Fort de Boncelles		1		1					
7	Fort de Flemalle	1					1			
8	Fort de Hollogne		1			1				
9	Fort de Loncin		1				1			
10	Fort de Lantin	1					1			
11	Fort de Liers	1						1		
12	Fort de Pontisse	1								
13	Fort de Cogneleè		1		1					
14	Fort d'Emines		1		1					
15	Fort de Marchovelette	1						1		
16	Fotr de Maizaret		1		1					
17	Fort d'Andoy		1		1					
18	Fort de Dave		1		1					
19	Fort St. Heribert		1				1			
20	Fort de Malonne	1					1			
21	Fort de Suarleè		1		1					
22	Fort Stabroek	1					1			
23	Fort Berendrecht		1							
24	Fort Schans Smoutakker		1							
25	Fort Ertbrand	1			1					
26	Fort Brasschaat	1			1					
27	Fort Schoten		1					1		
28	Fort Merksem		1				1			
29	Fort Gravenwezel		1					1		
30	Fort Oelegem	1			1					
31	Fort Broechem		1				1			
32	Fort Kessel		1			1				
33	Fort Lier		1				1			
34	Fort Koningshooikt	1			1					
35	Fort Sint-Katelijne Waver		1					1		
36	Fort Walem		1		1					
37	Fort Breendonk		1			1				
38	Fort Liezele		1				1			
39	Fort Bornem		1					1		
40	Fort von Steendorp		1				1			
41	Fort Haasdonk	1			1					
42	Fort Kruibeke		1	1						
43	Fort Zwijndrecht		1		1					
44	Fort St. Marie		1					1		
45	Bayernwald trenches		1				1			

		Ownership		*Current state*						
		Private	Public	Destruction - Loss	State of abandonment	Recovery with care (Museum)	Recovery	High level of transformation	Commemoration place - Cemetery	Commemoration place - Memorial
46	Dodegang Trenches	1					1			
47	Hill 60		1			1				
48	Passchendaele		1			1				
49	Messines Ridge		1							1
50	Sanctuary Wood	1				1				
51	Pool of Peace		1			1				
52	Hill 62		1							1
53	Yorkshire trench		1			1				
54	Trenches around Ypres		1			1				
55	Hooge crater/trenches		1			1				
56	Caterpillar mine crater		1			1				
57	The bluff craterland		1							
58	Menin Gate		1							1
59	CWGC Cemeteries		1						40	
60	Sanct.Wood Museum		1							1







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State of the art
Military Landscapes - WW1
Switzerland

Fort Airolo
Recovery

Craterland - La Largue
State of abandonment

Fort Altkirch
State of abandonment

Fort Bazberg
State of abandonment

Fort Buhl
State of abandonment

Fort Dailly-Savatan
Recovery

Fort de Cindey
High level of transformation

Fort du Scex
State of abandonment

Trenches - La Largue
State of abandonment

Fort Galenhutten
Recovery

Fort Gutsch
State of abandonment

Fort Hospiz
Recovery with care

Fort Stockli
State of abandonment

Trenches Fieudo
State of abandonment

Trenches Alpe delle Lagonce
Recovery

Fortification Motto Rotondo
State of abandonment

Fort San Carlo
High level of transformation

Forte Olimpio
Recovery

Fortified position Fieudo di sopra
Recovery

Fortification Monte Ceneri
State of abandonment

Fort Sasso da Pigna
High level of transformation

Trenches Sasso Gordona
State of abandonment

Entrenched system Monte Gesero
State of abandonment

Entrenched system San Jorio
State of abandonment

Trenches Magadino
State of abandonment

Trenches Monte Orsa
State of abandonment

Trenches Sasso Gordona
Recovery

Trenches Fieudo di Sotto
State of abandonment

Fort Spina
State of conservation

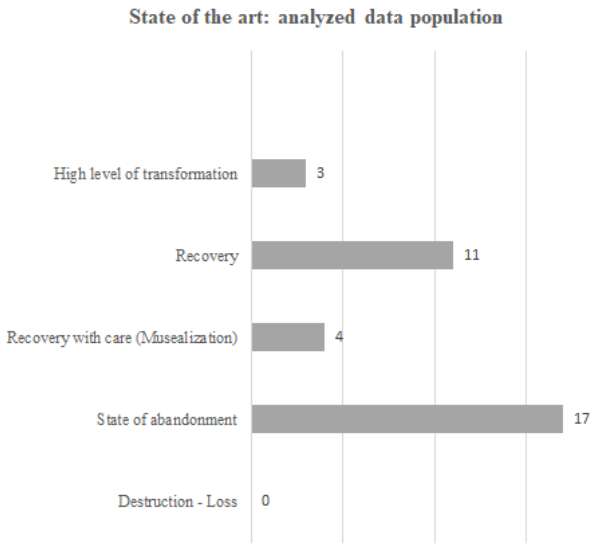
Forte Olimpio
Recovery

Trenches Magadino
State of abandonment

Fortification Stelvio
State of abandonment

Forino Mondascia
State of abandonment

		Ownership		*Current state*						
		Private	Public	Destruction - Loss	State of abandonment	Recovery with care (Museum)	Recovery	High level of transformation	Commemoration place - Cemetery	Commemoration place - Memorial
1	Fort Dailly	1					1			
2	Fort Savatan		1		1					
3	Fort du Scex		1				1			
4	Fort de Cindey		1					1		
5	Fort Airolo	1				1				
6	Fort Motto Bartolo		1		1					
7	Fort St. Gottardo					1				
8	Fort Hospiz		1			1				
9	Fort Bühl		1				1			
10	Fort Bäzberg		1		1					
11	Fortin Altkirch		1		1					
12	Forte Galenhutten		1				1			
13	Fort Furka		1		1					
14	Fort Stöckli		1		1					
15	Fort Gütsch		1		1					
16	Fortificazioni Monte Ceneri		1		1					
17	Forte Olimpio	1					1			
18	Fortificazioni Magadino		1		1					
19	Fortificazioni Gambarogno		1		1					
20	Fortificazioni Cima Medeglia		1				1			
21	Fortificazioni monte Bisbino		1		1					
22	Fortificazioni Monte Gesero		1				1			
23	Fortificazioni Monte Orsa		1				1			
24	Trinceramenti Sasso Gordona		1				1			
25	Fortificazioni San Jorio		1				1			
26	Fortificazioni Stelvio-Umbrail		1			1				
27	Fortificazioni KM 0		1		1					
28	Fortino Mondascia		1		1					
29	Alpe delle Lagonce		1				1			
30	Forte San Carlo	1						1		
31	Forte Sasso da Pigna		1					1		
32	Forte Spina		1		1					
33	Trincee Fieudo di Sotto		1		1					
34	Postazione fanteria Fieudo di Sopra		1		1					
35	Fortificazioni Motto Rotondo		1		1					



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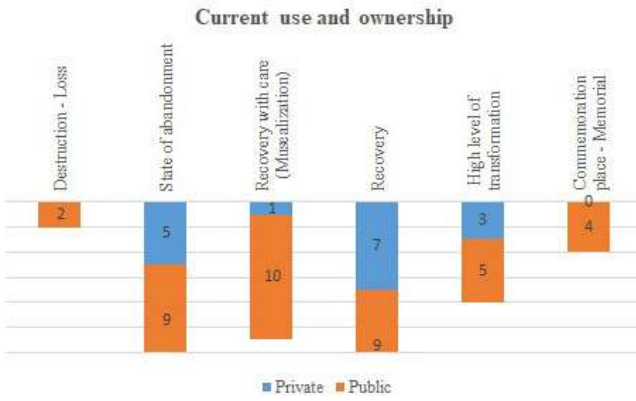
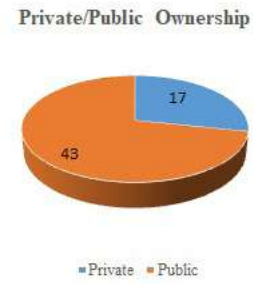




State of the art
Military Landscapes - WW1
Prussia

Fort Blumenthal
Recovery

Fort Bose
Destruction - loss

Fort Franchesky
State of abandonment

Fort Furst Bismark
Recovery

Fort von Baden
Recovery

Fort Kirchbach
Recovery with care

Fort Kronprinz
State of abandonment

Fort Foch
High level of transformation

Fort Moltke-Rapp
Recovery with care

Fort Podbilski
Recovery with care

Fort Roon
State of abandonment

Fort Schwarzhoff
High level of transformation

Fort von der Tann
High level of transformation

Fort Weder
State of abandonment

Fort des Bordes
Destruction - loss

Fort Diou
State of abandonment

Fort Grag Haeseler
State of abandonment

Fort Hindersin
Recovery

Fort Kaiserin
State of abandonment

Fort Kameke
State of abandonment

Fort Leipzig
State of abandonment

Fort Lothringen
State of abandonment

Fort Mansein
State of abandonment

Fort Plappeville
State of abandonment

Fort Prinzregend Luitpold
State of abandonment

Fort Queuleu
Recovery with care

Fort Schwerein
State of abandonment

Fort St. Julien
State of abandonment

Fort St. Privat
Recovery

Fort von der Goltz
State of abandonment

Fort Wagner
Recovery

Fort Guentrage
Recovery with care

Fort Illangen
Recovery

Fort Koningsmacker
High level of transformation

Fort de Mutzig
Recovery with care

Fort II - Poznan
Recovery

Fort III - Poznan
State of abandonment

Fort Va - Poznan
State of abandonment

Fort VI - Poznan
Recovery

Fort VII - Poznan
Recovery with care

Fort VIII - Poznan
State of abandonment

Fort IX - Poznan
High level of transformation

Fort I - Thorn/Torun
Recovery

Fort II - Thorn/Torun
State of abandonment

Fort III - Thorn/Torun
Recovery

Fort IV - Thorn/Torun
Recovery

Fort V - Thorn/Torun
Recovery

Fort VI - Thorn/Torun
State of abandonment

Fort VII - Thorn/Torun
State of abandonment

Fort IX - Thorn/Torun
State of abandonment

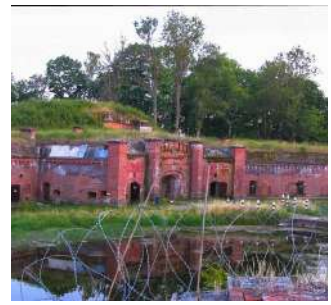
Fort I - Konigsberg
High level of transformation

Fort II - Konigsberg
State of abandonment

Fort V - Konigsberg
State of abandonment

Fort Va - Konigsberg
High level of transformation

Fort VIII - Konigsberg
State of abandonment



Fort XI - Konigsberg
State of abandonment

Fort Eichenkranz
State of abandonment

Fort Parski
State of abandonment

Fort Lasek
Destruction - loss

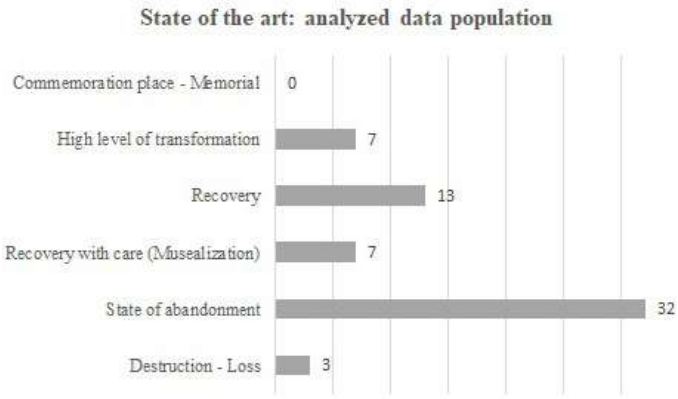
Fort Nova Wies
State of abandonment

Fort Tarpno
State of abandonment

Fort Swierkocin
State of abandonment

		Ownership		*Current state*						
		Private	Public	Destruction - Loss	State of abandonment	Recovery with care (Museum)	Recovery	High level of transformation	Commemoration place - Cemetery	Commemoration place - Memorial
1	Fort Blumenthal	1					1			
2	Fort Bose		1	1						
3	Fort Franchesky		1		1					
4	Fort Furst Bismark		1				1			
5	Fort G. von Baden		1				1			
6	Fort Kirchbach		1			1				
7	Fort Kronprinz		1		1					
8	Fort Foch	1						1		
9	Fort Moltke-Rapp		1			1				
10	Fort Podbilski		1			1				
11	Fort Roon		1		1					
12	Fort Scwarzhoff	1						1		
13	Fort Von der Tann	1						1		
14	Fort Weder		1		1					
15	Fort Des Bordes		1	1						
16	Fort Diou		1		1					
17	Fort Grag Haeseler		1		1					

		Ownership		*Current state*						
		Private	Public	Destruction - Loss	State of abandonment	Recovery with care (Museum)	Recovery	High level of transformation	Commemoration place - Cemetery	Commemoration place - Memorial
28	Fort St.Julien		1		1					
29	Fort St. Privat		1				1			
30	Fort von der Goltz		1		1					
31	Fort Wagner	1					1			
32	Fort Guentrage		1			1				
33	Fort Illangen	1					1			
34	Fort Koningsmacker	1						1		
35	Fort de Mutzig	1				1				
36	Poznan Fort II		1				1			
37	Poznan Fort III		1		1					
38	Poznan Fort Va		1		1					
39	Poznan Fort VI	1					1			
40	Poznan Fort VII	1				1				
41	Poznan Fort VIII		1		1					
42	Poznan Fort IX	1						1		
43	Torun Fort I		1				1			
44	Torun Fort II		1		1					
45	Torun Fort III	1					1			
46	Torun Fort IV		1				1			
47	Torun Fort V	1					1			
48	Torun Fort VI		1		1					
49	Torun Fort VII		1		1					
50	Torun Fort IX		1		1					
51	Koningsberg Fort I	1						1		
52	Koningsberg Fort II		1		1					
53	Koningsberg Fort V		1		1					
54	Koningsberg Fort Va	1						1		
55	Koningsberg Fort VIII		1		1					
56	Koningsberg Fort XI		1		1					
57	Fort Eichenkranz		1		1					
58	Fort Parski		1		1					
59	Fort Lasek		1	1						
60	Fort Nowa Wies		1		1					
61	Fort Tarpno		1		1					
62	Fort Swierkocin		1		1					



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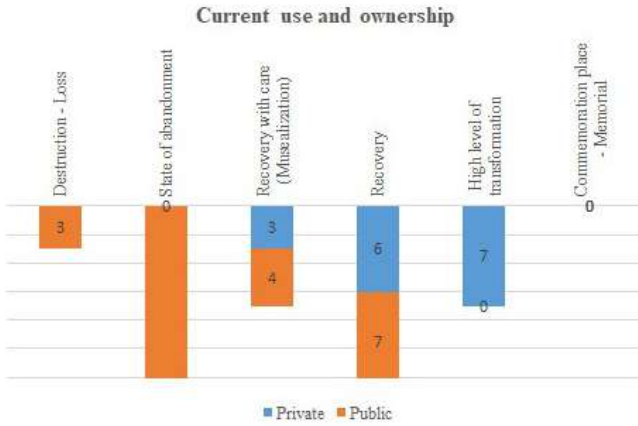
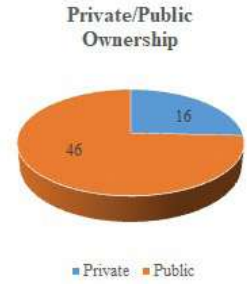




State of the art
Military Landscapes - WW1
France

Fort de la Roche
State of abandonment

Fort Lomont
State of abandonment

Fort Montbart
Recovery with care

Fort de Bressencour
Recovery

Fort de Giromagny
Recovery with care

Fort de Roppe
Recovery

Fort de Vezelois
Recovery

Fort du Bois d'Oye
State of abandonment

Fort Mont Rudolph
State of abandonment

Ouvrage de Chevremont
State of abandonment

Ouvratge de la Cote d'Essert
State of abandonment

Ouvrage du Haut-Bois
State of abandonment

Fort Meroux
High level of transformation

Fort Verpillere
State of abandonment

Fort Janus
State of abandonment

Fort Lenlon
Recovery

Fort Malefosse
State of abandonment

Fort Gondran
High level of transformation

Fort Grand Maye
State of abandonment

Fort Lauzette
State of abandonment

Fort Picciarvet
State of abandonment

Fort Mont Chauve de Tourette
State of abandonment

Fort de la Forca
State of abandonment

Fort Barbonnet
Recovery

Fort du Mont Angel
High level of transformation

Fort de la Drette
Recovery

Fort de la Revere
Recovery

Fort Mont Chauve d'Aspremont
High level of transformation

Fort Tete de Chien
Recovery

Fort Dogneville
State of abandonment

Fort d'Arches
State of abandonment

Fort d'Uxegney
High level of transformation

Fort Chapoly
High level of transformation

Fort Genas
State of abandonment

Fort Meyzieu
State of abandonment

Fort St. Priest
State of abandonment

Fort Truc
State of abandonment

Fort La Platte
Recovery

Fort Vulmix
State of abandonment

Fort Blenod
Recovery

Fort d'Ecrouves ou fort Desaix
State of abandonment

Fort de Bruley ou fort Pully
State of abandonment

Fort de Domgermain
State of abandonment

Fort du Chanot
State of abandonment

Fort du Tillot
State of abandonment

Fort du Vieux-Canton
Recovery

Ouvrage de Francheville
State of abandonment

Ouvrage de Charmes la Cote
State of abandonment

Ouvrage de la Cloche
Recovery with care

Ouvrage de Ropage
State of abandonment

Ouvrage du Bas du Chene
State of abandonment

Ouvrage du Charmois
State of abandonment

Fort Roche la Croix
Recovery

Fort Montgilbert
High level of transformation

Fort Montperche
High level of transformation

Fort Sapey
State of abandonment

Fort Telegraphe
Recovery

Fort Montmedy
State of abandonment

Fort Belleville
State of abandonment

Fort Douaumont
Recovery with care

Fort Saint-Michael
State of abandonment

Fort Souville
State of abandonment

Fort Tavannes
State of abandonment

St Mary A.D.S. Cemetery
Commemoration place-Cemetery

Fort Vaux
Recovery with care

Fort Vaucherauville
State of abandonment

Fort Moulainville
State of abandonment

Fort Laufeè
State of abandonment

La Somme Battlefield
Recovery with care

Thiepval memorial
Commemoration place-memorial

Vimy Battlefield
Recovery with care

Vimy Memorial
Commemoration place-memorial

Canadian Cemetery Vimy
Commemoration place-Cemetery

Arras memorial
Commemoration place-memorial

Cambrai memorial
Commemoration place-memorial

Cambrai Battlefield
Recovery with care

Delville memorial
Commemoration place-memorial

Villers-Bretonneux memorial
Commemoration place-memorial

Notre Dame de Lorette
Commemoration place-Cemetery

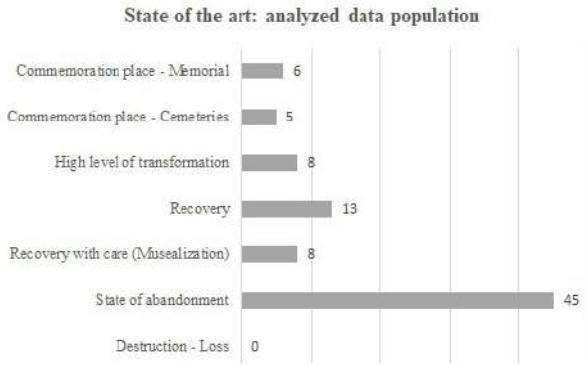
Dud Corner Cemetery
Commemoration place-Cemetery

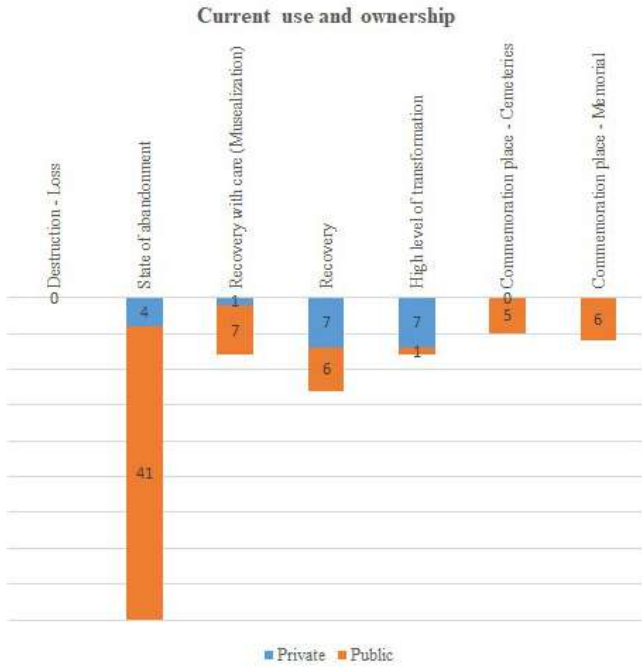
Faubourg d'Amiens Cemetery
Commemoration place-Cemetery

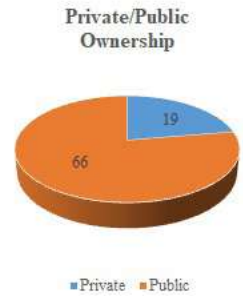
		Ownership		*Current state*						
		Private	Public	Destruction - Loss	State of abandonment	Recovery with care (Museum)	Recovery	High level of transformation	Commemoration place - Cemetery	Commemoration place - Memorial
1	Fort de la roches		1		1					
2	Fort Lomont	1			1					
3	Fort Montbart		1			1				
4	Fort de Bressencour		1				1			
5	Fort de Giromagny		1			1				
6	Fort de Roppe	1					1			
7	Fort de Vézélois		1				1			
8	Fort du Bois d'Oye		1		1					
9	Fort Month Rudolph		1		1					
10	Ouvrage de Chèvremont		1		1					
11	Ouvrage de la Côte-d'Essert		1		1					
12	Ouvrage du Haut-Bois		1		1					
13	Fort Meroux	1						1		
14	Fort Verpillere		1		1					
15	Fort Janus		1		1					
16	Fort Lenlon	1					1			
17	Fort Malfosse		1		1					
18	Fort Gondran	1						1		
19	Fort Grand Maye		1		1					
20	Fort Lauzette		1		1					
21	Fort Picciarvet		1		1					
22	Fort Mont-Chauve de Tourette		1		1					
23	Fort de la Forca		1		1					
24	Fort Barbonnet		1				1			
25	Fort du Mont Angel	1						1		
26	Fort de La Drette		1				1			
27	Fort de la Revere		1				1			
28	Fort Mont-Chauve d'Aspremont	1						1		
29	Fort Tete de Chien	1					1			
30	Fort Dogneville	1			1					
31	Fort d'Arches		1		1					
32	Fort d'Uxegney	1						1		
33	Fort Chapoly		1					1		
34	Fort Genas		1		1					
35	Fort Meyzieu		1		1					
36	Fort St. Priest		1		1					
37	Fort Truc		1		1					
38	Fort La Platte	1					1			
39	Fort Vulmix		1		1					
40	Fort Blenod		1				1			
41	Fort d'Ecrouves ou fort Desaix		1		1					

		Ownership		*Current state*						
		Private	Public	Destruction - Loss	State of abandonment	Recovery with care (Museum)	Recovery	High level of transformation	Commemoration place - Cemetery	Commemoration place - Memorial
42	Fort de Bruley ou fort Pully		1		1					
43	Fort de Domgermain	1			1					
44	Fort de Gondreville		1		1					
45	Fort de Lucey		1		1					
46	Fort de Trondes		1		1					
47	Fort Domgermain		1		1					
48	Fort du Chanot		1		1					
49	Fort du Tillot		1		1					
50	Le fort du Vieux-Canton	1					1			
51	Ouvrage de Francheville		1		1					
52	Ouvrage de Charmes-la-Côte		1		1					
53	Ouvrage de la Cloche	1				1				
54	Ouvrage de Ropage		1		1					
55	Ouvrage du Bas-du-Chêne		1		1					
56	Ouvrage du Charmois		1		1					
57	Fort Roche la Croix	1					1			
58	Fort Montgilbert	1						1		
59	Fort Montperche	1						1		
60	Fort Sapey	1			1					
61	Fort Telegraph	1					1			
62	Fort Montmedy		1		1					
63	Fort Belleville		1		1					
64	Fort Douaumont		1			1				
65	Fort Saint-Michael		1		1					
66	Fort Souville		1		1					
67	Fort Tavannes		1		1					
68	Fort Vaux		1			1				
69	Fort Vaucherauville		1		1					
70	Fort Moulainville		1		1					
71	Fort Laufée		1		1					
72	La Somme		1			1				
73	Thiepval memorial		1							1
74	Vimy Battlefields		1			1				
75	Vimy Memorial		1							1
76	Canadian Cemetery Vimy		1						1	
77	Arras Memorial		1							1
78	Cambriai Memorial		1							1
79	Cambriai Battlefields		1			1				
80	Delville Memorial		1							1
81	Villers-Bretonneu Australian Memorial		1							1

		Ownership		*Current state*						
		Private	Public	Destruction - Loss	State of abandonment	Recovery with care (Museum)	Recovery	High level of transformation	Commemoration place - Cemetery	Commemoration place - Memorial
82	Ablain St-Nazaire, "Notre Dame de Lorette"		1						1	
83	Dud Corner Cemetery		1						1	
84	Faubourg d'Amiens Cemetery, Arras		1						1	
85	St. Mary's A.D.S. Cemetery,		1						1	







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www.tracesofwar.com
www.wikipedia.com

State of the art
Military Landscapes - WW1
Austro-Hungarian Empire

Fort Gomagoi
State of abandonment

Fort Strino
Recovery with care

Fort Rocchetta
State of abandonment

Fort Larino
Recovery with care

Fort Revegler
Destruction - loss

Fort Danzolino
Destruction - loss

Fort Ampola
Destruction - loss

Fort S.Nicolò
Recovery

Fort Nago
Recovery

Fort Cadine
Recovery with care

Blockhaus Doss di Sponde
High level of transformation

Tagliata Civezzano
Recovery

Fort Civezzano
Recovery

Fort S.Alessandro
State of abandonment

Batteria Mandolin
State of abandonment

Batteria Candriai
Destruction - loss

Fort Romagnano
State of abandonment

Fort Mattarello Inferiore
State of abandonment

Batteria Doss Fornas
State of abandonment

Batteria Brusaferro
State of abandonment

Batteria Maranza
State of abandonment

Fort S.Rocco
State of abandonment

Batteria Cimirlo
State of abandonment

Batteria Roncogno
Recovery with care

Fort Martignano
State of abandonment

Batteria Casara
State of abandonment

Fort Corno
Recovery with care

Fort Tenna
Recovery with care

Fort S.Biagio
Recovery with care

Fort Buso
Recovery with care

Fort Dossaccio
Recovery with care

Fort Someda
State of abandonment

Bondone Trenches
State of abandonment

Fort Alto Mattarello
State of abandonment

Fort Zaccarana
Recovery with care

Fort Mero
Recovery with care

Fort Pozzi Alti
Recovery with care

Fort Carriola
State of abandonment

Batteria Tombio
State of abandonment

Fort Garda
Recovery with care

Fort Serrada
State of abandonment

Fort Sommo Alto
State of abandonment

Fort S.Sebastiano
State of abandonment

Fort Belvedere
Recovery with care

Fort Campo Lusern
Recovery with care

Fort Busa Verle
State of abandonment

Fort Cima Vezzena
Recovery with care

Fort Pozzacchio
Recovery with care

Tagliata Ponale
State of abandonment

Krakow - Fort IVa
State of abandonment

Krakow - Fort 50
State of abandonment

Krakow - Fort 44
Recovery

Krakow - Fort VII
Recovery with care

Krakow - Fort 51 1/2
Recovery

Krakow - Fort 41a
State of abandonment

Krakow - Fort 4
State of abandonment

Krakow - Fort 14
State of abandonment

Krakow - Fort 30
Recovery

Krakow - Fort 48
State of abandonment

Krakow - Fort 49 1/2
State of abandonment

Krakow - Fort 52
State of abandonment

Krakow - Fort 74 1/2
State of abandonment

Krakow - Fort XIX
State of abandonment

Krakow - Fort III
High level of transformation

Nagià Grom Trenches
Recovery with care

Marmolada Fortifications
Recovery with care

Monte Bondone fortifications
State of abandonment

Fort Tre Sassi
Recovery with care

Fort Drakuljica
Recovery

Fort Hermann
State of abandonment

Fort Strac
State of abandonment

Fort Vrmac
State of abandonment

Fort Corte
State of abandonment

Fort Ruaz
Recovery

Fort Prato Piazza
Recovery

Fort Landro
State of abandonment

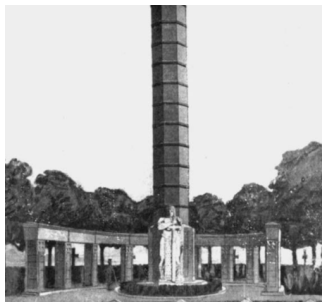
Fort Heideck
State of abandonment

Monte Altissimo trenches
State of abandonment

Fort Mitterberg
Recovery

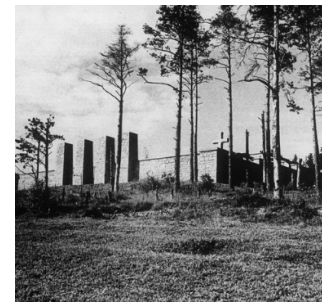
Bondo Cemetery
Commemoration place-Cemetery

Zakliczyn Cemetery
Commemoration place-Cemetery

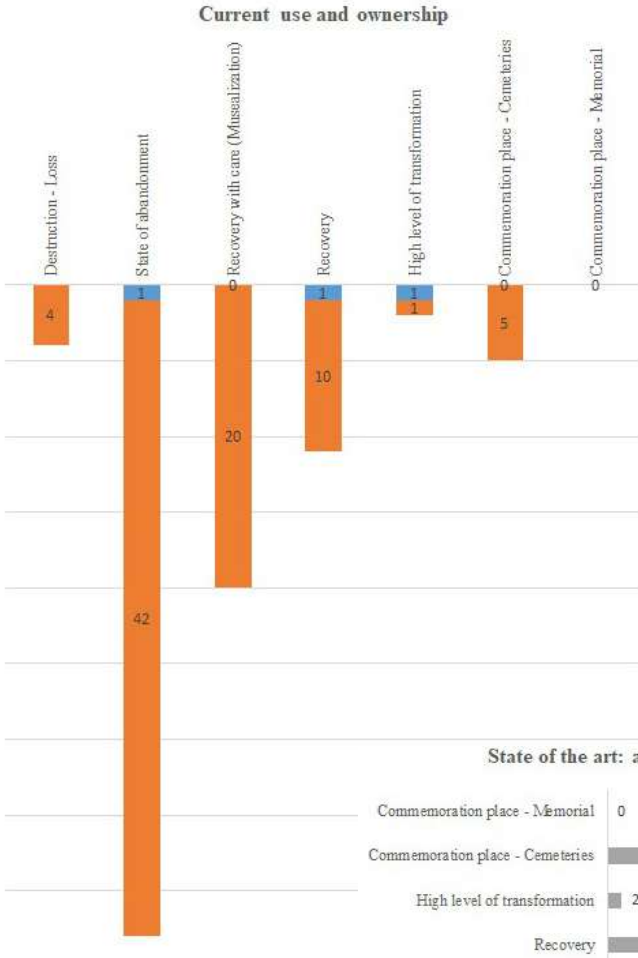


Neu-Sandez Cemetery
Commemoration place-Cemetery

Gorlice Cemetery
Commemoration place-Cemetery



Sekowa Cemetery
Commemoration place-Cemetery



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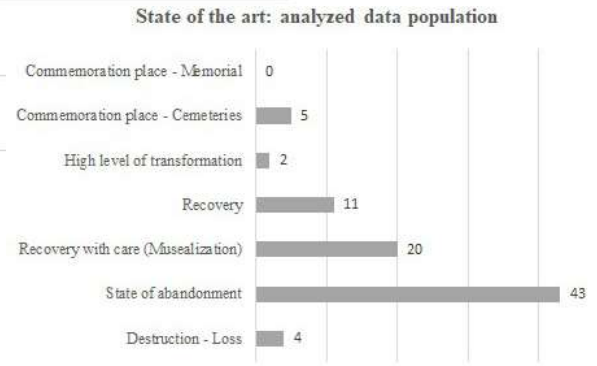


2.3. A future for military heritage: the need to recover a systemic vision

In the previous chapters, we have briefly summarized the main processes that led the different European powers to the militarization of their territories from the nineteenth century until the dawn of the Great War, the main interdisciplinary initiatives launched on the occasion of the Centenary, and a representative sample, for each European country, of projects concluded or underway for the recovery/restoration/enhancement of specific vestiges of the Great War. A codicil is necessary to understand the architectural and landscape heritage that is the object of study and deduce from this general picture some common characteristics and essential questions that distinguish it and must consciously share that right now.

First of all, the complexity of the "Great War" phenomenon is evident, both at a political-relational level in the intricate processes that determined the different phases of its development and at an operational level in the long and articulated process of planning the militarization of the territories elaborated by the various Military Geniuses.

This led to an actual large-scale territorial planning, which profoundly upset the landscape of the whole Europe, transforming it into a dense network of field and permanent fortifications, in an intricate web of trenches and shelters, barracks and underground caves, alternating with fortified walls connected by a labyrinthine system of military infrastructures designed in close relation to the morphology of the different territories. From the fields of Galicia to the French plains, from the Alps to the coasts of the Baltic Sea, this heterogeneous set of "works," today recognized as vestiges of the Great War, has radically reorganized the territorial assets and the original environmental ecosystems, giving rise to a long process of stratification of new traces and meanings that have contributed to the construction of what is now universally recognized as a fragile cultural heritage of high complexity.

The heterogeneity of this articulated and vast heritage has stimulated the development of as many different theoretical approaches and operational interventions that, mainly since the '70s, have been applied to the restoration/recovery/enhancement of both the forts and, to a lesser extent, of that more fragile fabric in terms of permanence, and therefore difficult to recognize, such as the entrenched systems and infrastructures linked to the forts themselves, outlining a framework of analysis that is anything but homogeneous and easy to understand.

In this regard, before continuing with the discussion, it is essential to note that did not conduct the in-depth investigation of the initiatives launched on the occasion of the Centenary and the reflections on the design interventions triggered by them to take a critical or controversial

stance but to try to begin to identify what the strengths/weaknesses of this heritage might be. The substantial issues to reflect on to understand what it might mean to "take care" of such a complex "set of signs" in the future.

If, on the one hand, the occasion of the Centennial has allowed catalyzing some projects and initiatives promoted by individual local administrations but supported at the national level (both in Italy and abroad), and therefore subject to compliance with precise technical, operational, and financial requirements, on the other hand, the growing interest in this particular heritage has also seen the proliferation of different projects and activities not well structured or coordinated, which in many cases have led to the arrangement and securing of numerous war artifacts (from entrenched systems to permanent fortifications) in a rather casual manner, without a prior and adequate knowledge of their "character," often going so far as to alter the recognizability of their original appearance and their deeper meaning.

Moreover, analyzing the palimpsest of projects carried out at a supranational level through an overall view, what emerges as a common denominator is a general fragmentation of interventions that in most cases, although with apparent differences in terms of disciplinary approach, have almost always placed at the center of their reflection the architectural object in its individuality of "isolated sign," without putting the same analytical-design attention to its being what remains of a system, of an apparatus of "works" connected not only by physical infrastructures but also by a dense network of visual and intangible relations, which guaranteed its functioning as a great "war machine." This reference to a system of "lost" relationships, both material and immaterial, that connected the different elements of the fortified landscapes is intrinsically inherent in the word frag-mentum. This condition characterizes the current situation of the remains in their complexity.[141] A clear indicator of this attitude is that most of the carried out projects were more concerned with the permanent fortifications than with the articulated entrenched systems that surrounded them and were an integral part of them.

On the other hand, it also showed the interest towards the recovery of some entrenched systems, developed mainly in the last years with the action actively promoted often "from below," shows difficulties in adopting a global vision, even if positively acknowledging the direct involvement of voluntary associations and shared citizens. As some

141 From the same root as fragile and break, in fact, fragment indicates both "the broken piece of something" and, from the opposite perspective, "the preserved piece of a work": a double meaning that simultaneously alludes to the intimate relationship between absences and presences that, as already stated, is etymologically also proper to the term vestige itself. Cf. QUENDOLO, 2014.

regional experiences show, in fact, very often the desire to maximize the valorization of the remains can lead to the double risk of dispersing the interventions and to consider the representation of the war as a succession of many "small fronts," each one very similar to the others, but with the ambition to say something particular.[142]

In other words, the main issue that emerges from this first survey of the status quo is that the fragmentation as a peculiar characteristic of the permanence of the vestiges in our contemporary world is reflected, not in a positive way, in an organizational and managerial fragmentation of the interventions. What we find is essentially a "problem of scale," a difficulty in adopting a systemic view capable of recognizing in the remains the components of a "mosaic," of a system conceived and planned on a territorial scale and characterized by deep relationships of mutual coherence between the elements (the current remains) that substantiated it, a "whole" that today, although physically "broken," is intangibly still very pregnant.

In the light of this observation, it is clear that if the responsibility of the present time is to ensure a "possibility of future" to the material evidence of the First World War, one of the main objectives of this research becomes the need to provide a valuable contribution to try to solve this interpretive-operational gap, placing as central the need to recover a systemic view, to analyze and strengthen the relationships between the fragments and the networks of relationships in which inserted them.[143] In other words, this means starting again to investigate the "landscapes of war" with the awareness of considering them as such, of observing them precisely because they are "landscapes." This awareness does not constitute a simple semantic game but imposes a substantial paradigm shift. While not entering into the complex difficulty of finding a univocal meaning for the term "landscape," which is not the objective of this study, what essentially unites the many definitions that have been given over time is its intrinsically relational nature, it's being a place where the systems of relationships produced by the interaction between man and the environment develop, sediment and modify over time, becoming carriers of meanings.[144] Therefore,

142 PIVA, ZADRA, 2003; ZADRA, 2014.

143 BADAN, BATTAINO, QUENDOLO, ZECCHIN, 2017; ALDRIGHETTONI, QUENDOLO, 2019.

144 The "landscape" is first of all defined, according to Jakob's studies, as a "representation in spatial relationship with nature" (JAKOB, 2009): what differentiates it from the "description" of the natural world is therefore in its being in some way a "relational" object, i.e., the product of a relationship established between a subject - who conducts the experience of observation from his perspective - and the surrounding nature.

resuming the investigation of the remains of the Great War through this interdisciplinary lens requires a change of scale, a momentary departure from the short-sighted and individualistic approach adopted until now, which has led to the parceling out of initiatives and projects, as emerged from the previous considerations, to welcome a broader vision, and overall one, apparently blurred but dense and rich in meanings and relationships that are difficult to recognize "up close."

Being able to recover a systemic vision is necessary both to recognize, at a tangible level, the close link between the permanent fortifications and the field apparatuses that surrounded and supported them to prevent the risk of loss and to be able to capture those networks of intangible relationships that, metaphorically connecting the different fortified positions, strengthened the fortified landscape as a system, making it significant.

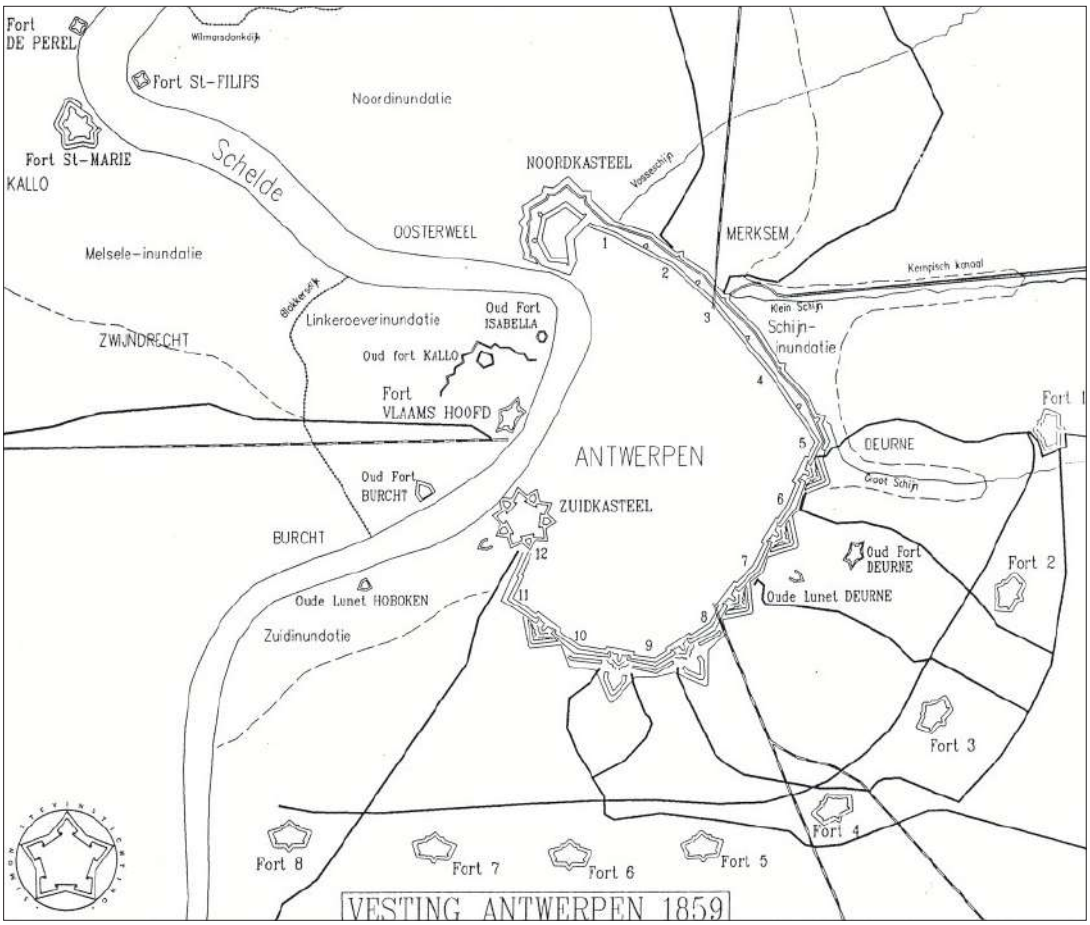
To begin to understand, therefore, how the vestiges of the Great War can continue to be a source of inspiration for various narratives, and at the same time become a concrete resource for the future, the research proposes to re-read the "war landscapes" from this new point of view, dilating to the "scale of the landscape" an attitude proper of the observatory of who wants to "take care" of the objects of the past, that is a cognitive process that develops to understand the identity of the good in the object, the peculiarities that define it's such, its personality, formed in the course of the time from the experiences of which it has been author and participant.[145]

It is about setting up a path of knowledge of the "contexts of war" as landscapes, focusing on the warscape to recognize and understand its specific "character" that, dilating to the scale of the geography what is usually referred to as an architectural artifact, "can only derive from the network of actions and events of which it [the warscape] has been witness and participant, theater and object, of which it keeps memory."[146]

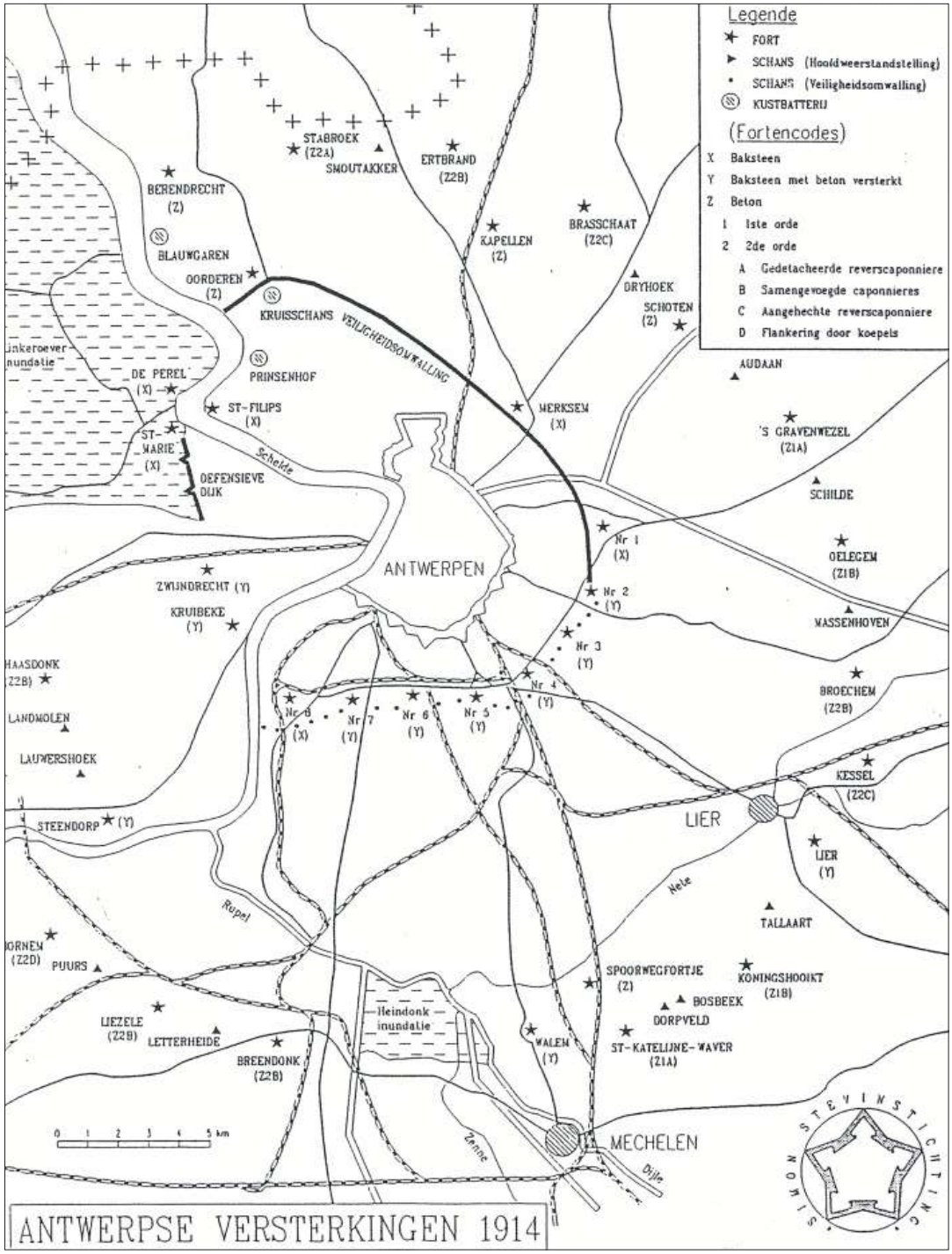
145 The building's personality, according to Sanpaolesi, is the unifying element of a given architecture in its place and with its experience, in the state in which it appears. The attempt to understand and then describe this personality is an opportunity to establish a dialogue between the observer and the observed, in order to go beyond the limits of an analytical, fragmentary and detached knowledge, to embrace a more participatory and intimate vision. In fact, if the objects we want to take care of pose "new problems and possibilities of knowledge, our attitude can only be one of listening, directed in the same way to the whole built environment" (DI BIASE; 1990), therefore also to a pervasive and widespread heritage such as the remains of the Great War. "The character of a building derives from what we perceive as peculiar and distinctive, it is the deep core of its being such for us, even if we can then isolate and treat separately the components related to its architectural nature, to the processes it has undergone and witnessed, to the relationship with the place or other architectures". See DOGLIONI, 2011.

146 DI BIASE, 1990.

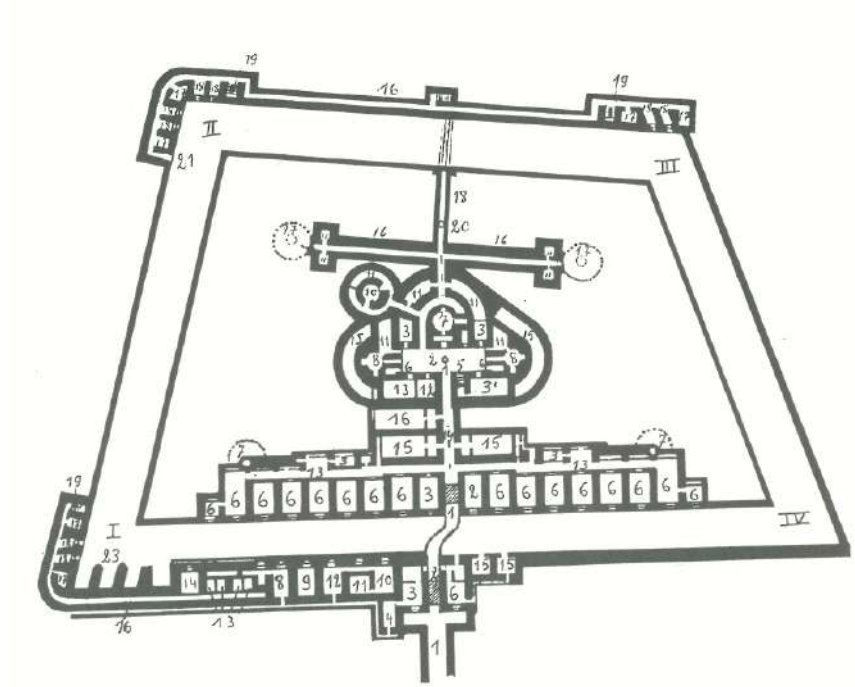
Photographic apparatus



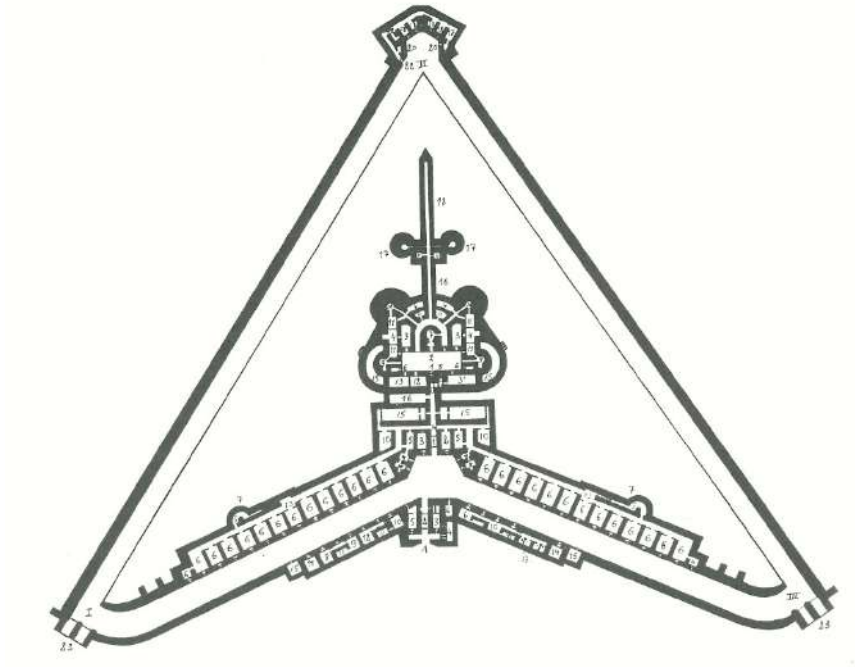
Pic. 2.1 - Antwerp area: militarization plans, 1859.



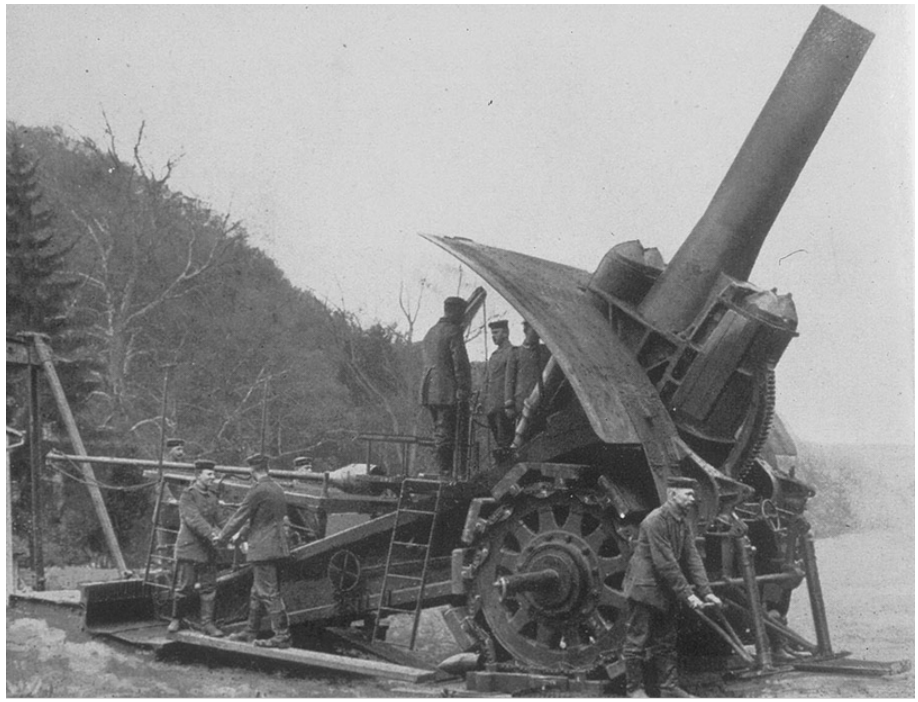
Pic. 2.2 - Antwerp area: militarization plans, 1878.



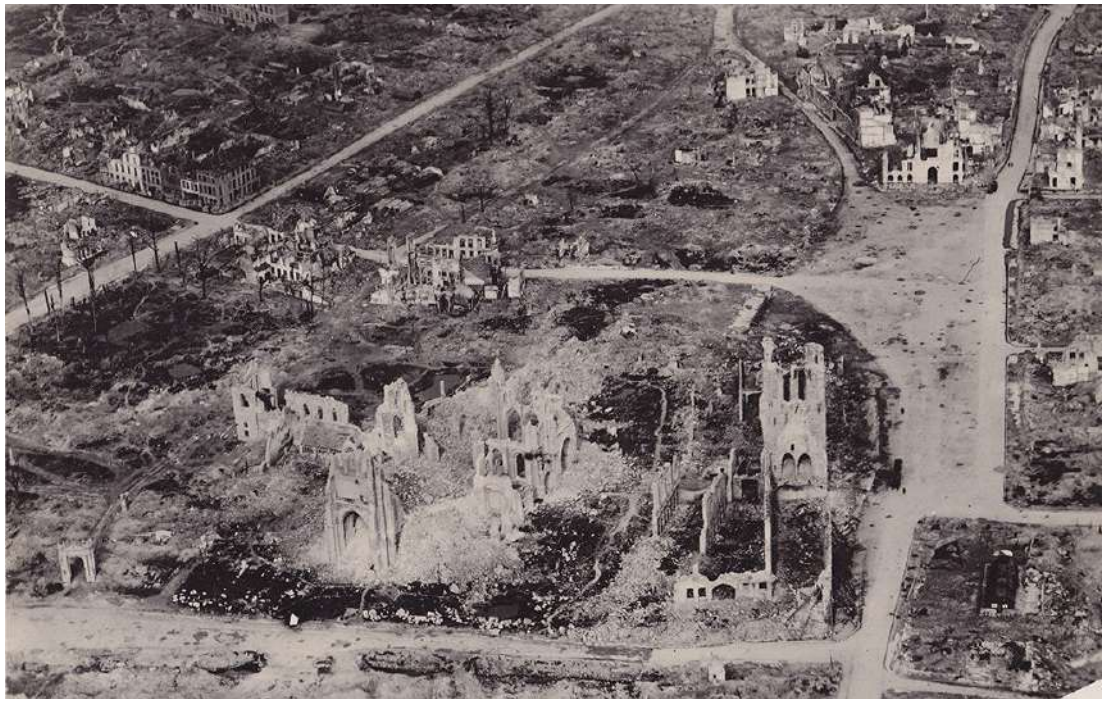
Pic. 2.3 - Fort Brialmont's type, quadrangular plant (A2, A2 1/2,B1, C1, D1 models)



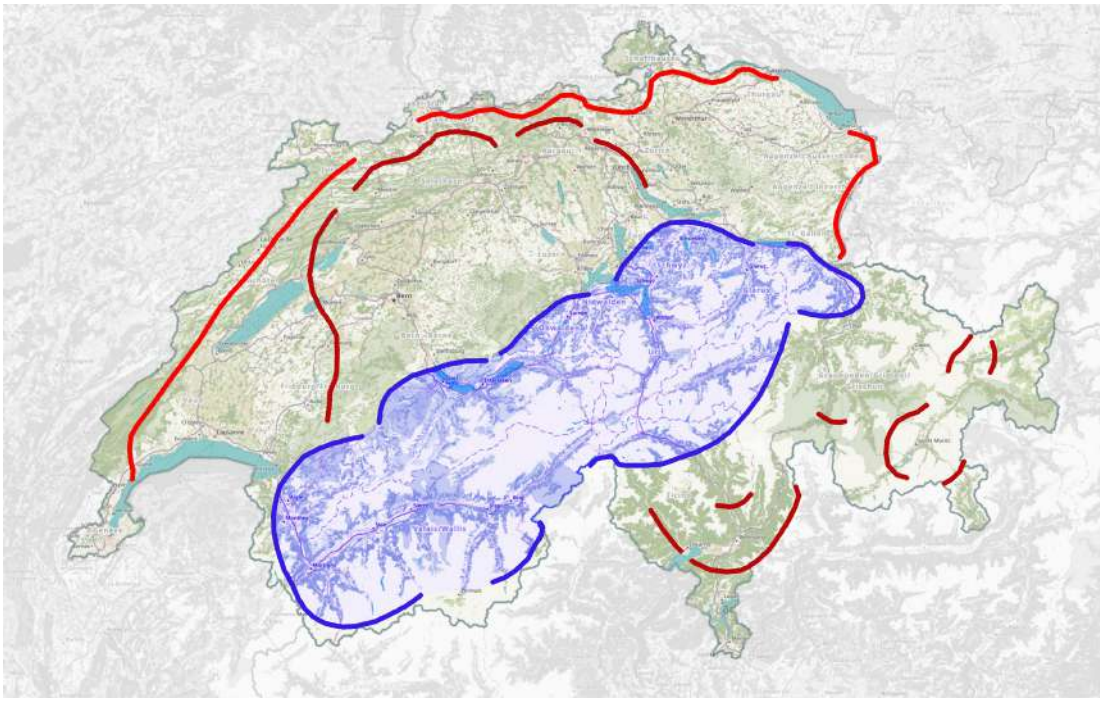
Pic. 2.4 - Fort Brialmont's type, triangular plant (A1, B2, C2, D3 models)



Pic. 2.5 - "The Big Bertha"



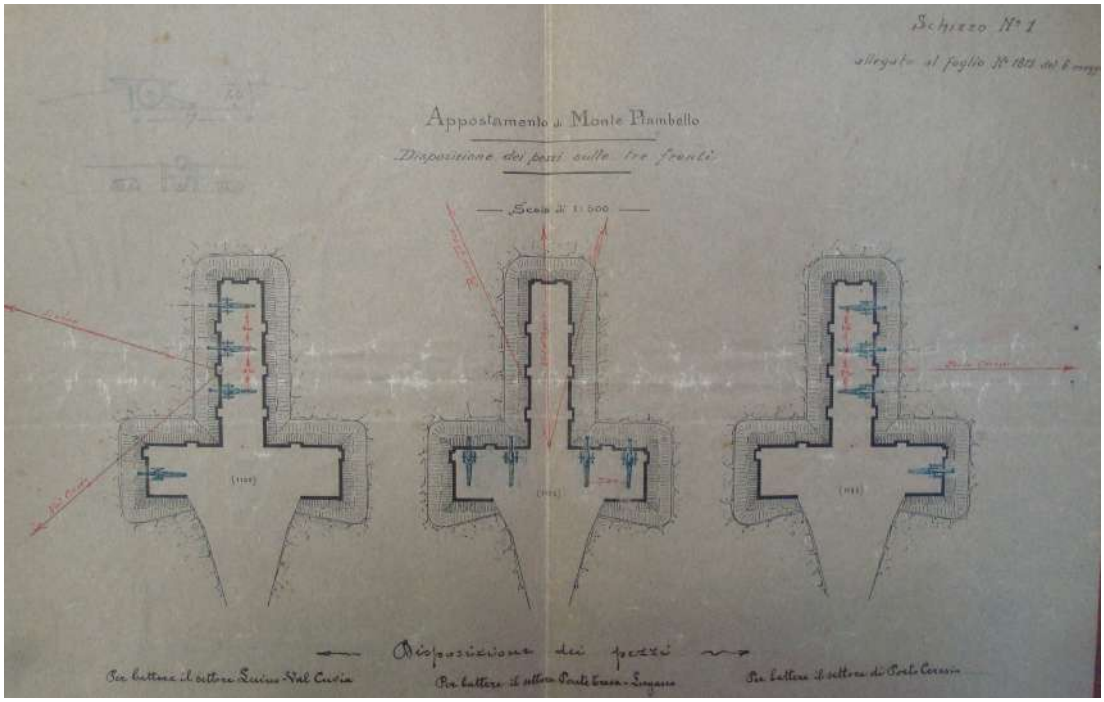
Pic. 2.6 - The destruction of Ypres, Beligum, 1918.



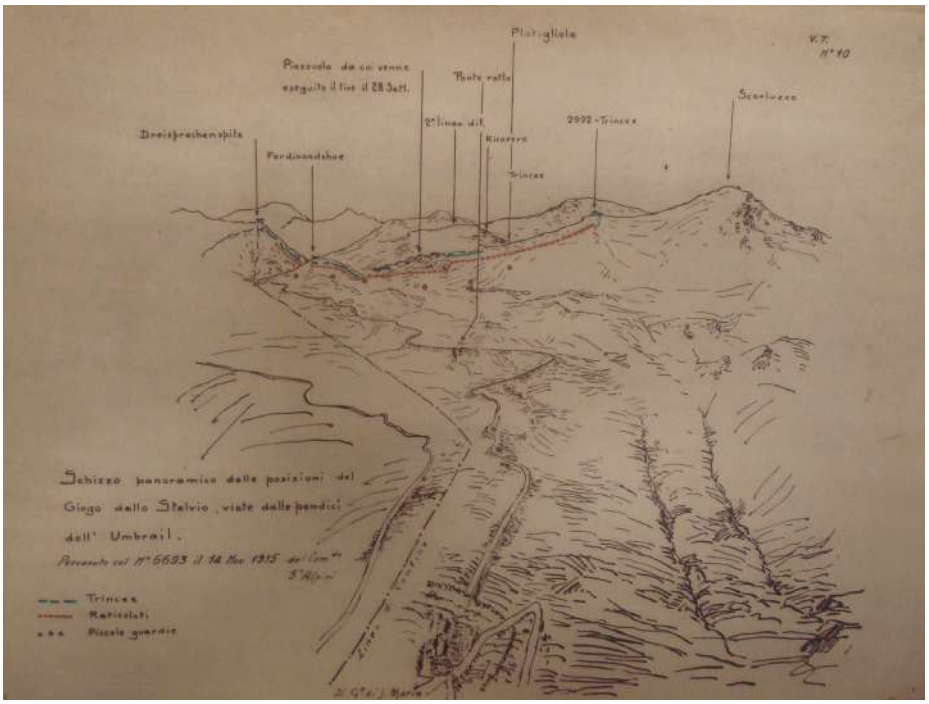
Pic. 2.7 - The National Redoubt, Switzerland

Pic. 2.8 - Workers in front of the north portal of the tunnel under construction (Gotthard). Detail of an Adolphe Braun photograph, ca. 1880.

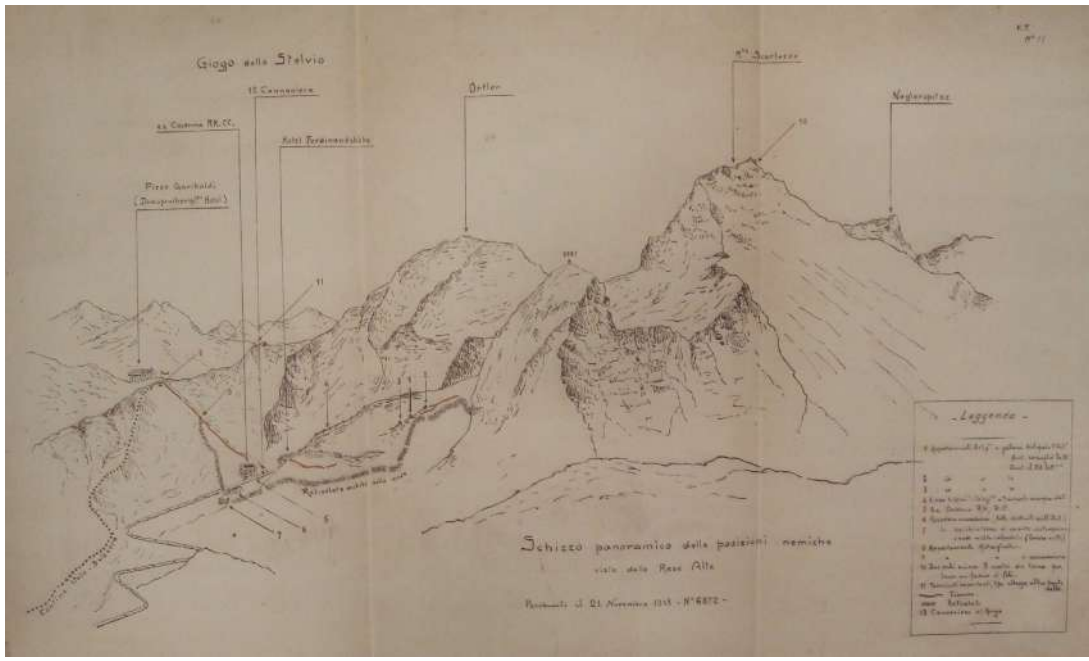
Pic. 2.9 - Ticino Salient: militarization projects



Pic. 2.10 - Monte Piombello, militarization projects.



Pic. 2.11 - Stelvio-Umbrail: militarization projects.



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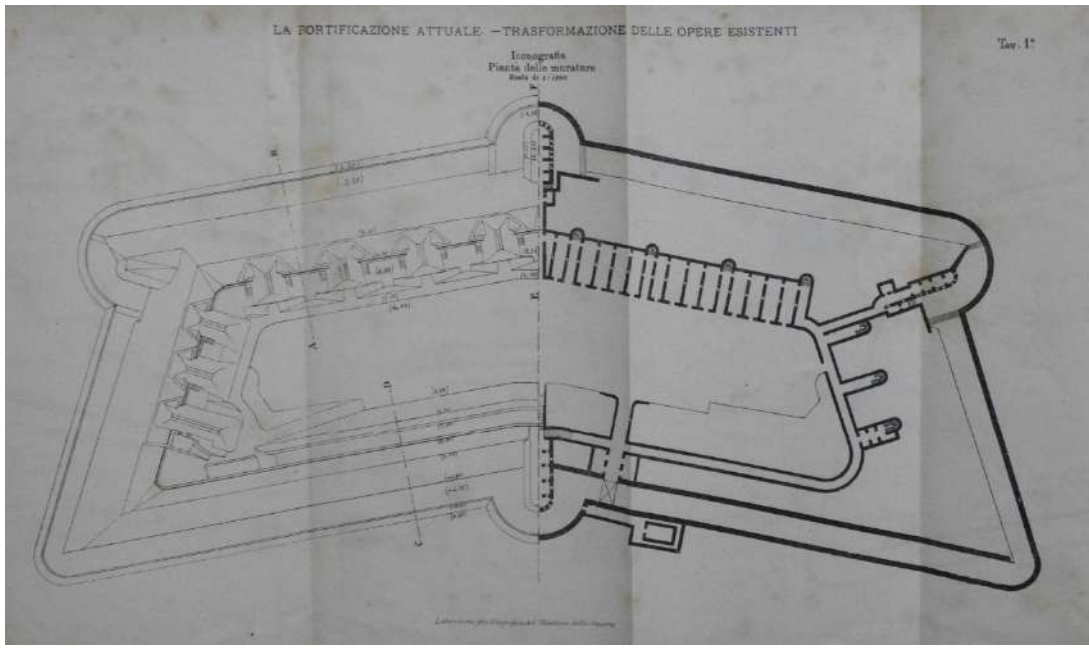

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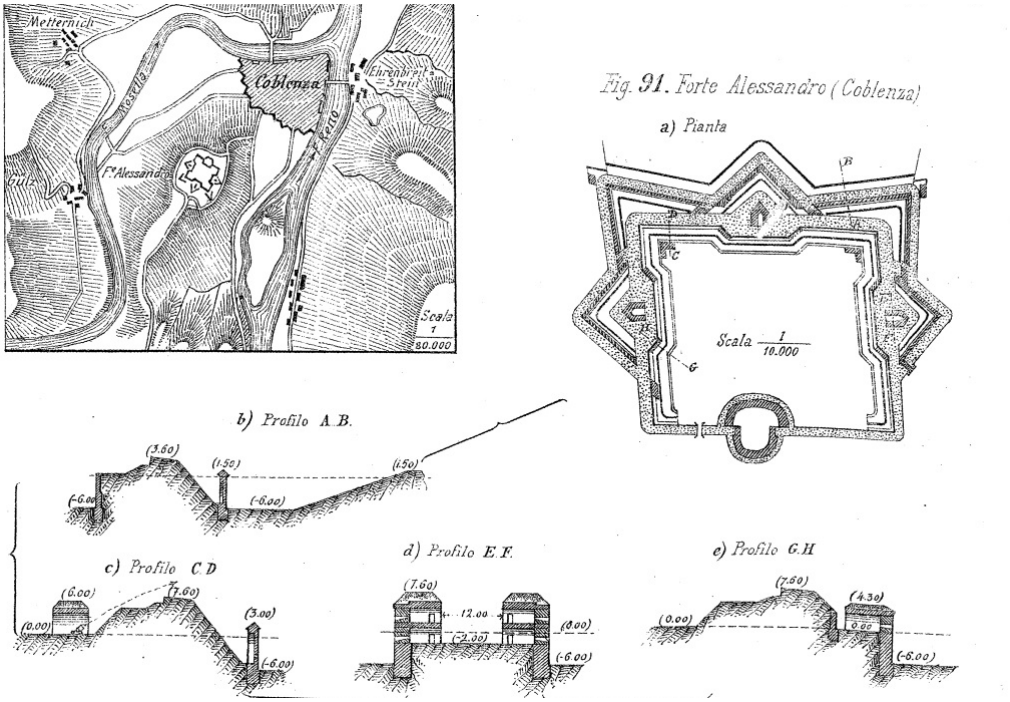

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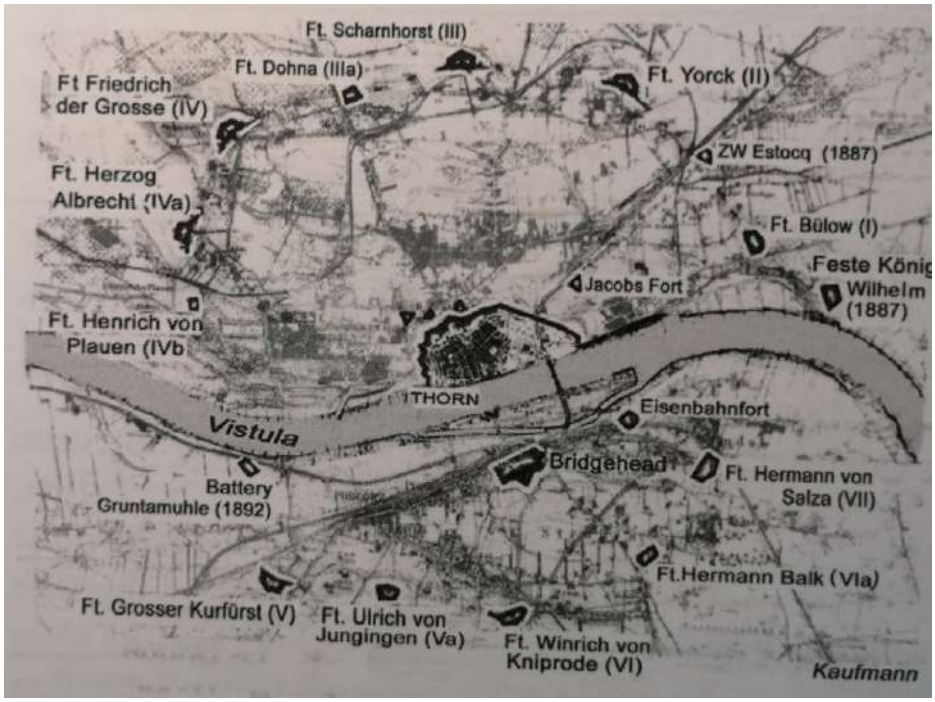

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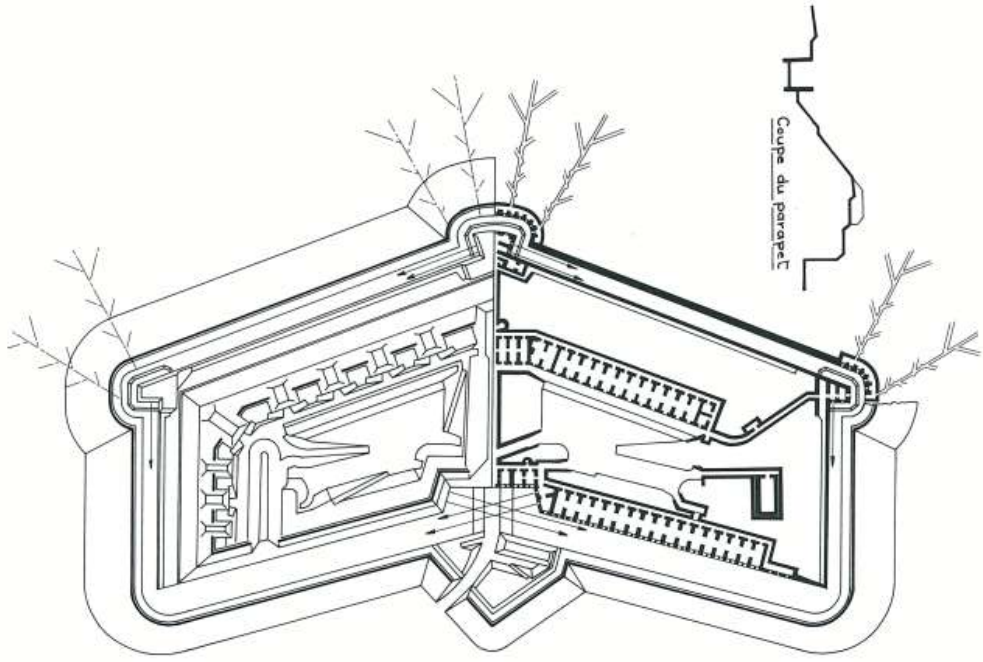

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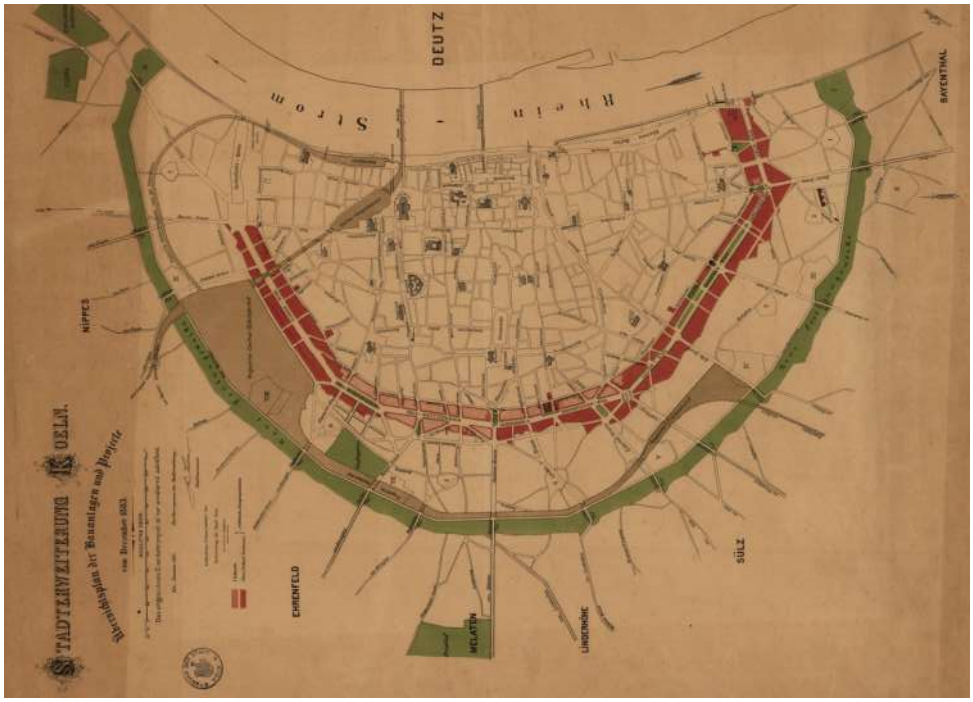

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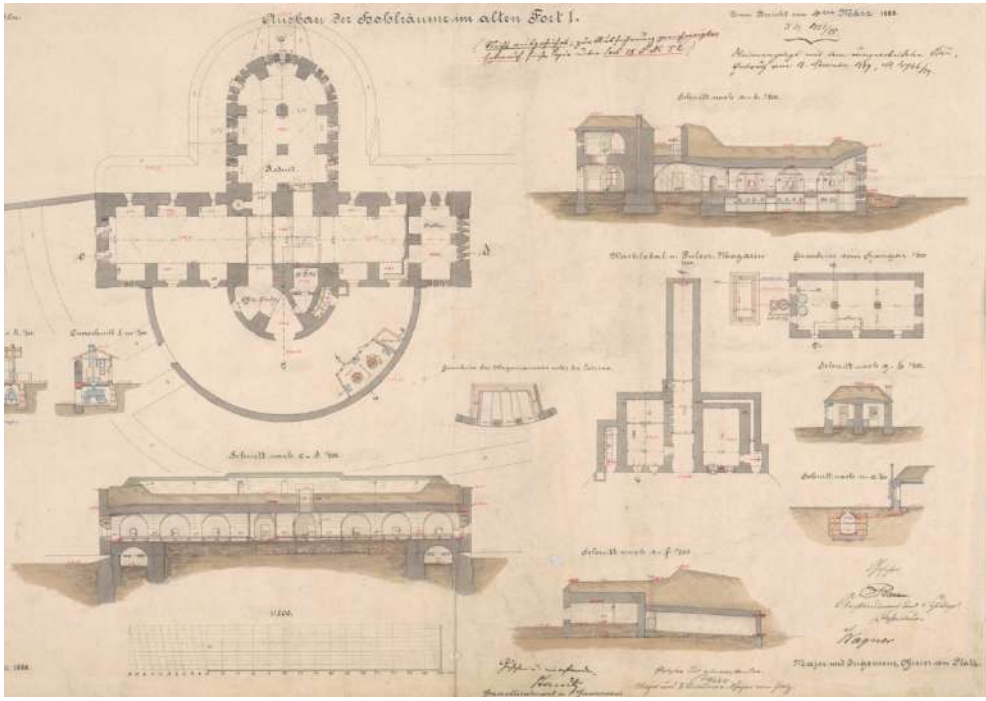

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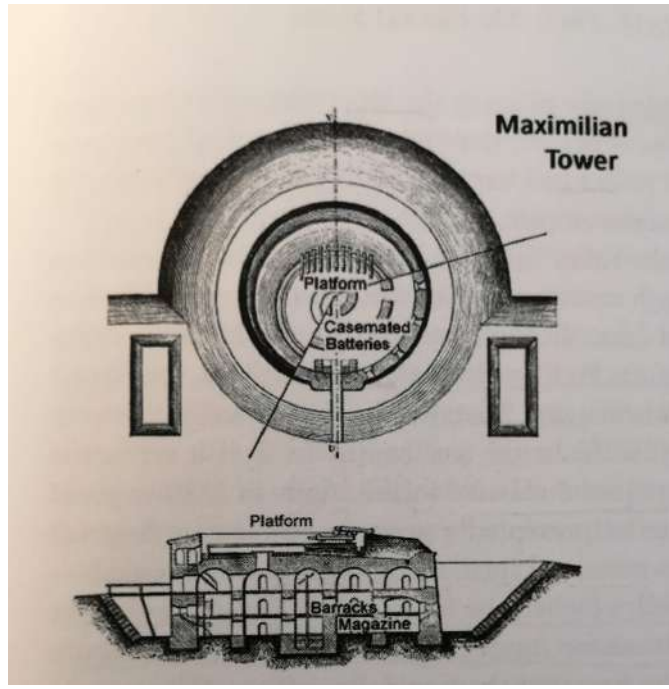

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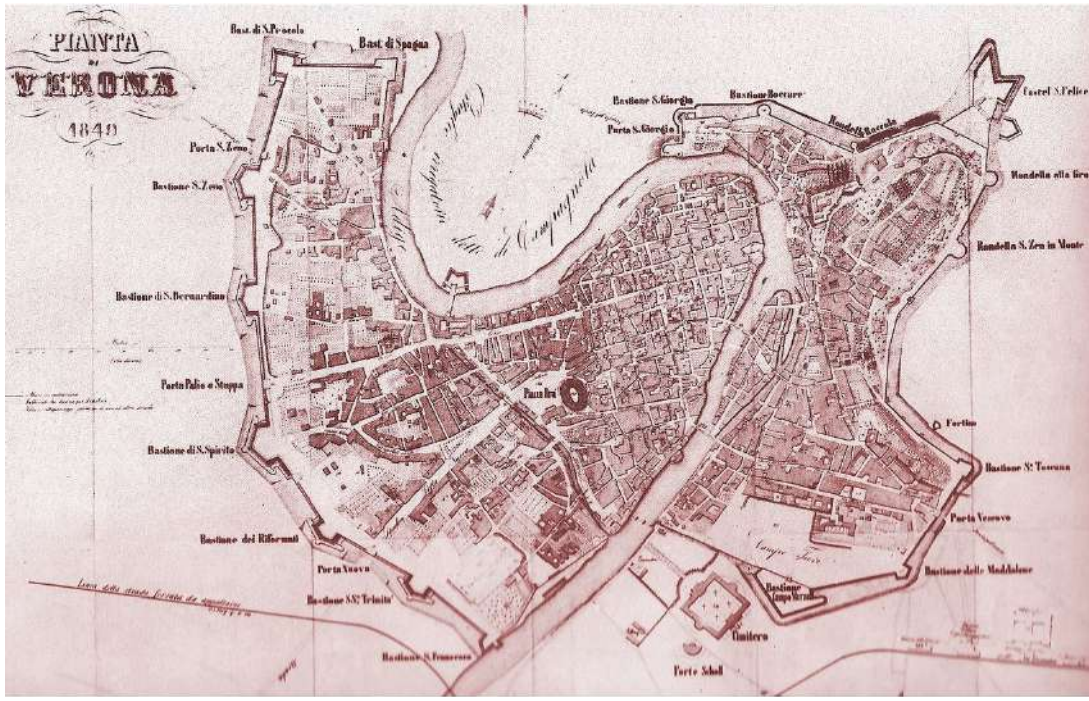

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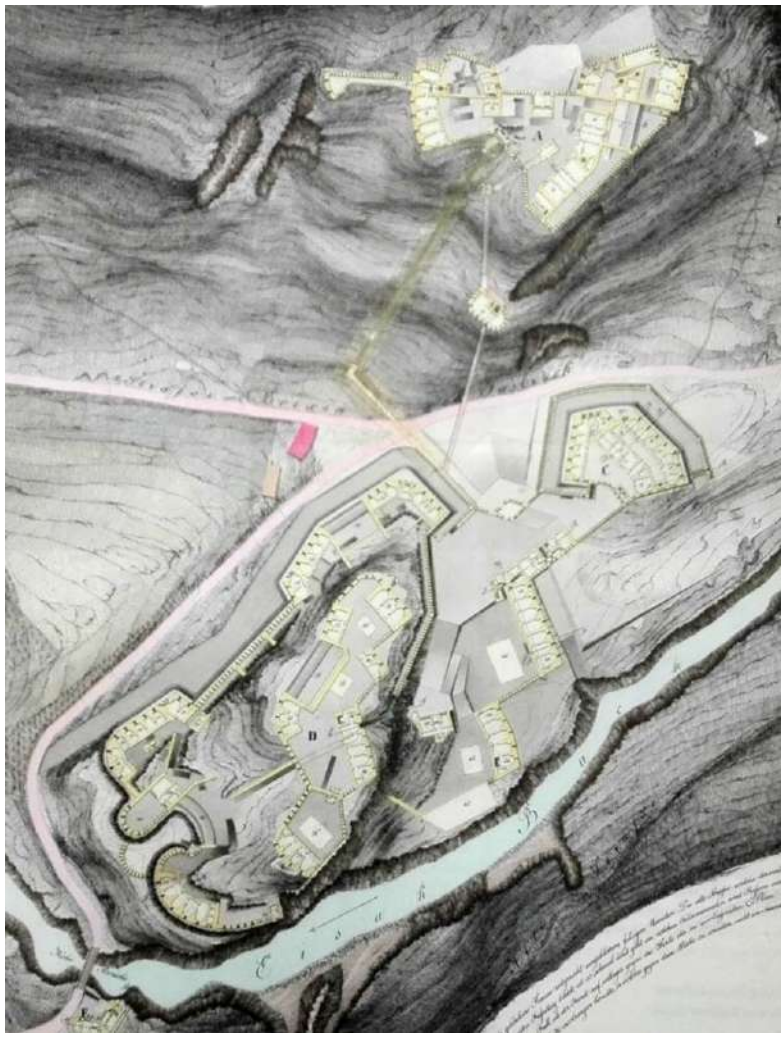

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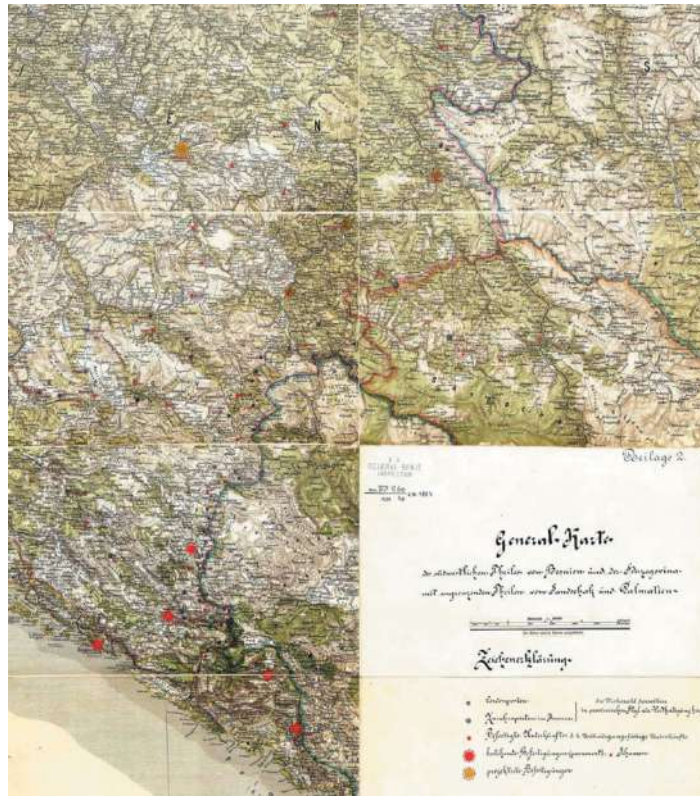

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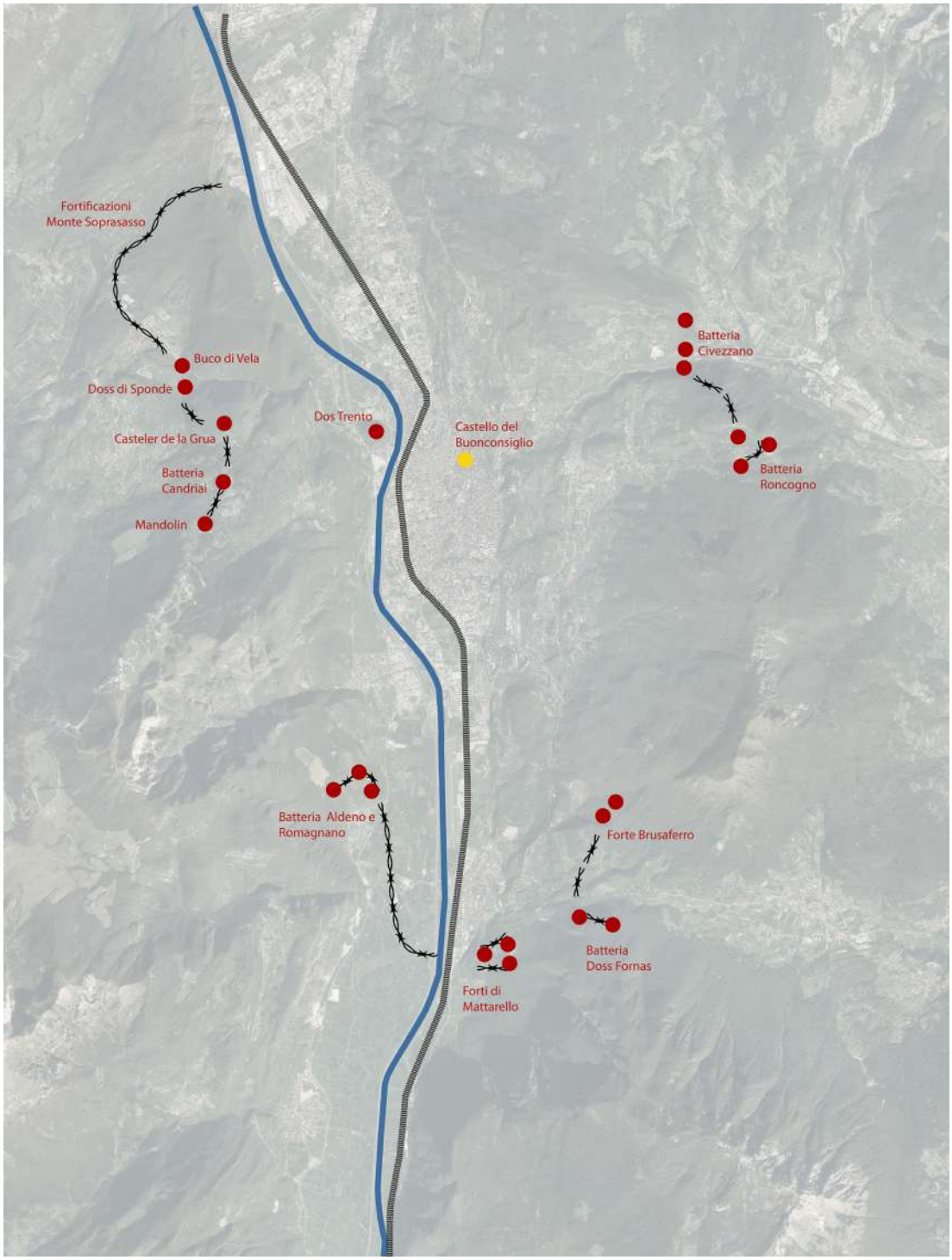

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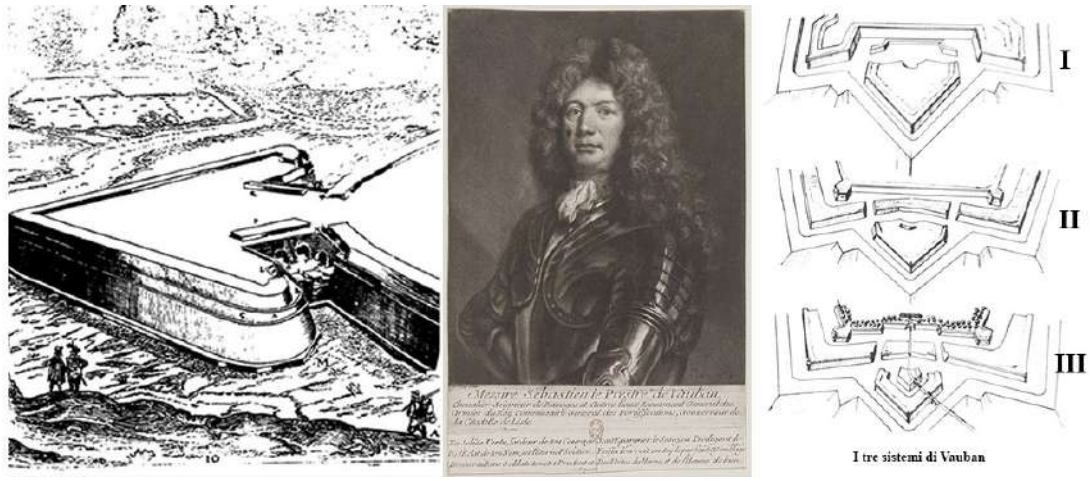

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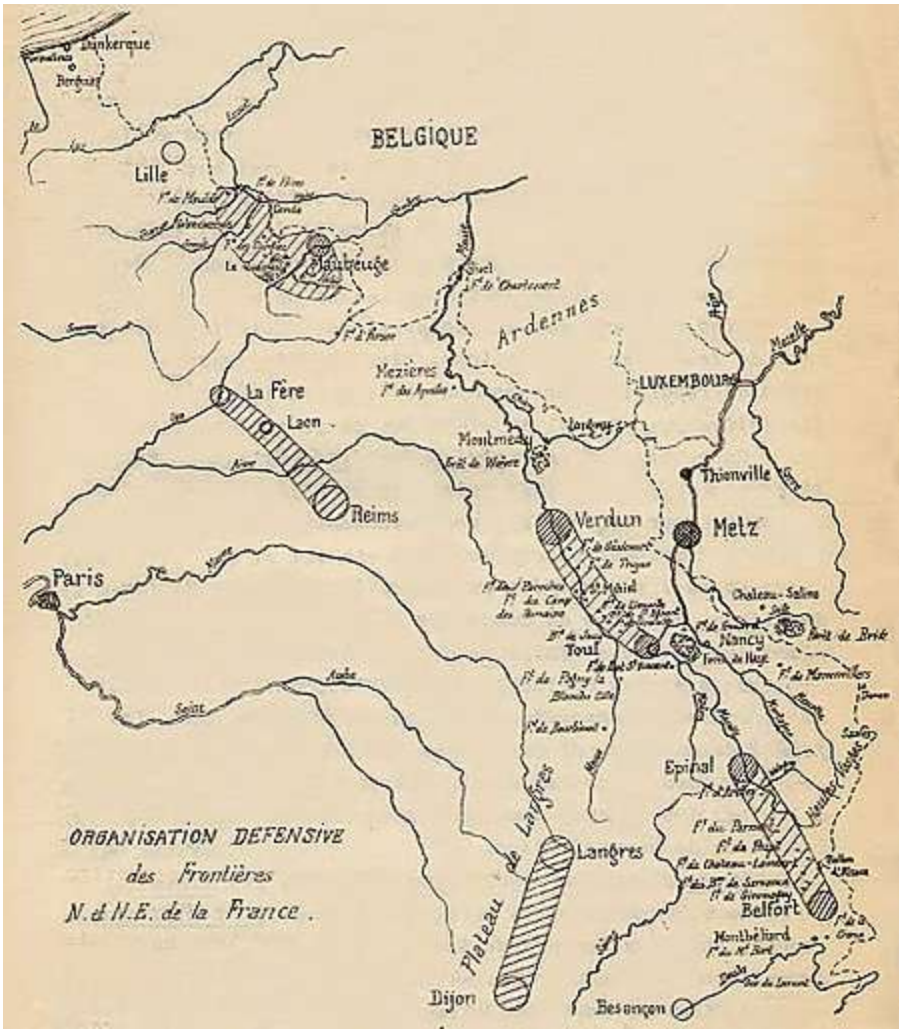

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Chapter 3

Warscapes biography: the need for a holistic approach to understanding the "character" of vestiges.

3.1. The polysemy of the landscape's concept

The need to go beyond the singularity of the fragments that make up the heterogeneous ensemble of vestiges in order to re-emerge their intrinsic relational nature, is expressed in the adoption of a multi-scalar approach capable of grasping the specificity of the individual artefacts and at the same time their being part of a "war machine" designed on a territorial scale, the functioning of which was based precisely on the symbiotic relationships between the artefact and its surroundings, between the individual fortress and the fortified system. In this perspective, it is easier to understand how precisely the networks of relations, not only concretely represented by the war infrastructures but also by the lines of sight with their relative radii and firing covers, constituted the arterial apparatus against which these fortified systems were designed, which precisely because of these considerations can be identified as militarised "landscapes". In addition, considering the subsequent significant layers that have been stratified on these systems both during the war period, in the physical "signs" of destruction and in the relative intangible values connected to them, and in the natural and anthropic transformations from the post-war period to the present day, these "fortified landscapes" may well be recognised as "cultural landscapes with a civic value", in that they bear witness to the intrinsic "character" of an entire historical moment and its evolution.

Metaphorically expanding the concept of cultural heritage (bene culturale) to the scale of the landscape, this consideration imposes an important "change of step" for those who study these landscapes in order to understand how to "take care of them" so that they can

continue to be "witnesses" in the near future[147]. This means resuming the investigation of the remains of the Great War with the intention of recognising the specific "character" that identifies them through an inter-scalar approach that places the "warscape" as such at the centre of the analysis and studies it in its entire nature and biography.

Starting again to investigate the remains of the Great War as "landscape" presupposes, however, a first necessary declination of the meaning of this term in the horizon of meaning in which the research is developing, also in relation to the multiplicity of meanings that it can assume depending on the disciplinary contexts in which it is used, as well described by the historian and landscape theorist Michael Jacob in his book "Landscape", in which he speaks of an "incessant landscape Babel that invades all domains of life"[148].

147 About the definition of cultural heritage and its specific meaning about the heritage of the relics of the Great War, please refer to the details presented in Chapter 2.

148 See JAKOB, 2009. In the face of a constant "landscape babel" that invades all domains of life, of which it seems difficult to understand the semantic limits and relative "areas of influence," what is universally recognized and shared is a definition of landscape understood as a complex material that is born and takes shape at the moment in which man, through perception, relates to his environment. The importance of perception in the cognitive process of the world had already been highlighted by Alexander von Humboldt in his "Journey to the Equinoctial Regions of the New Continent" in 1807. In this sense, the common denominator of the different ways landscapes can be understood is that they represent a cultural identity for the people who inhabit, experience, and transform them. The centrality of the landscape and the protection of its stratification are certainly not new elements in the context of national legislation, which since the early years of the last century has shown interest in defending the "most precious common good that Italy possesses." As early as 1922, Benedetto Croce defined the landscape as "the material and visible representation of the homeland," taking up a formula according to which the landscape was the "beloved face of the homeland," a very common slogan in Italy at that time, also attributed without certainty to John Ruskin. Ruskin was particularly esteemed by Croce, who defined him as the first true initiator of the European movement in defense of nature and landscape. In 1939 the Bottai law framed for the first time the instruments for protecting the landscape with the identification of protected areas "because of their considerable public interest" and the drafting of territorial landscape plans. With Article 9 of the Italian Constitution of 1948, landscape protection became one of the 'fundamental principles of the Republic's legal system and the origin of a long series of theoretical/regulatory reflections and debates on the relationship between the landscape-environment-territory and the relative powers. After the Galasso Law of 1985, an important point of arrival was the elaboration of the European Landscape Convention, a document signed by 39 European States in Florence on 19 July 2000, whose founding cornerstone consists in a new and wider meaning given to the concept of landscape, which no longer represents a "simple backdrop of which man is a spectator, but constitutes the entire scene in which society acts as a protagonist." The Convention is the first international treaty exclusively dedicated to the European landscape as a whole; it applies to natural, rural, urban, and peri-urban spaces and therefore recognizes in equal measure landscapes that can be considered exceptional, everyday landscapes and degraded landscapes. These assumptions were then acknowledged and deepened in the 2004 "Cultural Heritage and Landscape Code," in which landscape protection is defined as the safeguarding of "the values it expres-

Referring to the vast and rich bibliography on the subject for a more in-depth examination of the different declinations of this phenomenon[149], it is interesting here to propose a brief reflection that stems from the awareness of how the relational essence of every landscape, anticipated in the previous chapter, is already evident in the etymological origin of the term itself.

Analyzing the Anglo-Saxon origin of the term Land-schaft, we find the co-presence of the root Land-, which refers to the spatial concept of area/part of the territory, with the suffix -schaft, which derives from the verb schaffen, that is to create, make, shape. Also taken up by the American meaning of the term land-scape, this semantic structure proposes an ambivalent meaning that refers indistinctly both to a "specific portion of land" and to the interaction that takes place when this "object" [portion of land] is modified and shaped by a "subject who creates". This second declination of the term land-scape, mainly used in British English, clarifies how the identification of a given landscape (in the specific case of war landscapes) is firstly based on the conscious recognition of both the physical element that is transformed/influenced by external agents (e.g., the set of relics) and above all of the relational act in itself that triggered its formation (such as the strategic-military vision that generated fortified systems all connected by a dense network of military infrastructure, both physical and visual)[150].

In this sense, the first obvious relationship to which the term landscape alludes is obviously the interaction between man and nature, declined on a wider scale to the concepts of community that shapes the territory in which it lives according to specific needs in different time frames. The link between territory and community, which constitutes the Anglo-Saxon matrix of the concept of landscape just described, is also

ses as perceptible manifestations of identity, while enhancement promotes and spreads knowledge and use by the public." See Humboldt, 1807; TOSCO, 2007; JAKOB, 2009; PINTO, 2013.

149 See also ASSUNTO, 1973; TURRI, 1974; PUPPI, 1980; COSGROVE, 1990; TUAN, 1990; DEMATTEIS, 1998; SOCCO, 2000; TURRI, 2008; VALLEGA, 2008; BELTRAME, 2009; PINTO, 2013; SETTIS, 2014; ANTROP, VAN EETVELDE, 2017.

150 For a specific discussion regarding the different meanings of the term landscape in British and American English, see OLWIG, 1996; ANTROP and VAN EETVELDE, 2017. In the British meaning of the term landscape this aspect is even more evident since the suffix -scape, derived from the Old English -scipe, has the same root as -ship, whose meaning clearly alludes to the condition of mutual relationship between two entities (the terms Ship/Shipping are always linked to the world of fandom). The etymology is simple: first of all the suffix -ship in English indicates a condition, a state, a position (think of the words relationship, companionship, fellowship, friendship, citizenship). The term Ship, and consequently the verb that derives from it, To Ship, is more closely related to relationship and concerns the relationship between two characters, two actors, two celebrities. See CATALANO, 2012; CAGNATO, 2018.

confirmed in the translation mechanisms of the French word Paysage, and consequently in the Italian word paesaggio, where the choice of terms is grafted on the "symbiotic" concept of the relationship between inhabitants and territory, typical of the Roman culture[151].

With this awareness, the term landscape is therefore declined in the ability to express a place by representing the specificity of the relationship between a community and its habitat.

In this declination, it is evident how much the relational character of a landscape underpins its very recognisability and existence. Despite this, the meanings that are daily assigned to this concept are made more complex by the multiple connotations that it takes on when it is specified through the use of various adjectives combined with it to qualify its nature: natural landscape, agricultural landscape, rural landscape, urban landscape, industrial landscape, "cultural landscape". With a view to ascribing the Great War phenomenon to this line of reasoning, it becomes useful to delve into the definition of "cultural landscape". In this regard, the statement drawn up by the UNESCO World Heritage Convention in 1992 is interesting: "*Combined works of nature and of man" and "embraces a diversity of manifestationsof the interaction between humankind and its natural environment*". As can be clearly seen, it effectively summarises the effort, promoted at international level, to reconcile one of the most pervasive dualisms of Western thought, namely that of nature and culture[152]. Through the definition shared in the UNESCO Convention, in fact, the "cultural landscape" is identified precisely in the product of the interaction between the expressions of "human making" and the means they use to manifest themselves, namely the modification of natural elements.[153]

151 Jeanne Martinet argues that pays derive from the Latin pagensis, meaning both the inhabitant of a pagus (village) and the territory of a town: pages (ager). Runners, in turn, are rooted in the verb Pango (to delimit by driving stakes into the ground), expressing the concept of the habitat of a community. As for the suffix -age, the author herself does not exclude, despite the general rules, the meaning of indicating the action or the result of action even if applied to a noun and not to a verb. Cf. MARTINET, 1983; SETTIS, 2013; CAGNATO, 2018.

152 PANNELL, 2006.

153 The term 'cultural landscape' seems to have been used for the first time by the geographer Otto Schluter at the beginning of the 20th century. In 1908 he defined geography as the "science of landscape," or Landschaftskunde, giving it an independent field of action not shared with other disciplines. Schluter outlined two particular forms of landscape: the original landscape (Urlandschaft), i.e., the landscape before human-induced changes, and the cultural landscape (Kulturlandschaft), i.e., the landscape created by human culture. Geography had to deal precisely with studying the relations and reciprocal relationships between these two types of landscape. The idea of 'cultural landscape' was probably put forward by Carl O. Sauer, a cultural and human geography scholar. He emphasized how human activity, as a product of the culture of a given society, was able to shape the landscape. Sauer defined the cultural landscape in this way:

From this point of view, 'wartime landscapes' can rightfully be included among 'cultural landscapes', since, for example, the articulated plans for fortifying territories constituted a clear 'expression of human activity' which, from the second half of the 19th century onwards, began to shape and transform the territorial and ecosystem structures of a large part of Europe, both near the future front lines and in the more inland territories. Similarly, the 'signs of destruction' inflicted heavily on the landscape by the conflict itself represent the outcome of a continuous process of anthropogenic modification of the environment in which it occurs.

In the specific case of the warscapes, however, the destructive impact of this process (war) has not only violently imprinted the traces of history on the landscape, but has also simultaneously opened up lacerating and painful "wounds" in the spirit of the communities. This triggered the development of a long process of perceptive and sensorial recognition which, over time, has led to the identification of these war landscapes as "places of memory", reservoirs of accumulation consisting of tangible "signs" built for and by the conflict but also permeated by the intangible values linked to them, in which the perception of "what has been" continues to live on in the contemporary world as an educational stimulus for the development of the future civic sense of the communities.[154] In this perspective, we can understand how "war landscapes" are actually multi-layered palimpsests with different depths of meaning, the result of the continuous and mutual interaction of natural and anthropic factors that have determined the transformations at different times, and that are made manifest through the perception that different communities have of them.

This consideration coincides exactly with the polysemy, developed over time, according to which each specific cultural landscape constitutes a reality that can be perceived by individuals both in its material dimension, in the set of physical elements that make it up, and in its dimension of mental image, the result of the encounter between these elements and the individual who perceives and understands them through his own perception and sensitivit. This is one of the most complex aspects of

"The cultural landscape is forged from a natural landscape by a cultural group. The culture is the agent; the natural elements are the means, the cultural landscape is the result". Following these initial definitions, the concept of "cultural landscape" underwent numerous revisions and adaptations until, in 1992, the World Heritage Committee decided to organize a meeting of "specialists" to advise and assist in the rewriting of the Committee's Operational Guidelines to include "cultural landscapes" as an option for the listing of heritage properties that were neither purely natural nor purely cultural in form (i.e., "mixed" heritage). For a more detailed discussion of the topic, see SAUER, 1925; MARTIN, 1981; HABER, 1995; FOWLER, 2003; PANNELL, 2006.

154 For a specific discussion of the socio-anthropological consequences of the conflict and the theme of memory, see the in-depth discussion in Chapter 5.

this concept, which clearly refers to what Farinelli has recognised as the "wit of landscape": its being "*a word [...] that serves to intentionally designate the thing and at the same time the image of the thing*".[155]

The long and articulated theoretical-disciplinary path that led to this reflection was made explicit in the definition of landscape drawn up by the Council of Europe (2000) as an outcome of the European Landscape Convention (ELC) organised in Florence in 2000: "*Landscape is defined as an area, as perceived by people, whose character is the result of the action and interaction of natural/or human factors*". This definition recognises the landscape's dual cultural dimension as a physical and at the same time intangible place, on which the various natural/anthropic interactions have deposited, generating message-bearing "signs" which, if identified by communities through perception, can become cultural, identity and spiritual values defining the character of the landscape as a whole, its personality.[156]

Declining this definition to "war landscapes", understood as "perceived objects" through the gaze of the communities that relate to them, means therefore recognising them as real multi-layered palimpsests, repeatedly, at different times, to be investigated with different relational

155 Farinelli, 1991. Not only Farinelli but also Raffestin refers to this second dimension, "landscape is an intersection between the physiology of the eye, subjectivity and social mediators": as the author himself explains, this means that the physiological act of looking at something (a landscape, in this case) is not neutral, since, at the very moment in which the eye grasps the object in its materiality, specific meanings and interpretations are attributed to it; these in turn, although they indeed depend on the experiences, personal values and sensitivity of the perceiving subject, are to some extent influenced by the "social mediators," that is, by the "cultural schemes" in force in the society to which the subject belongs, from which he can never totally disregard. See RAFFESTIN, 2005.

156 In an interdisciplinary vision, it is evident how this reflection reverberates, on a broad scale, the path that since the end of the 1970s has accompanied the theoretical debate within the discipline of architectural restoration, especially in the Italian context, towards increasing attention to material culture, recognized as a "vehicle of knowledge regardless of the form," and therefore understood as a place where the "signs" of time and history are stratified and deposited, forming a physical layer rich in potential meanings. There is a growing awareness that purely analytical-descriptive knowledge, even if in-depth, cannot be considered exhaustive in the contemporary debate. Doglioni sums up this concept well, stating that "research that scans the characters of the parts and searches for their meaning, as if they were single words in a sentence, must at some point turn towards the whole of the construction, to try to understand the meaning of the sentences and the whole text. We are not only referring here to the necessary identification of the artifact through the references and tools of architectural history [...]. In addition to this, and also based on this, we want to achieve an understanding of the object based on the ability to read it as a whole through the suggestions and emotional reactions that architecture in its place arouses in us, and we must be able to grasp and describe". In other words, implicit reference is made precisely to the wise and relational sphere, allowing an almost adequate understanding of the object under analysis, indispensable for grasping its essence and personality. See DOGLIONI, 2015.

approaches to empathise with them in order to identify their authentic "character" and reconstruct their evolutionary biography.[157]

In fact, the biographical approach can help to find the most effective "observation modes" to reconstruct the transformative dynamics of the different warscapes, in order to elaborate a solid cognitive basis as an indispensable presupposition to consciously set up the possible future choices with respect to their destiny.[158]

3.2 Multi-stratified palimpsests at different times: *prewar, wartime, post-war*.

Investigating "warscapes" in order to understand their evolutionary biography means investigating their current complexity by breaking them down into their constituent parts, i.e. recognising the different layers that, over time, have determined their construction, in order to understand their meanings and reciprocal relationships.

It is therefore a question of recognising the intrinsically dynamic character that characterises the various warscapes (just like any other "landscape" as such) and identifies them as a particular kind of chronograph capable of recording the passing of time through the "signs" deposited on them by the continuous reciprocal interactions between natural processes and human activities.[159] In this perspective, the "war

157 The biography of a landscape provides a holistic account from its genesis to the various events that have characterized it over time, in a broad interdisciplinary perspective. Since 1979, when Samuels introduced this term to refer to the fundamental role of individuals in the formation of landscapes, understood as "expressions of the author" who create them, historical knowledge of the part of communities, their ideas and actions about the landscape have become fundamental aspects in describing its evolutionary history. Transposing traits of the human person (character, personality) to the landscape expresses the tendency to consider it part of our life horizon. Therefore, the biography of a landscape is a simple description of the evolution of elements, structures, and themes and focuses on the history of their relationships and interactions and the causes of their transformation. For further discussion see also Samuels, 1979; Kopytoff, 1986; Gomez, 1998; Bloemers, Kars, van der Valk, Wijnen, 2010; Kolen, Renes, Hermans, 2015; ANTROP, VAN EETVELDE, 2017; CARAFA, 2020.

158 The objective of elaborating a methodological path to better understand the evolutionary biography of a given landscape is aimed at building a cognitive base helpful to empathize with the landscape itself, to understand its potentialities and criticalities, to focus on the distinctive traits of its personality and above all on the needs it needs to continue to express its own "voice" and experience. In other words, it means developing a broad and pervasive knowledge as the basis for future choices in terms of protection, conservation, and transformation. In other words, it means adopting an attitude of profound respect towards the object under analysis, to be able to outline its prospects without betraying its "sense" and quality. See PALANG, 2001; ANTROP, VAN EETVELDE, 2017.

159 DOGLIONI, 2015.

landscapes" are recognised as organisms in continuous mutation, on whose "skin" not only the interactions with the external environment are resolved, but which accumulate over time "original and acquired figurative values and meanings".[160] Adopting a transdisciplinary approach, this means recognising this stratification, and therefore the warscapes as palimpsests written and re-written by many hands in different temporal layers, as "historical evidence", to be studied and understood by refining the gaze at different depths, in order to be able to "preserve [...] as the most precious of heritages ".[161]

Recognising the intrinsically changing character of the landscape also means taking up the concept well expressed by Marc Augè, according to whom "a landscape is the meeting of different temporalities", in order to place the concept of time, in its multiple and interdisciplinary meanings and nuances, at the centre of reflection.[162] Without going

160 The reference expands to the scale of "war landscapes," a commonly held reflection in the field of architecture on the action of time and the treatment of multi-layered ancient surfaces. Marguerite Yourcenar already stated that time, the "great sculptor" imposed profound modifications on the materials of architecture through its processes of slow degradation and abandonment, as well as through the direct actions of man himself. These modifications bear witness to a work experience and are therefore not necessarily harmful, but some of them may even be sublime. Carbonara stated that it is precisely these continuous changes that 'add an involuntary beauty, associated with the cases of History, due to the effects of natural causes and time [...] to the beauty as intended by a human brain, an era, a particular form of society. In this perspective, the reverberation of Ruskin's positions regarding the recognition of architectural surfaces not as mere "places of decay" but as "places of historical testimony," characterized by those "second" picturesque and symbolic values, which are summarised under the name of "patina," is evident. Adopting a multi-scalar approach, the expansion of these considerations to the different warscapes makes it possible to outline a single horizon of meaning capable of recognizing precisely in the multi-layeredness of these complex palimpsests the distinctive features of their personality. For further information on the subject, see RUSKIN, 1849; YOURCENAR, 1985; CARBONARA, 1990; DOGLIONI, 2015.

161 Reflections on the passage of time and its stratification of layers and meanings refer back to the fundamental concepts addressed by John Ruskin in dealing with the "Lamp of Memory," in which he says: "And if we know how to derive some profit from the history of the past, or some relief from the idea of being remembered by those who are to come, which may give conviction to our actions, or patience to our tenacity today, there are two tasks that confront us with the architecture of our country whose importance cannot be overestimated: The first is to give a historical dimension to the architecture of today, the second is to preserve that of past eras as the most precious of legacies." See, RUSKIN, 1849.

162 For the contemporary anthropologist M. Augè, the landscape is a place for losing oneself and finding oneself again, which has to do with the geographical and spatial dimension and the historical and temporal dimension. In contrast to the uniformity of non-places, the secret of a landscape lies in its "sense of time," i.e., in its being a tangible testimony in which we find the permanence of different temporalities, of historical moments, stratified one on top of the other. And for Augè, these permanences are the ruins; the material remains of one or more pasts that persist in a changing time such

into specific theoretical details, for which there is a rich and fertile bibliography to which we refer, time represents the very essence that drives the entire work of those who want to "take care" of the objects of the past, whether they are artefacts, architecture or landscapes, as in this specific case.

The transformative effects linked to the passing of time, in fact, manifest themselves regardless of the object in question, changing its visible characteristics and making each new condition different from the previous ones, thus triggering various impulses, even of opposite sign, with respect to different approaches to consider these transformations and to operate on and with them.[163] In this sense, wide-ranging and in-depth reflections have already been elaborated with reference to the ambivalent ways of considering change as degradation and decay, but also as a potential process of enhancement of a given good.[164]

In order to better understand the centrality of this double interpretation of the concept of time, it is necessary to make explicit a statement that constitutes one of the fundamental assumptions for the discipline of architectural restoration but, more generally, for the actions of anyone who has to deal with the "things of the past", and therefore also with the "landscapes of war".

This is the recognition of the good in question as a product of the interaction between a material datum, physically visible and which can be experienced, and an intangible meaning that constitutes its essence, a quid value that identifies and characterises it in a specific way23. This recognition, although unanimously shared, has triggered the development of a heated interdisciplinary debate, at both theoretical

as contemporaneity, in which everything changes incessantly. If we apply this thought to the "landscapes of war," we can understand how the remains are ruins, fragments that, precisely as such, tell of their "being in time," their fragile incompleteness, which makes them so fascinating. For more on this subject, see AUGE', 2003; REGNI, 2009.

163 SETTE, 1996; CARBONARA, 1996.

164 If by definition, restoration must act on the effects of time, there is now a consolidated awareness that degradation and decay should not be considered in an exclusively negative sense. While being the cause of pathologies that can potentially compromise the very existence of an asset, and which must therefore be resolved through restoration, the action of time does not act only in diminution but must also be rightly considered for what time has given and can give to the building, and which, if not acknowledged, could be irresponsibly canceled by uncontrolled actions of indiscriminate contrast towards every effect of degradation. It is as much a question of tangible aspects as a value charge that is gradually formed and constitutes precisely the testimony of experience. Ruskin asserted that it is precisely in that "golden patina of time" that we must look for the true light, the actual color, the true preciousness; Riegl maintains a similar position by distinguishing the "historical value" from the "value of the antique"; Augè summarises the reflection by speaking of the "sense of time." See RUSKIN, 1849; RIEGL, 1903; AUGE', 2003; DOGLIONI, 2015.

and philosophical level, regarding the nature of the relations between these two dimensions, their mutual in- or inter-dependence and the will to identify possible prevailing relationships, also with regard to the possible ways of "taking care of them ".[165]

Without going into detail, the clarification of this assumption is essential to highlight how the effects of the passage of time are manifested both on the "physical signs" of the "built material", with natural processes of ageing/decay but also with the stratification of "new traces", and in the stratification of as many significant layers (immaterial values) of which these "signs" are custodians and witnesses.

In this perspective of meaning, it is therefore clear to identify the different "landscapes of war" as multi-layered palimpsests in history and time, "accumulation basins" on which the very imprint of the conflict was strongly impressed not only as a result of the original plans fortifications, designed by the different military Geniuses in close relation to the morphology of the territories and underpinned by a general systemic vision, but also through the "signs of destruction". In this regard, it is significant to highlight how the destructive impact of the conflict has determined a continuous process of "construction of new landscapes", in which remains, rubble and debris have often become the construction materials to create new opportunities, new morphologies, new "significant layers". Finally, the erasures, rewritings and transformations concerning the dynamics of post-war modification have determined the stratification of other layers that, very often, have further contributed to change, often weakening, the strength of the original systemic structure.

Investigating, therefore, the modalities and trajectories according to which these multi-layered palimpsests have evolved and transformed over time is an indispensable prerequisite in order to identify - and try to resolve - the main fragilities of this set of "signs" so that they can continue to narrate their "being in time" in the future.

In other words, it is a question of recognising and interpreting this "being in time" of the various warscapes through a lens of observation in which the very concept of degradation, expanded to the scale of the landscape, takes on a new meaning, going beyond the reference

165 The question of the existence of an intangible quid that characterizes a given asset has been at the center of a heated debate within the discipline of architectural restoration, which has contributed to reflecting on the very nature of the conservation approach and its relative declinations. To summarise the issue, Bellini's reflection is significant: "is the object what the material datum gives us back and allows us to experience today; or does it have a quid, a meaning that constitutes its essence not conditioned by the material? [...] We can discuss endlessly whether this quid exists or not [...] however if I have to operate taking it into account I have to identify it, and it is connected to the object". See BELLINI, 1990.

to mere material decay to become an indication of the construction/ transformation processes that have determined its stratification. In this sense, the "signs of time" become the means of a cognitive relationship between subject and object, in which the observer is able to come into contact with the very dimension of the passage of time, to which the tangible traces bear witness.[166]

If, at a general level, change is "a difference in the state of an object, place or area between two moments in time"[167] then trying to reconstruct the evolutionary biography of "war landscapes", from their conception to the present day, means identifying at least three different temporal layers (pre-war situation, wartime, post-war to present day), to be studied through the identification of both the main dynamics of transformation within them, and the specific impulses that have determined them.

In this regard, it is necessary to remember that interest in the elaboration of different and in-depth analytical models, through which to investigate the transformations of the landscape, began at the end of the 1980s, and has been increasingly amplified in proportion to the awareness of how the different evolutions and modifications in the use/covering of the land constitute one of the main factors influencing environmental change as a whole.[168] In order to have a solid understanding of the changes, it is also necessary to know the different functions, both real and symbolic, that the landscape itself has assumed over time, and the relative and underlying processes27.

In other words, it is necessary not only to identify different temporal layers of analysis, understood as "macro-phases of landscape construction", but also to identify the underlying driving forces that have stimulated and determined these changes, those key processes or drivers that have influenced the orientation of the different evolutionary trajectories of the landscape.[169]

166 QUENDOLO, 2001.

167 ANTROP, VAN EETVELDE, 2017, p.185.

168 BAKER, 1989; DALE et al. 1993; MCDONNELL and PICKETT 1993; MEYER and TURNER 1994; BURGI, HERSPERGER, SCHNEEBERGER, 2004.

169 The study of identifying the driving forces that determine landscape changes has a long tradition within the disciplines of geography and landscape. As early as 1969, Wirth elaborated a kind of general geographical-cultural theory of these forces subdivided into economic, social, and public parties. However, the driving forces of change form a complex system of dependencies, interactions, and feedback loops and influence different temporal and spatial levels. For this reason, their definition is complicated and not unambiguous. In general, one can distinguish between studies that interpret human action itself as one of the main driving forces in transforming the surrounding landscape and research that focuses instead on the interrelations between man and nature. In the 1990s, for example, Kates, Turner, and Clark developed a new study that identified the need to investigate human-environment relations to better place human-induced dri-

The analysis of these driving forces is particularly complex because they form a dense network of dependencies and reciprocal interactions on numerous spatial and temporal levels, which make their specific and individual identification difficult. This difficulty is reflected in the presence of various proposals in the literature that attempt to classify/ group these driving forces, but always with the awareness of advancing solutions in continuous evolution, not closed and definitive[170].

In this horizon of sense, applying this analytical approach to the warscapes allows us to advance a first, perhaps not obvious but certainly predictable, consideration that identifies the war event itself, in its most complete form, as the main driving force that determined the radical transformation of European landscapes from the second half of the nineteenth century onwards.

This observation can certainly be shared both with reference to the complex processes that led to the elaboration of the different plans for the militarisation of the territories in anticipation of the war, and with respect to the wartime itself, in which the imprint of the conflict was more markedly impressed on the European landscape, marking it "in body and soul", and of which all the field works suddenly arranged on the various fronts and the craters of exploded bombs and mines are clear evidence.

However, investigating the different warscapes by considering the conflict itself as the sole driving force would be reductive: both because of the intrinsic complexity of the "Great War phenomenon" in itself, and because what are now considered "wartime landscapes" do not paint the desolate picture they must have looked like in the immediate post-war period but, while retaining this imprinting, they are also the result of all the transformations/ stratifications that occurred in the subsequent temporal layers, and were therefore stimulated and determined by other driving forces.

In this perspective, it is more effective to consider the Great War phenomenon as the general driving force that substantiates the entire horizon of meaning against which the different temporal strata previously identified can be "broken down", to be analysed specifically by identifying other precise driving forces that have determined the relative dynamics of transformation and that can direct the trajectories of future change.

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ving forces and the interrelationships between them and human behavior towards them. For a more in-depth study of the topic, see WIRTH, 1969; KATES, TURNER, CLARK, 1990; WOOD, HANDLEY, 2001; BURGI, HERSPERGER, SCHNEEBERGER, 2004.

170 Antrop and Van Eetvelde recognize, for example, four leading families of driving forces: demography, economics, politics, and natural disasters. Burgi, Hersperger, and Schneeberger identify five driving forces: socio-economic, political, technological, honest, and cultural.

3.2.1 Pre-war: constructive experimentations concerning the morphology of the territories and the evolution of artillery

In chapter 2.1 above, we have already presented the complex political-operational processes which, starting from the second half of the 19th century, have determined, in the various European countries, the main phases of development of plans for the militarisation of territories in anticipation of war. Elaborated by the various military Geniuses down to the smallest details, mainly with the aim of defending their borders from potential enemy attacks, these territorial plans define the first temporal layer useful for analysing the various phases of the "construction" of the warscapes. [171]

A first general analysis clearly shows how these large-scale militarisation projects profoundly upset the European landscape of a hundred years ago, transforming it into a dense network of field and permanent fortifications, a web of trenches and shelters, barracks and underground shelters, connected by a labyrinthine system of military infrastructures, all designed in close relation to the morphology of the different territories, carving up the terrain, excavating the mountains, reorganising the territorial assets and the original environmental ecosystems. In a short time, this phenomenon catalysed the attention of the entire world towards certain landscapes that had previously been marginal, but which during the war became the centre of gravity of the tragedy. From mountain fortifications to the construction of underground shelters against grenades, from transformation projects linked to masking or camouflage, to the creation of a dense network of connections to connect the front line with the most inland territories, the places designed by the war have not only involved border areas, but have determined the historical forms of the landscape affecting wider contexts, thus contributing to the construction of much of the modern and contemporary territory.

Such considerations seem to accurately paraphrase Rachel Woodward's assertion that 'military geographies are everywhere; every corner of every place in every land in every part of this world of ours is touched, shaped, seen and represented in some way by military forces and activities".[172]

Reconstructing the dynamics underlying the development of these "military forces and activities" therefore implies the integrated study of the various influencing factors that have determined them, and which refer to reasons of a different order: political, economic, social, technical/

171 For an in-depth study of the evolution of militarization plans and fortification projects developed by the main European countries in anticipation of the Great War, see the previous chapter.

172 WOODWARD, 2004, p. 3; PEARSON, 2012.

technological, anthropological and cultural. Although we are aware that it is precisely in the integration and reciprocal influence of these aspects that we find the reasons on which the various militarisation plans were drawn up, the priority here is to focus attention on identifying the main driving forces relating to the strictly planning and typological-constructive aspects of the works designed for war.[173]

In this regard, a first important consideration stems directly from the general survey of sites and artefacts previously presented in chapter 2, in which the very close symbiotic relationship between the typological nature of the various constructed works, linked to offence and defence, and the physical nature of the terrain on which they were built, clearly emerges.

Both with regard to permanent works and, even more so, with regard to field works, the fortification models in the military manuals drawn up in the mid-nineteenth century, which were repetitive and modular in nature, were adapted from time to time in terms of construction techniques and tactical solutions, in relation to the different morphological and geographical conditions and the specific physical characteristics (such as the nature of the soil, the hydrography, the presence and types of vegetation) of the territories in which these works were to be built.

In addition to the military science taught in the "war schools" and military academies, it was the orography of the terrain with its complex micro-geographies made up of different altitudes, wooded plots, deep valleys, rocky spurs, marshes, grassy and cultivated expanses that directly imposed the types of actions and the planning of strategies.

In addition to the military science taught in the 'war schools' and military academies, it was directly the orography of the terrain with its complex micro-geographies of different heights, wooded plots, deep valleys, rocky spurs, marshes, grassy and cultivated expanses that dictated the types of action and the planning of strategies.

In this regard, the following statement expressed in 1896 by General Saint-Mars, commander of the 12th French corps, is particularly significant: "The soldier's shield, immense and multiform, is the terrain with its innumerable accidentals; starting with the strategist, who moves the masses of men, and ending with the isolated marksman, who wields only his rifle, each triumphs only because of his ability to use the nature

173 The focus here is on studying the driving forces that determined the evolutionary and planning development of the built structures linked to the Great War, and therefore to the changes in the landscape connected with this phenomenon. In reality, however, as previously stated, the complexity of the driving forces brings together different aspects and economic, political, and social factors that, albeit indirectly, have influenced the evolutionary biography of these warscapes.

of the terrain ".[174] This phrase effectively condenses the central role of the terrain and its natural versatility to be "used" as a priority design element of the "transient fortification". In this sense, the Great War, as a war of position, more than other conflicts was connected to the physicality of the ground, which was dug, engraved, worked with the aim "not of immobilizing the soldiers but of providing lines of shelter to advance ".[175]

In this perspective, a profound change in the very idea of field fortification is evident: while in the past it was considered a tool of "passive defence", in this period it became a necessary condition for the offensive, to allow soldiers to advance within the range of enemy fire through the provision of temporary shelters, the construction of short trench lines adapted to the sinuosity of the terrain, and the use of natural incidents as protected positions.[176] These shelters (e.g. shelters of progressive formation, covered shelters, shelters for gun ports, and others) and firing positions (for seated, ground, kneeling and other marksmen) were built according to different types of construction developed in relation to the different morphological conformations of the contexts in which they were inserted, as is amply documented in the Military Manuals drawn up by the various Geni.[177]

Through this lens of observation, therefore, the morphology of the territories can be rightly recognised as having a fundamental role of centrality as an "active element", capable of determining specific design choices, directing planning towards different fortification orientations.

174 MAGGIOROTTI, 1990. p.56.

175 Particularly significant in this respect is the war in the Far East, in which the Japanese army showed great skill in shaping the terrain as a defense. This is well explained in the words of Gen. E. Rocchi in his treatise on the "Study of Field Fortifications," in which he writes: "In the young Japanese army, in which there seems to be no hereditary repugnance to removing the earth, the link between tactics and shelter has reached such an intimacy that it has left behind much of what [...] has been written for over twenty years. Sudden fortification does not serve the Japanese as a passive defense to cling to the terrain but as valuable support to the offensive to ensure stopping points in the advance. In each rifleman line, a soldier fires while a neighbor digs, then there is another rifleman, followed by a loader, and so on. But unlike the European armies, the small Japanese soldiers dig while lying on the ground to not offer a target to the enemy. When they are tired, they are replaced by the neighboring soldier whose place they take in the firing action. Thus, with the constant alternative of work and fire on the part of the soldiers making up the elementary group or the quadrille of the chain, the most advanced line can be buried without the enemy noticing. The lines that follow then find a good and ready shelter'. See also BREDA, 2012.

176 MARINELLI, 1915, p.9.

177 For a specific in-depth study of the different types of construction of permanent and field fortifications, see the details discussed in Chapter 7. For a more in-depth study of the Italian context, see also BONAZZI, 1891; ROCCHI, 1898; MAGGIOROTTO, 1900; MARINELLI, 1915; CIRINCIONE, 1925; BERGONZI, 1926.

The examples in this regard are varied: from the construction of road cuts and valley barriers to the construction of underground forts entirely dug into the mountains; from the exploitation of karstic caves to build observatories, deposits and shelters, to the intricate entrenched systems dug deep into the plains of Flanders; from the development of specific technologies for waterproofing trenches in "below sea level" contexts, to the defensive adaptation of rocky spurs as natural allies/enemies for temporary defence.

In the light of the above considerations, therefore, in this first temporal stratum of analysis, the orography of the territories can be considered to all effects one of the main driving forces that has directed the dynamics of transformation of European landscapes towards the "construction" of future warscapes.

In addition to this, however, it is necessary to examine a second aspect, intrinsically connected to the previous one and equally fundamental and decisive: the substantial contribution sustained by the specific evolution of construction techniques and technologies in the fortification field, developed in response to the progressive improvement of armaments.

This consideration leads us to reflect on the already well-known artillery-fortification pair, in respect of which the evolution of defensive systems has always gone hand in hand with that of the instruments/means of attack. In this respect, it is important to highlight how, in the second half of the nineteenth century, the unceasing faith in limitless progress, supported by numerous scientific discoveries and important technological innovations, stimulated the introduction of armaments with ever greater destructive potential. Between 1883 and 1885, there was a revolution in artillery, with the introduction of new materials such as rifling, which led to a significant improvement in the length, accuracy and effectiveness of firing trajectories, and the invention of picric acid, a powerful explosive that increased the destructive power of black powder artillery by 3 to 4 times.[178] In addition, ordinary grenades were gradually replaced by shrapnels, hollow projectiles filled with

178 Picric acid is a highly explosive material, first mentioned in Johann Rudolph Glauber's chemistry notes in 1742. At first, it was created from specific nitrites found in animal horns, silk, and natural resin. Its synthesis from phenol and the correct determination of its formula was successfully outlined in 1841. In 1873, Hermann Sprengel proved that picric acid could be made to detonate. So, in 1885, French chemist Eugene Turpin patented pressed and stretched picric acid for explosive charges and artillery projectiles. In 1887, the French government added nitrocellulose to it and adopted this explosive under the name melinite. In 1894, Russian workers devised a method of manufacturing artillery shells. Shortly afterward, the foremost military powers used picric acid as their primary explosive material. However, bullets filled with picric acid became highly dangerous as the mixture reacted with the metal on the bullet casing, creating a compound more unstable than rifle cartridge primers.

lead balls and small grenades with much greater destructive power.[179]

In response to these technological advances, the various military Geniuses were forced to test the degree of resistance of the existing fortifications with various experiments, sacrificing some permanent fortifications such as Fort Malmaison in France or Fort Cerro on Lake Maggiore in Italy.[180] The results were as evident as they were disconcerting: all the fortifications built up to then using traditional construction techniques proved to be absolutely ineffective and obsolete.[181]

At this juncture, therefore, the revolution in the field of artillery stimulated constant research and experimentation to identify new materials capable of withstanding and counteracting the destructive power of the new weapons.

The various fortification schools began to develop innovative structural solutions both to strengthen existing fortifications and to identify avant-garde types of construction for new constructions. In a short time, therefore, the priority objective became the gradual abandonment of the "traditional types" of masonry and earth, in order to increase the resistance of the protective masses with the introduction of new materials such as cement concrete, steel, and their various combinations.

As early as 1888, the Belgian school, in the person of the charismatic engineer General Brialmont, proposed the total abandonment of ordinary masonry constructions in favour of concrete structures for roofs, vaulted or flat, and for piers and retaining walls.[182] More generally, for the new permanent fortifications the casemate type of fort was proposed, rather than the open-air type, which was progressively

179 These are hollow projectiles filled with steel lead balls and fitted with a bursting charge connected to a time fuse. The fuze was adjusted to ensure that it would explode before the projectile made contact with the ground or the target. With the introduction of specific fuzes, shrapnels were used for anti-personnel and anti-aircraft purposes. Their first use in war dates back to 1808 when England used them during the Battle of Vimeiro, but they were also used extensively during World War I, World War II, and the Vietnam War. A model known as the 'shrapnel grenade' was also invented, which contained, in addition to the lead balls, a small grenade which, when exploding, was thrown together with the balls and, thanks to a percussion mechanism built into the fuse, exploded on contact with the ground, increasing the destructive effects.

180 For an in-depth look at the different experiments carried out on existing fortifications to test the degree of resistance of varying construction technologies, see ISGRO', 2019.

181 "*Dalle esperienze di Kummersdorf (Germania) risulta che un blocco di calcestruzzo spesso 3m, senza alcuna copertura può resistere ad un colpo di granata-mina; dalle esperienze di Bourges (Francia) si sa che le cariche di melinite nel calcestruzzo producono solo imbuti profondi 30 cm, con diametro variabile da 1.20m e 1.56m; effetti molto più devastanti si sono avuti nelle opere in muratura ordinaria*". In ISGRO', 2018.

182 Brialmont, 1888; FAQUE, 1987.

adopted not only in the Belgian fortifications of the Meuse, but also in the Italian fortifications of the Rocchi system, albeit with some variations.[183] This new type of construction envisaged a central fortified nucleus made up of a narrow concrete bank slightly protruding from the ground, within which the various emplacements for the guns (protected by fixed or revolving domes) and the ammunition rooms were located. The caponieres, considered too fragile, were replaced by counterscarp galleries; less exposed than the caponieres, these galleries were part of the counterscarp wall itself, and led to the fort by means of an underground tunnel that passed under the moat. In some forts new entrances were created, better protected from firing and located at the bottom of the moat, also known as "war entrances".

Similarly in France, among the many forts already built by General Séré de Rivières, the strategically most important ones were chosen and modernised with a new 'structural skin' made of substantial concrete layers up to 2.50 m thick and other reinforcement works (for example the strongholds of Verdun, Toul, Épinal, Belfort and Maubeuge), while other forts were downgraded to the role of observers and protection devices.[184]

More generally, many European countries embraced the idea of experimenting with the new construction material and, in this direction, special laboratories were gradually installed to carry out structural tests and samples of the different cement mixtures obtained using different types of binder, among which the most resistant turned out to be the more expensive Portland cement.

In this perspective, the most illustrative example that allows us to synthesise and clearly understand how the reciprocal relations between technological factors and the orography of the territory marked the evolutionary dynamics of the 'landscapes of war' in the period prior to the war itself, is the fortification approach adopted by the Austro-Hungarian school.

With reference to the permanent fortification of the Austro-Hungarian Empire, in fact, the five unanimously recognised "generations of forts"

183 In Italy, a fortification model similar to that proposed by Brialmont gradually spread but reworked in a sort of 'simplified version' developed by General Enrico Rocchi: the school of reduced armored forts with independent defense. This typology aimed to reduce the number, size, armament, and equipment of individual regiments containing extremely high construction costs. Rocchi's basic idea was to build solid and robust fortresses in orographically advantageous positions to defeat the enemy's permanent works and field artillery. About the types of fortifications adopted in Italy on the southern front, see what has been presented in chapter 2 above. For further in-depth analysis of this subject, ZANOTTI, 1891; GUIDETTI, 1913; AGO, 1915; AMILCARE, 1955; MENEGHELLI, 2012; TRECCANI, 2015; ISGRO', 2019.

184 LA HALLE', 2001; www.fortiffsere.fr by VAUBOURG e CEDRIC.

presented in chapter 2 represent exactly different solutions with respect to the reciprocal interactions between the two driving forces presented above. In the first two generations the orography of the mountainous territories was the determining factor in the typological-constructive choices: in the valley and road cuts with the construction of structures designed to guard and bar any strategic passages, and in the "Trentino style" forts, built using only locally available building materials, with a plan-volume development that adapted to the terrain and exploited every possible natural obstacle as a potential defensive garrison. Compared to the third-generation forts, however, the revolution in the field of artillery made it necessary to adopt new typological-constructive guidelines, today recognisable in the "Voegl style": these are casemates on a sloping front, made of concrete, with revolving armoured domes and shields to protect the artillery, equipped with elevators, lighting and ventilation ducts. The fortified nucleus was developed on several levels with a compact volumetric system, the front surface protected by thick walls, covered with granite blocks and inclined at about 45° so as to bounce any bullets upwards. To complete and protect the ravine ditches, caponieres and even some "Traditor" type cannons were inserted. To this type of forts belong many fortifications of the walls of Trento and some defensive systems in the Alto Garda area. The incessant technological evolution of armaments and of the relative destructive power laid the foundations for the development of the "Armoured Forts" (fourth generation), the peculiarity of which, apart from the massive use of concrete reinforced with iron girders, was the presence of thick zinc plates to protect the thick concrete roofs, testimony to the high level of development reached by the European iron and steel industry of the time in metal casting techniques46. Finally, the fifth and last generation of forts, in which the awareness that no armour would be able to protect the fort from the newest weaponry led to exploiting the different morphologies of the territories as far as possible, digging the fortresses completely inside the mountains and creating the so-called ipogei forts.

In the light of all the above considerations, the long and complex path that led to the militarisation of European territories, from the second half of the 19th century to the dawn of the Great War, appears to have been a complex planning process, whose design choices were profoundly oriented as much by reasons of construction technology, making explicit the intrinsically experimental nature of war itself, as by the need to make the most of the orographic peculiarities of the various territories, adapting the various design choices to them.

3.2.2 Wartime: "destruction as construction"

The statement that recognises that the First World War was most probably the war conflict most closely linked to the physicality of the land does not refer exclusively to purely typological-constructive aspects, in respect of which the land constituted a design element modelled, excavated and garrisoned through the complex projects of militarisation, but also makes explicit reference to the extent to which the landscape was violently and suddenly distorted by the destructive effects caused by the war itself.

The impact of the conflict was enormous: more than 68 million people worldwide were deployed to fight on the various fronts, and of these, 42 million soldiers and civilians died, were wounded or mutilated during the war: an unspeakable figure that makes the 'Great War' one of the bloodiest conflicts in human history.[185]

But the tragedy did not only affect man himself, it also had enormous effects on everything around him. Between 1914 and 1918, in fact, the tens of thousands of artillery positioned on the various fronts battered the 'war landscapes' with over 1.45 billion projectiles of various calibre and type, bringing death and destruction, rendering unrecognisable the entire palimpsest of 'signs' that had previously been designed down to the smallest detail, as evidenced by the fortification plans and design manuals drawn up by the various military geniuses.

Combat after combat, the various warscapes were transfigured into lunar landscapes, unrecognisable and completely distorted by the "signs of destruction" such as countless bomb craters, exploded trees, destroyed trenches and dugouts, industrialised war debris, spent grenades, smashed tanks and unexploded ordnance. Official estimates show that in the 'red zones', where the impact of the conflict manifested itself most violently, there were even more than 1,000 bombs per square metre, such as around the Verdun stronghold on the Western Front, where more than 32 million shells of various calibres were fired in 1916 alone. [186]

Paraphrasing the art historian Martin Warnke, who stated that 'wars are fought in and against the landscape'[187] , it is also important to point out that the tactic of 'mine warfare' or 'underground warfare' also contributed significantly to the complete reorganisation of previously planned fortifications. Widely applied during the conflict on all fronts, but above all on the Italian-Austrian mountain front, as an attempt to "break the static nature of the front, based on the defensive trinomial

185 WINTER, 1998; VIOLI, 2014; STONE, CARLOTTI, 2015.

186 DONNEL, 2011; KALUZKO, MAYER, 2014.

187 WARNKE, 1994; SAUNDERS, 2007; PEARSON, 2012.

of reticulated trenches-smithing and the use of artillery", in fact, this strategy involved the construction of underground passages (mine and counter mine) in which powerful explosives were stored and then detonated with such devastating deflagrations that they changed the very profile of the mountain peaks above (TAB.3.1 - 3.2.)[188]

An analysis of historical photographs, aerial reconnaissance of the period, official reports on the various military operations, and diary accounts that have come down to us and have been widely published on the occasion of the centenary, shows the "material extent" of this destruction, and gives the rather bleak image of an '[...] otherworldly landscape, [where] the bizarre mixture of decay and munitions, the presence of the dead among the living, literally holding up the walls of the Ypres trench at Verdun, suggested that demonic and satanic kingdoms were indeed here on earth'.[189] But the 'imprint of destruction' is not the same as that of the war.

But the "imprint of destruction" did not stop "on the surface", disrupting ecosystems and deforming the morphology of territories, but went beyond the visible to penetrate deeply: the landscape "etched" by the cannon fire began to be flanked by a new landscape "soaked" by the effects of the war, contaminated by huge quantities of heavy metals, which in many cases were dangerous poisons such as mustard gas. From this perspective, it can be understood how the impact of the war on the "shape" of the warscapes actually permeated their substance as well, producing to all intents and purposes a dangerous environmental impact directly proportional to the quantity of artillery shells fired in the various war zones.[190]

The case of the 'Zone Rouge' in north-eastern France, where the great pitched battles took place around La Somme and Verdun, is emblematic in this respect. Already at the end of the conflict, these areas were recognised as being completely devastated and saturated with unexploded ordnance, including many shells loaded with aggressive chemicals, where the soil was so badly polluted with lead, mercury, chlorine, arsenic and other harmful and poisonous chemical compounds

188 PADOVAN 2009; BREDA, 2012.

189 INVERNO, 1995.

190 In a study of the area around Ypres (site of the First Battle of Ypres in 1914, the Second Battle of Ypres in 1915, and the Third Battle of Ypres in 1917), large concentrations of copper and lead were found in the soil. Copper, for example, with a concentration on Earth of 17 mg per kg, reached 60 to 200 mg per kg at Ypres. Dangerous values remain despite a century. Similarly, on the Slovenian front (part of the Balkan front), about 1100 square kilometers of agricultural and forestry land were physically damaged and chemically contaminated by artillery shells, with high concentrations of copper and lead in the soil, as well as high levels of mercury, antimony, and zinc, which were also found in the soil surrounding these areas.

Messines Salient

"Messines lunar-scape"

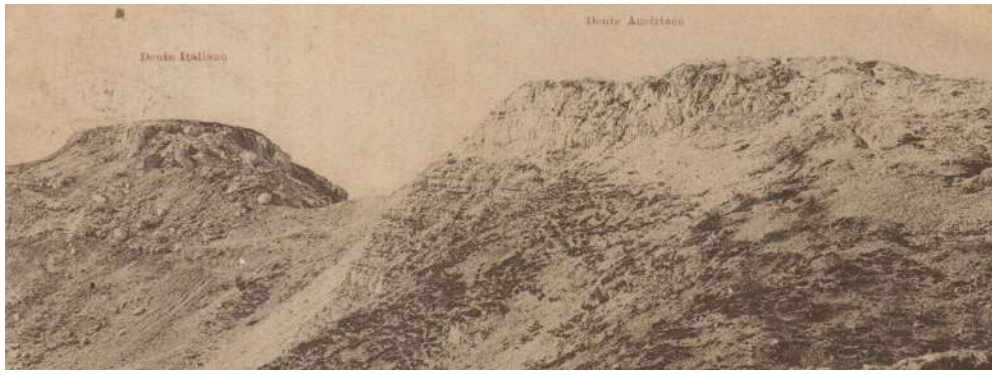
The use of mines was also widely used on the western front, particularly in Flanders during the Battle of Messines, a battle that lasted about 17 days between the English and the Germans for the conquest of the heights of Messines Allies before advancing towards the city of Ypres. The Allied generals had the Sappers of the "Tunneling Corps" dig twenty-four very long tunnels, filled with over 500 tons of explosives divided into 19 mines, to devastate the German positions and conquer the hill around the town of Wytschaete. Unlike the mine and countermine tunnels dug on the Alpine front, in Flanders, the corps of miners had to face water that greatly complicated the construction of such works. To this end, the Royal Engineers brought directly from England two specialized geologists to understand how to dig the tunnels into detonating the entire Salient. It was found a layer of clay suitable for the purpose, although it was at a very high depth. In any case, the English dug these mine tunnels at a depth between 24 and 37 meters, penetrating under the German lines for more than 5km. To prevent the Germans from discovering these tunnels, the Allies decided to dig further tunnels at a lesser depth to attract the enemies' attention and not make them discover the real plans in action. On May 21st, 1917, the Allied offensive against the Germans officially began with an attacking front along an arc of over 16km. On June 7th at 3:10 a.m. General Plumer gave the order to activate the detonators, and in the next twenty seconds, over 400 tons of Ammonal detonated in sequence, razing the entire Saliente to the ground. Only 17 mines exploded, transforming the landscape of the time into an authentic moonscape, an "open-air cemetery" that has forever marked these places' history. One of the two non-detonated mines exploded in 1955 due to the accumulation of static electricity due to a thunderstorm, while the last one still lies unexploded somewhere, under more than twenty meters of earth, ready to change for the last time, the landscape of Messines. Today, the most famous evidence of the explosion of these mines is the "Pool of Peace", a perfectly round pond, a material trace of the explosion of one of these mines.

Craterland around Messines Ridge - *Historical and current photographs*

The Spanbroekmolen Mine Crater - *Current state*

Pasubio Massif
"Dente Italiano e Dente Austriaco"

The mountainous massif that has its central nucleus the Pasubio (Palon peak mt.2236) is circumscribed by three valleys - Vallarsa, Terragnolo, Posina - and rises from the Venetian plain just beyond Schio to degrade between the first houses of Rovereto. The massif also includes Mount Corno, Col Santo, Forni Alti, Cogolo, Novegno and the famous Denti, one Italian and the other Austrian. Just the conquest of the Austrian Dente was characterized by repeated attempts by the Italian soldiers that, however, never succeeded in reaching the prefixed objective. Because of the impossibility to conquer and maintain adversary positions, both sides began to dig tunnels and caves, piercing in-depth the mountain realizing a real infrastructure entirely excavated in the rock. The year 1917 was characterized by an incessant "mine war" and by imposing works in the rear, including the preparation of the famous road of 52 tunnels between February and July 1917. Between April 1917 and March 1918, as many as nine mines (4 Italian and 5 Austrian) ripped through the Pasubio massif, killing and mutilating many soldiers without modifying the contenders' defensive system. The most powerful of the entire war was the Austrian mine of March 13th, 1918, prepared with 50,000 kg of high explosive, which completely collapsed the head of the Italian Dente, burying the advanced Italian positions under tons of rock and definitively marking the profile of the mountain itself. "... the whole massif of the Dente looked like a sea of flames from which emerged flames up to 30 meters high..." wrote General Brunner. The last Austrian offensive of June 1917, launched from the Grappa to the Adriatic (Battle of the Solstice), had only a modest effect on the Pasubio, given the impossibility of moving masses of soldiers to assault against the heavily armed Italian positions dug into the living rock.



Monte Pasubio - Dente Italiano e Dente austriaco - - *Historical photograph*


Dente austriaco - *Current state*


Dente Italiano - *Current state*

that there was no possibility of clearing them up.[191] It is also important to remember that the 'Zone Rouge' in the north-east of France, in the places where the great battles of the camps took place around La Somme and Verdun, was the site of the great battles of the Somme and Verdun.

Similarly, it is important to remember that the ecological damage caused by the conflict at sea was no less important, with ships damaged or sunk and thousands of men pouring tons of polluting fuel into international waters.

In addition to all the previous considerations concerning the "direct" impacts of the war on the landscape "at the front", the specific field of interest of this research, for the sake of completeness it is appropriate to highlight how the unfolding of the conflict itself also brought about important transformations on the environmental and settlement patterns of the most internal territories.[192] By way of example, it is worth mentioning the important infrastructural road and railway networks that were built during the conflict to connect the rear with the front, but also the various activities carried out to ensure the constant supply of building materials essential to the various offensive/defence actions and the construction of the relevant fortified posts.[193] With a view to reconstructing the evolutionary biography of the different warscapes through the analysis of the different dynamics of transformation that have affected them in the successive temporal layers, it is however

191 In the immediate post-war period, the zone rouge around Verdun covered more than 1,200 square kilometers; today, it has shrunk but is still widely present. Every year, more than 30 tonnes of unexploded ordnance are recovered from these territories, most of which are also loaded with chemical weapons, including mustard gas. According to the French government agency Sécurité Civile, it will take no less than 700 years for the area to be cleared entirely. Surveys carried out in 2005 and 2006 found up to 300 devices per square kilometer, and only in the top layer of soil (15cm). In 99% of cases, not even the vegetation can grow in these areas. In the area north of Verdun, for example, ammunition loaded with arsenic gas was piled up and set on fire in an area known locally as the ''place à Gaz'' (gas place). In this soil, layer arsenic can reach concentrations of 175.907 mg/kg in some samples. For further discussion, see also BASINGER, BONNAIRE, PREUSS, 2007; HOPQUIN, 2017.

192 Suffice it to say that during the war, the so-called 'war zone' was organized into a 'zone of operations,' directly adjacent to the front lines, and a 'zone of the rear,' which was mobile but much more profound, ranging in thickness from 10 to 40 km. In this sense, we can understand how the intense war activity on the front corresponding to the territorialization of troops and services and the relative settlements. See also IORIO, 201

193 The French Forest Service estimated that over 350,000 hectares of forest were cut down during the war, a figure that would have required sixty years of replanting. During the last two years of the war, American foresters in France also manufactured nearly 220 million boards of lumber; 3,051,137 railroad ties; 1,926,693 miscellaneous products; and 534,000 pieces of firewood. In addition to the plague caused by the bullets, the man had to destroy his land out of necessity. See also SAUNDERS, 2007; PEARSON, 2012.

important to place side by side with the previous observations a further reflection, less obvious but fundamental.

It is in fact interesting to understand how the destructive impact of the conflict has actually subjected the various "war landscapes" to an imprinting as sudden as it is substantial, which has stimulated the triggering of a continuous process of "construction of new landscapes", in which the remains, rubble and debris have constituted the construction materials to create new opportunities, new morphologies, new "significant layers".

Within this horizon of meaning, then, the destruction inflicted by the war can be metaphorically considered the main driving force that, during the wartime, not only literally battered the different warscapes, violently imprinting on the landscape the "signs of history" and thus de-constructing the entirety of the vestigial system as it had been designed, but at the same time stimulated a "functional readjustment" in emergency and rapidity, activating a sort of intrinsic "survival instinct".

In this regard, official accounts and reconnaissance photographs tell of how the rubble itself, accumulated in the space between the two opposing fronts, often became the constituent elements of the field adaptations made quickly by soldiers between one combat and another. For example: craters left by exploding bombs and mines were often reused as new trenches in which soldiers could find protection from enemy marksmen's aim and advance slowly, gaining a few dozen metres of 'no man's land'; the trunks of trees were literally "emptied" to be transformed into "front line" observers, from which to monitor and spy on the enemy, understanding their habits to better plan an attack; the carcasses of animals, and not infrequently human corpses themselves, were used as "shields" to protect themselves by advancing even just a few metres.

In this perspective, therefore, the rubble produced by the destruction can be recognised as elements that stimulated new re-writes, constructed by readjusting, modifying and enhancing the decomposed remains of the previous text, to create new layers that, layered on top of the pre-existing ones, have in turn become an integral part of the warscapes, tangible evidence of their dynamic character, of their "being in time".

The "destruction as construction" of new layers of meaning, however, is not only this.

As previously mentioned, in fact, the imprint of the Great War not only deposited the tangible traces of the conflict on the landscape, but at the same time opened lacerating and painful "wounds" in the souls of the communities for the enormous and senseless amount of human lives sacrificed on the different fronts.

This observation obviously opens up the field of reflection to different

disciplinary fields, from anthropology to sociology, from history to archaeology, for which the vast bibliography of references provides a complex and articulated framework of studies and research.[194]

From this point of view, this refers to the need to associate the recognition of the "signs of destruction" as "wounds" with their being tangible mediums capable of activating the memory of those feelings - such as pain for loss, sacrifice for the homeland, acceptance of death and its memory - which permeated European civilisation a hundred years ago and to which they are themselves custodians and witnesses.

Recognizing the different warscapes as "dense condensers" of testimonial values stratified with time, and in this essence, recognizing their dignity as cultural assets, however, is not enough. There is a need to go beyond the materiality of the "physical signs" left by the conflict to seek answers in the field of emotions, of intangible values, in what will later be better defined as the "second essence" of these landscapes. As will be better explored in Chapter 5 the different warscapes must be recognized as matter signata and embodied matter, which has been nourished by the sacrificial blood of millions of young lives that have penetrated deeply, becoming an integral part of the landscape itself.[195] In this perspective of meaning, it is clear to understand how the destructive impact of the conflict has not only impressed its physical imprint by signing the land but has also conformed to its personality, permeating it with those intangible values and "feelings" that define its very essence, that hic et Nunc that makes it unique and unrepeatable.[196]

3.2.3 *Post-war: erasures, overwrites, rewrites.*

The intrinsically changing character of the different warscapes has continued to manifest itself even after the end of the conflict, since both the "signs" designed for the war and the physical "traces" directly deposited by it, with their relative value potential, have been gradually reabsorbed into the different dynamics of transformation that have affected the whole of Europe from the first post-war period to the present day.

Given the thickness of this temporal layer and the multiplicity of different actions-reactions that have contributed to the "construction

194 A specific focus on the socio-anthropological consequences of the conflict will be addressed more specifically in Chapter 5.

195 For an in-depht insight see also Chapter 5.

196 "Deepening the field of observation as far as the minuscule facts of everyday life - events or incidents - leads to an appreciation, behind the general and repetitive <structure>, of the singularity of each expression which is the foundation of its authenticity: <the hic et nunc> on which the aura of the work is based without, however, exhausting it," in VASSALLO, 1986.

of the landscapes of war" as they remain at different temperatures in the present day, this reflection wants to present, as an example, some specific keys to understanding useful to better understand the overall reasoning, without any claim to completeness.

Within the diversified trajectories of change present, what can be recognised as the general common denominator is certainly a criterion of necessity manifested and shared by all the countries involved in the conflict, aimed essentially at reviving the devastated post-war economy. In relation to the themes dealt with in this research, this has been reflected in the different questions concerning the multiple possibilities for restoring, recovering or reusing the different warscapes tormented by the conflict.[197] Nevertheless, it is immediately evident how the different trajectories of physical transformation of the landscapes developed since the immediate post-war period, even if they have stratified new significant layers on each front, have not been triggered by univocal driving forces common to the different contexts as it was manifested until the wartime, but rather by reasons of different nature (of use, economic, social and demographic) deeply connected to the specificity of the different territorial areas.

As already presented, at the end of the conflict the European landscape was profoundly altered: the imprint of the war had radically changed the pre-existing territorial structures and ecological systems, causing an unprecedented environmental impact, abruptly and repeatedly modifying land uses, causing deforestation, and profoundly changing the historical dimension of the landscape, both on the plains and in mountainous contexts.

On the great expanses of the Western Front, for example, as well as on the plains of Galicia and on the Russian border, the absence of embankments of a size that could be used as natural allies in combat strategies and tactics had led to the development of permanent fortified systems in the form of "strongholds" and the need to model the terrain "negatively" in order to embed the entire palimpsest of entrenched and connecting systems in it, so as not to make them visible to the enemy. In other words, the "war zones" were superimposed on the previous built and environmental fabric, deconstructing both the settlement matrix and the original land uses of the adjacent territorial areas.

In these contexts, at the end of the war, the remains and fragments of the vestiges produced by the destruction of the conflict found themselves integrated with the rubble of the settlement patterns of the nearby towns, with those "shreds of walls" that testified to the location of villages

197 During the war, politicians and officials sometimes start planning the restoration and reconstruction of war-damaged landscapes and depleted natural resources. See, for example, GUYOT, 1917.

now obliterated. The surrounding areas of land were also devastated, trenches furrowed the original pastures like scars, and meadows and cultivated fields were now dotted with the thousands of craters produced by bombing and mines. The farmers returning to their land were presented with a completely alien and unrecognisable territory.

These considerations allow us to better understand the reasons why the dynamics of transformation of these specific warscapes had to come to terms with the need for reconstruction and re-territorialisation, which led to "heavy" and sometimes even radical transformative interventions, designed to meet the contingent needs of communities that, already extremely tested physically, economically and spiritually by the conflict, wanted to regain possession of the territory materially and intellectually.[198]

For example, on the plains of Flanders, heavily damaged by bombing and mine warfare, the need to reclaim the land in order to make it cultivable again led to a general levelling of the landscape through the filling of many "craters" and entrenched tracks, which were literally "submerged" under these new layers. Similar actions were undertaken in many other morphologically related contexts, such as the plains of Galicia or on the French battlefields. In the La Somme area, for example, large areas of agricultural land were restored, while on the former battlefields of Verdun some 15,000 hectares of forest were plante.[199]

In more recent times, however, some permanent fortifications in the vicinity of urban centres were considerably downsized and in some cases even demolished to make room for the construction of new residential quarters as planned following the new needs for expansion of the settlement fabric in response to the demographic trend of communities.[200]

Following the same line of reasoning, it is easy to understand how, in mountain contexts, the need for reconstruction and re-territorialisation of warscapes has led to very different results from those described above. In these places, in fact, the fortified texture of the palimpsest of "signs" designed and built for the war was not superimposed on the pre-

198 "Each cycle of territorialization is a non-destructive integration of new territorial and environmental balances: cycles are not pervasive, but are forms of actualization of inherited heritage. After a [deterritorialization] stage of rupture in which the land changes its physical appearance and seeks a new symbolic meaning, a stage of "reterritorialization" takes place: the subsequent cycle feeds on the previous one, but in an original way, re-interpreting and structuring it in different forms, according to its new cultural models," in MAGNAGHI, 2007.

199 See also AMAT, 1987; HUPY, 2005. On post-1918 reconstruction programmes in northern France see also HUPY, 1996.

200 For more specific details, please refer to the files compiled in Chapter 4, particularly with regard to the Belgian strongholds in Liège and Namur.

existing settlement fabric, usually located in the valley bottoms, but had mainly manifested its "high altitude" imprint. The entire articulated and typologically complex palimpsest of vestiges built on the mountains had "populated" the most inaccessible, least accessible, uninhabited and uncultivated areas, and therefore had not directly modified the territorial and environmental structures linked to the conduct of community life.

At the end of the conflict, therefore, all the defensive posts located in isolated high-altitude contexts that were not necessary for local land-use practices were often neither destroyed nor reabsorbed into the dynamics of land re-appropriation or readapted for new needs and functions. In these places, the fragments of the vestiges remained as "silent sentinels", often in a state of abandonment, bearing witness to history, on whose physical body, over the years, the natural signs of the passage of time were deposited, that "golden patina"[201] that in some cases redefined a new balance between built and nature, connoting these fragments with a ruderal character. Along the Alpine front, nature has very often reappropriated these remains to the point of literally "freezing" them within the main glaciers, and it is only in recent years, as a result of major climate change, that these remains are gradually being brought back to light.

On the other hand, one of the transformation processes that affected the alpine contexts more than those of the plains was the reconstruction of the forest heritage both on the mountain slopes, which during the conflict had been mostly exploited for the supply of timber, and on the areas surrounding the forts, which had been thinned out to ensure a clear view and eliminate any possible obstacle as well as potential cover for approaching enemy infantry.[202]

In this perspective, the context of the Lavarone/Luserna/Asiago plateaus, between the provinces of Trento and Vicenza (Italy), represents a significant example, since the impact of the war on the local woodland heritage was particularly significant: only on the Asiago Plateau, in fact, of the 18656 hectares of woodland surveyed before the war, in 1918 only 2860 were still present and undamaged, while the remainder had been entirely destroyed mainly to obtain the timber used in the various war activities. Immediately after the war, reforestation began, planned in successive stages, with an initial phase of clearing the land of bombs and unexploded ordnance, and then the actual re-planting began in 1925, mainly using spruce as a rustic, hardy and fast-

201 RUSKIN, 1849.

202 The first large-scale deforestation operations with tangible effects on the landscape and Alpine agriculture were only planned in the years immediately preceding the outbreak of the First World War. For a more in-depth look at the deforestation plans drawn up by the Austro-Hungarian Army Corps of Engineers, see also FONTANA, 2016.

Tab. 3.3 | Post-war driving forces of change: CLIMATE CHANGES | Glaciers melting

growing plant. By the 1930s, the process of reconstructing the forest was already well advanced, and today the forest cover is in constant autonomous expansion.[203] Finally, a more topical consideration concerning mountain contexts is that they are particularly "exposed" to some important effects of ongoing climate change. Considered as important driving forces for the transformation of the contemporary landscape, they can determine, more or less suddenly, even drastic transformations in the conformation of the various landscapes. As previously reported, for example, the increasing global warming is causing a dangerous retreat of the glaciers that, as a consequence, is also having a strong impact on the current warscapes, causing the re-emergence of many fragments of both vestiges and human remains of soldiers that have remained "submerged" under the snow for more than a century.[204] This certainly represents an interesting opportunity to learn about fragments of vestiges that have remained almost unchanged for a hundred years, but at the same time imposes new reflections on how to think about the fate of these high-altitude "war landscapes", also in relation to the contemporary phenomenon of repopulation of the "highlands "70, in terms of protection and preservation, but also of possible transformation.[205]

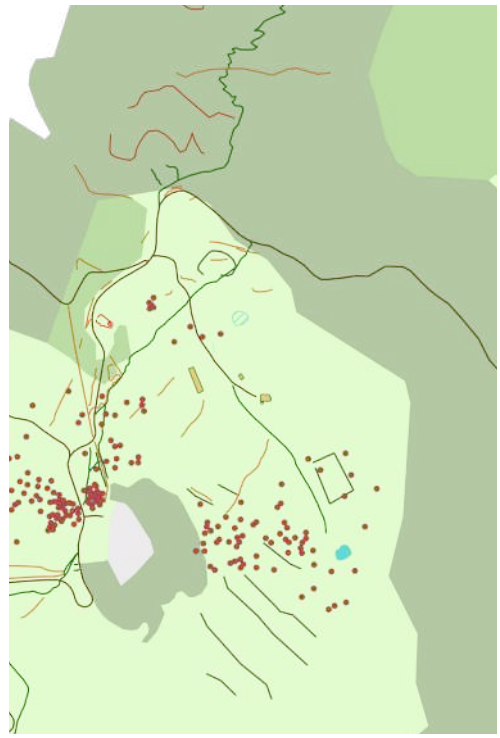
Finally, the extraordinary atmospheric events that in 2018 hit the Alpine arc right in the places where the bloody "war of the forts" had been fought one hundred years before, on the border between Trentino and Veneto (Italy), caused the felling of a large part of the forest texture of these mountain slopes. Although this had a drastic impact on the local environmental and ecological ecosystems, on the other hand, the Vaia effect brought to light, in specific contexts, the traces engraved in

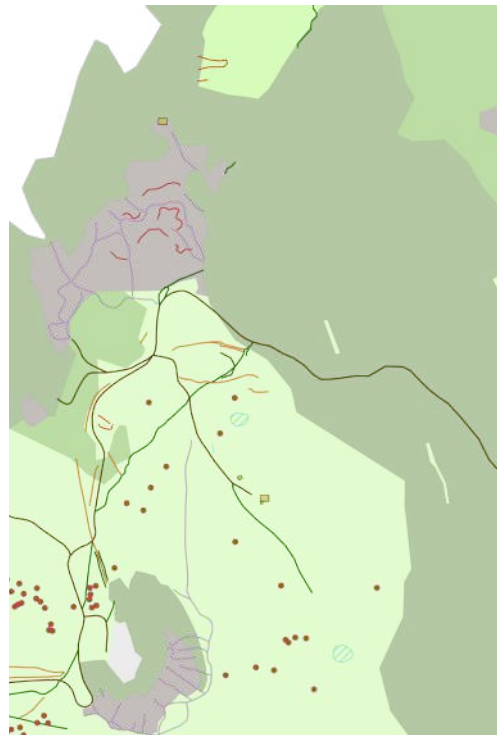
203 ZENERE, 2014; ZOVI, 2017.

204 While the melting of the Alpine glaciers is seen by glaciologists and scientists all over the world as a dramatic demonstration of global warming, the consequences of which could weigh heavily on the equilibrium of the territories concerned, for archaeologists it represents a unique opportunity to find the material remains of the past beneath the blanket of snow and ice. In the mountains of Trentino, for example, the melting of the ice has led to the continuous discovery of bodies and objects from the "vertical war" or "white war," i.e., the battles that in the Great War saw the contending armies engage in great physical, military and engineering tests. Among the wooden huts clinging to the icy cliffs and the remains of soldiers in Hapsburg or Italian uniforms covered by the snow, the retreat of the tongues of ice "returns" many surprises. From the remains of an Austro-Hungarian soldier to the discovery of armaments, objects of daily use in the trenches, and parts of soldiers' clothing. It is worth mentioning, for example, the discovery of the remains of a soldier in the area of Vedretta Val di Fumo in the summer of 2017: resurfaced at an altitude of almost 3000 meters, based on the equipment still present (uniform, boots), it was possible to identify him as belonging to the Italian army. See TAB.3.3.

205 For an in-depth look at the phenomenon of mountain repopulation, see VIAZZO, 2017.

Tab. 3.4 | Post-war driving forces of change: CLIMATE CHANGES | VAIA Storm





the landscape of the original entrenched systems linking the Austro-Hungarian forts, which until then had been obliterated by the forest cover.[206]

Without any claim to being exhaustive, the above-mentioned reflections represent useful keys to understanding the main dynamics of transformation of the warscapes at a territorial level, according to the different morphological contexts of location. In addition to this, however, the stringent economic reasons, stimulated by the need to revive the industrial sector, also determined other specific trajectories of change of these landscapes, also declined to the scale of individual artefacts. While the central governments of the various countries tried to revive and reconvert the national production sectors that had been transformed into war material production centres during the war, the need to quickly find raw materials and semi-finished products, avoiding all imports from foreign countries, became increasingly contingent. For this reason, it was gradually recognised that war material left over from the now abandoned front lines could also be recovered, thus triggering a sort of legitimate despoliation of the remains themselves, which became "open pit mines" from which any metal object that could be reused, and therefore sold, could be taken. In the immediate post-war period, an initial phase of action by the salvagers began: men, women and sometimes even children who set off for the mountains armed with a shovel and pickaxe to face the long days on what had been "the front" and return to the valley with trench stoves, field kitchens, provisions, unexploded shells, copper, iron, lead and scrap metal, to be sold or exchanged to earn a living. Bending over under the weight of overloaded rucksacks, the scavengers thus followed, but in the opposite direction, the same routes as the fighters of the Great War, triggering a sort of "reverse transport" with respect to what had been done, with effort and sacrifice, to build those very works only a few decades earlier.[207]

206 Storm Vaia was an extreme weather event that affected north-eastern Italy (almost essentially the mountainous area of the Dolomites and the Venetian Pre-Alps) following a substantial disturbance of Atlantic origin, which brought powerful winds and persistent rainfall to the region from 26 October 2018 until 30 October, as part of a severe weather wave over Italy (also affecting the neighboring areas of Switzerland, Austria, and Slovenia). The event is erroneously known as a 'storm.' Still, the winds reached 'hurricane' speeds on the Beaufort Scale, winds that commonly only originate over tropical or subtropical waters on the planet. The mighty, hot Sirocco wind, which blew at between 100 and 200 km/h for several hours, caused millions of trees to fall to the ground, destroying tens of thousands of hectares of alpine coniferous forests, making it a natural disaster. As well as destroying hectares of forest, the storm also uncovered some traces of relics from the Great War that would otherwise have been hidden in the dense coniferous forests of the highlands. See TAB.3.4.

207 In this first phase, what was recovered were mainly 'noble materials' that were readily reusable and could be quickly sold: explosives, copper, brass, lead, hunting weapons, and construction material. often obtnined lead from unexploded shrapnel bullets

In the following period, also in response to specific political rearrangements at a general level,[208] a real "iron race" began that lasted until the 1960s, leading to the gradual and systematic dismantling of permanent fortifications, of the main armoured works and of military villages. These operations were no longer carried out only "on sight", by collecting what was left on the ground, but also through excavation, removal and demolition of the structures themselves to recover every metal element present, from the armoured domes to the metal coverings, from the iron girders drowned in the thick layers of concrete to the expanded mesh used to reinforce the vertical closures.

As can easily be assumed, this had a devastating effect on the remains of the permanent fortifications, which, if not already destroyed during the war, were very often blasted in order to extract all possible "precious" iron elements. In this regard, it is appropriate to introduce an important consideration, which will be explored in greater detail in Chapter 7, and which concerns the use of iron as a supplement to concrete to reinforce the structure of forts following the introduction of the powerful new artillery. From an exquisitely typological-constructive point of view, it is important to remember that it was precisely in these years that important experiments began which led, in the first decades of the 20th century, to the structural definition of "reinforced concrete", and the projects for reinforcing existing fortifications served, in this sense, as a field of experimentation for military engineers. In these cases, in fact, a particular type of composite material was used, usually referred to as 'reinforced concrete', i.e. an assembly based on the use of thick layers of compressed concrete and iron elements, such as beams or corrugated sheets, embedded in them. Thanks to the action of the salvage workers who removed the iron beams entirely or cut them leaving large areas of concrete without any apparent support, and to the observation that these floors did not collapse (in some cases they are still in situ today), it is evident how the structural behaviour of this material differs from traditional reinforced concrete as currently conceived. By way of example, it should be remembered that most of the Austro-Hungarian forts of the last generation were heavily affected by the actions of the

scattered on the glaciers or still to be fired piled up in the ammunition reserves; brass was provided by ammunition casings (light and heavy weapons); while copper came from the forcing crowns, placed at the base of the bullets themselves, from which iron and cast iron were also obtained. In the post-war years, iron was paid 10-11 lire per quintal, lead 1.20/1.30 per kilo, brass 1.80, and copper 5 lire. A bricklayer got 10 liras a day; a milk cow cost 400.

208 In the case of Italy, for example, this phase began with the systematic dismantling of Italian and Austro-Hungarian fortifications, with various royal decrees, of which Royal Decree no. 1882 of 12 June 1927 was the first and most important, but above all with the advent of Fascism, which with its colonial aims imposed increasingly onerous sanctions on Italy.

salvage contractors, which in some cases even caused their partial collapse.[209]

Ultimately, therefore, the need for "rebirth" led the vestiges of war to undergo a second phase of "deconstruction", a de-composition of that complex "assemblage of signs" linked to offence and defence that increasingly accentuated their fragility. The frequentation of those places which, albeit for a short time, had catalysed the development of all activities, became less and less habitual and the isolated fragments of what had been a solid fortified system gradually lost their central role and were invested by a general process of estrangement, abandonment, physical but also emotional obliteration.

The events of the Second World War also contributed to this, causing a general weakening of the communities' sense of belonging to the places of the Great War, after an initial phase in which, instead, the need for commemoration had stimulated the construction of the "architecture of remembrance", as a further important layer deposited on the already complex stratification of the warscapes,[210] which will be analysed in depth in chapter 5.

Depending on the different political-territorial contexts, in this phase some of the vestiges of the Great War were reabsorbed to varying degrees into the dynamics of militarization of the territories linked to the Second World War.[211] On the western front, for example, many of the "works of '17" became an integral part of the bunkers belonging to the Maginot Line, while some of the permanent fortifications of the Meuse and Moselle were structurally reinforced with reinforced concrete works to become defensive strongholds of the new border lines. Similarly, after various phases of maintenance, many of the fortified works on the Alps belonging to what had been the Cadorna Line were incorporated into

209 The forts of the Folgaria, Lavarone, Luserna, and Vezzena plateaus were heavily affected by these ferrous material recovery actions, which very often caused their collapse and partial loss. For more on this topic, see also FONTANA, 2016; ROSNER, 2016.

210 With regard to the architecture of remembrance and the theme of memory linked to the vestiges of the Great War, please refer to the in-depth discussion in Chapter 5.

211 The events connected with the development of the Second World War brought further modification of territories and landscapes even though conceiving war and fighting had now radically changed. If the Great War had been physically very much connected to the terrain, the Second World War on mainly an aerial and not a positional war. Nevertheless, in many places, the new front lines overlapped with the entrenched and militarised territories of the First World War. A new layer of fortifications (mainly reinforced concrete bunkers) developed especially in-depth in these contexts. The need to bury the works of defense and offense was already evident towards the end of the Great War when, for example, the Austro-Hungarian Empire began to build the fifth generation of forts, buried (such as Fort Pozzacchio in Trentino), but also with the burying of the works of '17 on the Western Front in Belgium.

the creation of the new Alpine Wall, even though they never actually played an active war role.[212] Moreover, the new military tactics based essentially on the potential offered by air attacks, led to the construction of more and more underground works and therefore less detectable "from the air", and in this sense all those fortifications that had already been excavated within the rocky compartments for the Great War and yet, very often, never used, acquired renewed importance. The Swiss fortifications are an eloquent example of this.[213]

After all these vicissitudes, from the second half of the 1960s, the "war landscapes" of the First World War began to arouse renewed interest, both in the media and in the communities, mainly as a result of the celebrations for the 50th anniversary of the Great War. In this phase, a new figure of "memory retriever" began to develop, who worked to ensure that the testimony of the dramatic events would not be lost and would serve as a warning to future generations, and who therefore returned to the different warscapes with very different objectives from those of the immediate post-war period, stimulated by purely economic needs. Very often they were veterans accompanied by relatives and friends who recalled stories and events directly linked to those places, or enthusiasts in search of objects and remains, recognised as material evidence of the daily suffering endured by soldiers during the years in the trenches.

This new attitude laid the foundations for the development of a growing awareness of how the physical remains of the relics, i.e. the objects but also the artefacts themselves, were "custodians" of the memories of the past, not only of the war in general but also of the infinite number

212 In the 1930s, the Fascist regime began construction of the Vallo Alpino (Alpine Wall) and at the same time decided on maintenance work on the works of the Cadorna Line. The Cadorna Line received a moment of attention in 1938, when Mussolini thought of invading Switzerland, perhaps to show off to the Germans who had recently annexed Austria. The 700-strong "Camicie Nere Como" battalion was sent to the border, but then the order returned, and the project was abandoned. Despite the considerable financial commitment for its construction and the efforts of the more than 20,000 workers, the line was never used for war purposes. However, some works were the scene of clashes between partisans and Nazi-Fascist units. The only war action witnessed by the line was on 13 November 1943, when the first battle of the Resistance took place in the bunkers of San Martino in Valcuvia, between the dominant Nazi-Fascist forces better of Colonel Croce's partisans. For further information see also CORINO, 1995; MINOLA, RONCO, 1998; ASCOLI, RUSSO, 1999; BERNASCONI, ASCOLI, LUCARELLI, 2004; BOLDRINI, 2006; VASCHETTO, 2008; MINOLA, 2010.

213 Concerning the fortifications built on Swiss territory before Italy entered the war in 1915, see Chapter 2. As far as the period between the two world wars is concerned, Switzerland primarily pursued preserving its independence and not getting involved in the war. As early as the 1930s, Switzerland began to increase its defense budget by reinforcing the existing fortified positions of the National Redoubt and building new ones, mainly in the form of reinforced concrete bunkers. See also ROVIGHI, 1987; ASCOLI, RUSSO, 1999.

of personal stories with which they had come into contact and of which they had become participants. This approach was increasingly developed from the 1970s onwards, reflecting the renewed interest in material culture, recognised as an informative potential to be preserved and passed on to the future,[214] and which led to the development of the first projects for the recovery and valorisation of the various warscapes for museum purposes, designed to deal with their fragile state of preservation, which corresponded to the "risk of loss" of the "possibilities of knowledge" to which they bore witness.[215]

From this moment on, there was an increasing interest in this "fragile and highly complex heritage", a cultural path characterised by a growing demand for knowledge and conscious use, which stimulated the development of a fervent cultural climate within which all the public and private initiatives, already presented and commented in the previous chapter, came to life.

3.3 "Way of seeing" : from "war landscape" to warscape

The in-depth studies analysed in the previous chapter have made it possible to better understand the dynamic character of the different warscapes as chronographs capable of recording the passage of time through the 'signs' deposited on them by the interaction of multiple factors.

Recognising this multi-layering, but also the current condition of fragility of these landscapes, poses important questions of knowledge that underlie the need to understand how to "take care of them", to avoid the risk of dispersion understood as "loss of memory ".[216]

In this perspective of meaning, knowledge is enriched with meanings, not limiting itself to being an accumulation of information obtained from the study of documentary sources, but becoming "applied knowledge", useful for learning to recognise the traces of history and time, in order to

214 DEZZI BARDESCHI, 1981,1991; FANCELLI, 1984; LA REGINA, 1984; MARCONI, 1986; CARBONARA, 1988; TORSELLO, 1988, 1989; VASSALLO, 1995; DOGLIONI, 2008.

215 Concerning the first museum projects in Italy and Europe, please refer to Chapter 2 and the reflections in Chapter 5.

216 It has been pointed out that the debate that led to the drafting of the 2001 Law may also be ascribed to the awareness of the gradual disappearance of the last witnesses of the war and the need, therefore, to protect the various documents and the complexity of material traces related to the event. But also the clear awareness that "the disappearance of the preserved works is a dry and irreparable loss for the memory of the Great War and the very identity of the territories that contain them." In RAVENNA, SEVERINI, 2001.

"make known" its value as testimony also to the future.[217] This objective can be achieved through the declination of a cognitive method capable of decoding the "words of the tale" directly from the "materia signata", the understanding of which becomes the necessary and indispensable prerequisite on which to base any possible future choice.[218]

In the first place, this means refining the gaze to return to investigate the different warscapes through this new lens of observation, also identifying new "ways" of observing these landscapes, in the awareness that their condition of existence as such is based precisely on the reciprocal relationship that is established at the moment in which they are "observed".

In fact, as stated in Article 1 of the European Landscape Convention, the "landscape designates a certain part of the territory, as perceived by the populations", so it is constantly transformed according to the empathy established between "the observer" and "the observed", the different possibilities of communication between subject and object, and how the observer perceives and "feels" it.

Since "warscapes" have, by their very nature, an intrinsically historical matrix, adopting a transdisciplinary mentality clearly refers to reflections on man's relationship with the objects of the past, and specifically to that "counter-look" of things towards man, already referred to in the previous chapter, which restores to the observer the possibility of perceiving the auratic dimension through the "cognitive capacity of feeling ".[219]

Therefore, analysing the different warscapes by identifying different "gazes" means entering into a relationship with them, going beyond the temporal distance and developing a sort of affective identification that makes them part of the observer's existence, which allows us to "welcome them into our space. It is not we who move into them, but they who enter our lives ".[220]

In this way it is possible to begin to better understand the character of

217 The endiad "recognizing and making known" the different war landscapes was explored in depth in an interdisciplinary conference held in Naples in 2019, organized by CITTAM in collaboration with the Italian Institute of Castles and the Federico II University of Naples. For further details, please refer to the proceedings of the conference, including ALDRIGHETTONI, QUENDOLO, 2019.

218 "Knowing to conserve - conserving to know" was, and still is, a practical synthesis of the link in restoration projects between the transmission of a document from the past and the need to know it to be able to transmit it. It is a link that contributes to defining the specificity of restoration, which uses preventive study and the project itself as tools to increase knowledge of work. See BELLINI, 1989, 2005; TORSELLO, 2005.

219 Please refer to the details in the previous paragraphs of this Chapter.

220 BENJAMIN, 1982, 1986; QUENDOLO, 2001.

these "war landscapes", overcoming the barriers of a purely analytical knowledge, necessary but by its nature detached and not very "felt", opening the heart to the suggestions that their essence is able to communicate because, using the words of D. Cosgrove, "a glance is different from a stare, a view is different from a vision".

Empathising with these warscapes does not mean passively registering what the eye sees of the outside world, but implies an intentional orientation of the eyes towards this object of interest, in the awareness that landscape is first and foremost a "way of looking", a connotation of how geography "is seen, imitated and imagined ".[221]

The approach adopted in the previous chapter to study the main dynamics of transformation to which the different "warscapes" have been subjected, has allowed us to recognise them as complex spatial systems of continuous interacting artefacts and phenomena, permeated by strong symbolic meanings and values that can be "felt" and understood using the rules of perception.[222]

However, regarding the different perspectives through which to look at such landscapes, among the multitude of points of view that observers can adopt, particularly interesting were the four "ways of seeing" identified by Antrop and Van Eetvelde (2017) to investigate each type of landscape and applied here to be able to "see poetically" the different warscapes in their complexity. These are four different but complementary perspectives, specifically:

- From above: an external point of view that observes the "warscapes" vertically or obliquely;
- From inside: a horizontal perspective that presents a view of the

221 COSGROVE, 2002; ANTROP, VAN EETVELDE, 2017.

222 According to Antrop and Van Eetvelde, there are mainly three different ways of looking at the landscape:

- a complex spatial system of continuous elements and phenomena in mutual interaction. From this point of view, landscapes are complex and dynamic systems made up of structures, patterns, functions, internal ecosystems, which can be measured and analyzed using metrics and indicators;
- a scene or image that can be described using the rules of perception. The basic concepts are views, vistas, visuals, perspectives, and preference-related ideas such as aesthetics, openness, naturalness, disturbance, etc. Theories of environmental perception and Gestalt psychology are applied, as well as design principles;
- an existential phenomenon with strong symbolic meanings and values. Basic concepts used in this context are home (land), heritage, history, genius loci, character, landmarks, social construction, narratives, etc. These are approaches from art, philosophy, humanistic geography, and sociology.

As can be seen, all these privileged perspectives can provide an exciting outlook for analyzing the different warscapes, which, in compliment, can give the complete understanding possible of the landscape itself. For a specific study see also ANTROP, VAN EETVELDE, 2017.

"war landscapes" from the "protagonists";

- From within: this viewpoint provides a mental image of a given warscape, filtered through the observer's experience, perceptions and mental representations;
- Transcendent: an all-encompassing "look" that goes beyond tangibility and refers to a holistic approach, to a metarealistic dimension.

3.3.1 Top-down perspective. An all-encompassing look

Perspective from above is the "way of observing" the landscape from a point of view, real or virtual, external and distant from it, which gives a synoptic and detailed view of the visible spatial patterns, integrated in their context of insertion. Since ancient times, human beings have instinctively sought vantage points in elevated positions from which they could dominate, if only visually, ever larger portions of the surrounding landscape, and with the advent of photography this became more agile and systematic.[223]

Aerial photographs, together with subsequent satellite images, quickly became the most widespread forms of this mode of observation, on which the discipline of cartography itself is based.[224] They enable the simultaneous capture of the different components of the landscape, such as land use, vegetation, settlements, field systems and landforms, highlighting both their hierarchical structure and their mutually consistent relationships. As can be seen, the information content offered by these views is very extensive and, through a comparison of different time frames, also allows the formulation of hypotheses on the processes active in the landscape, its historical evolution and land use. For this reason, both oblique photographs and vertical stereoscopic perspectives have become fundamental tools for the study of the landscape in different disciplinary fields, from geography to history, from land evaluation to archaeological prospecting.[225]

223 Photography from the air offered incredible landscape views and revealed patterns and features that were hitherto unknown. The benefit of the new technology was obvious and soon created the most diverse devices to take cameras into the air: balloons, kites, pigeons, and airplanes. See also CHIANELLO, 2016.

224 They produced first-generation satellite imagery for intelligence purposes during the Cold War. As early as 1967, however, electronic images from earth observation satellites became available for civilian and scientific use. An exciting series was the Corona stereoscopic photographs taken by the U.S. Air Force for the strategic survey from 1959 to 1972, covering the USSR, China, the Middle East, and other strategic areas. The program was declassified in 1995, and the images became available for scientific and civilian use.

225 Large-scale oblique photographs offering great detail are often used for de-

With regard to the analysis of 'wartime landscapes', it should be remembered that photographic technique in general has been a very valuable tool for military purposes since its discovery in the first half of the 19th century. After being used during the Mexican-American War of 1847, a certainly important event was the taking of the first aerial photograph in 1858 when Gaspard Felix Tournachon (also known as Nadar) photographed the Bièvre Valley from a hot air balloon. In the years that followed, this technique "from above" was increasingly developed, particularly with regard to the need to make the equipment needed for its operation less bulky, so that it could be used more easily and quickly.[226] At the beginning of the twentieth century, technological advances with respect to the implementation of engines designed for aircraft helped to make aerial photography increasingly popular, but it was the Great War that led to its widespread use as a tool particularly suited to replace the reconnaissance previously carried out by cavalry.

The considerable potential offered by this new observational technique was already manifested during the war, when the use of the photographic technique "from above" was employed for different purposes: in addition to obtaining "simple" but meaningful aerial photographs, it was implemented for essentially reconnaissance purposes, as a tool for observing enemy lines, and as an active support for directing artillery offensives (whose increasing development led to the creation of fighter

tection. Their recording is very flexible and fast, interactively allowing the best exposure conditions to be tested and used for monitoring and repeat photography of specific features. Applications such as these are critical in archaeological surveying (DASSIE´ 1978), as demonstrated by intensive surveying in Britain by O. CRAWFORD (1960), in Germany by Irwin SCOLLAR (1975), in Picardy (France) by Roger AGACHE (1978), and many others. Archaeological prospecting using aerial photography has proved to be very fruitful, as, for example, demonstrated by the work of Jacques Semey, who took more than 70,000 photos in 20 years over Flanders, revealing more than 650 unknown archaeological sites. See also AMPE et al., 1996; DE REU et al., 2010. However, the extent covered by an oblique photograph is limited, and geometry distortions and lighting conditions are essential. For mapping purposes, systematic stereoscopic vertical pictures are best. These often range in scale from 1:10,000 to 1:50,000. Vertical perspective requires some training in photo interpretation to recognize objects and understand the features shown accurately. It can make a significant contribution by using special visualization techniques such as false-color infrared. Concerning the analysis of the microtopography of the territory, stereoscopy also allows the vertical dimension of the elements and the terrain to be exaggerated to accentuate any irregularities. With respect to these insights, see also CHIELENS, 2009; STICHELBAUT, 2011; STICHELBAUT, CHIELENS, 2013; STICHELBAUT, GHEYLE, SAEY, VAN EETVELDE, VAN MEIRVENNE, NOTES, VAN DEN BERGHE, BOURGEOIS, 2016; CHIANELLO, 2016.

226 Gradually overcame the problem of requiring large cameras, and in 1884, the American entrepreneur George Eastman designed a box camera, which is considered the first modern camera. See KLEMMER, 2010.

planes and bombers).[227]

At the beginning of the war, aerial observation was the only real task carried out by the air force, and resulted in numerous written reports, notebooks, sketches and conceptual maps that were often out of scale and did not reflect reality.[228] In this regard, it is necessary to remember how the first reconnaissance flights failed or were not even taken into consideration, while in other cases, however, the enormous quantity of shots taken during the reconnaissance flights provided an essential and sometimes decisive contribution with respect to the course of the entire battle, for the direct identification of the enemy lines, and therefore to define the relative attack strategies.[229] One recalls, for example, the words of the German General Hindengurg after the victory in the Battle of Tannenber: "Without airmen, there would be no Tannenberg", but also the important contributions of such observations that allowed the French to defend Paris during the Battle of the Marne.[230]

Technological advances made it possible to gradually solve some of the technical problems that had emerged in relation to the need to take photographs on the move, i.e. with constantly changing light conditions and not insignificant vibrations.[231] Thanks to the introduction of resistant lenses and fast shutters, this photographic technique for observing battlefields became more and more popular, and was declined in the two different types of oblique photography and vertical shooting.[232] The first, inclined and facing the horizon, gave a view of the front from a perspective similar to that of the soldiers, albeit from an external point

227 For more details see also CAVIGIOLI, 1933; DOCK, 1928; KENNET, 1991; MORROW, 1991; GROSZ, HADDOW, SCHIEMER, 2002; RAVBAR, 2011, 2019.

228 Observation aircraft usually had two seats, one for the pilot and one for the observer. They were equipped with bulky radios and a camera, making them heavy and uncomfortable to fly. Despite this, they became the new eyes of the armies. see also CAVIGIOLI, 1933; RAVBAR, 2019.

229 CHIELENS, 2009; STICHELBAUT, 2011; STICHELBAUT, CHIELENS, 2013.

230 PORTER, 1921; KENNET, 1991; MORROW 1993.

231 The technical problems at the beginning had to do with light and vibration. As far as the light was concerned, set the shutter manually. Still, since the light conditions could change quickly during a flight, this could seriously affect the quality and, therefore, the photo's usefulness. The vibrations induced by the aircraft engines also affected the quality of the photographs. Finally, the wind also often caused problems by hitting the bellows of the camera during a flight. Since the weather could also dry out the gelatine on a glass plate, keeping it in special aluminum boxes solved the problem. See KLEMMER 2010.

232 Reconnaissance was so widespread that, in 1918, France and Germany used to photograph their trenches twice a day, while between 1916 and 1918, the number of shots taken on the French side of the front amounted to more than 500,000. See STICHELBAUT, GHEYLE, SAEY, VAN EETVELDE, VAN MEIRVENNE, NOTES, VAN DEN BERGHE, BOURGEOIS, 2016; CHIANELLO, 2016.

of view; the second covered a smaller visual space but guaranteed the same "scaled" view of the entire image, making it easier to read.[233]

In the course of the conflict, these innovative observation methods became the "new eyes" of the armies, capable of going beyond the physical horizon of traditional views to grasp the complexity of the landscape in its entirety and three-dimensionality. In this regard, the stereoscopic procedure was often used, as it was considered to be "very useful for recording and studying bursting effects, for making the nature and proportions of the work carried out more evident and for other applications "[234]: artillery, various weapons, barracks, cemeteries and war graves, permanent fortifications, temporary defensive installations, road infrastructure, cableways, shelters, and much more.

Photographic reconnaissance "from above" became a widespread practice along all the front lines, from the fields of Flanders to the Black Sea, from the Balkans to the Baltic Sea, producing thousands of images of unparalleled evocative power, which today constitute an indispensable information potential, to be known and investigated also in relation to the development of new techniques for classifying multispectral images and spatial filtering, as well as digital mapping and the development of raster-GIS.[235]

In the light of the above considerations, it is therefore evident how this "way of looking" at the different warscapes today can provide an important contribution to begin to decode the codes according to which these "warscapes" are written. In particular, thanks to the continuous improvements in the field of remote sensing technology that have made it possible to produce images capable of identifying landscape structures in ever greater detail, this type of analysis can provide a global vision with specific regard to those spatial patterns and phenomena that could not easily be grasped from a "ground" perspective, such as the "signs" impressed on the ground linked to the various processes of militarisation.

Starting from the "simple" superimposition of georeferenced maps belonging to different temporalities, up to more refined elaborations and specific and innovative instrumental interpretations, as will be better detailed in chapter 8, the in-depth study of these "ways of looking" can provide a significant contribution for the understanding

233 DOCK, 1928.

234 In 'Army General Staff. Historical Office. The Great War on the Italian Front. From the images of the military photographic service', 2009.

235 With respect to these insights see also CHIELENS, 2009; STICHELBAUT, 2011; STICHELBAUT, CHIELENS, 2013; STICHELBAUT, GHEYLE, SAEY, VAN EETVELDE, VAN MEIRVENNE, NOTES, VAN DEN BERGHE, BOURGEOIS, 2016; CHIANELLO, 2016. Please also refer to Chapter 8, where these arguments will be taken up and explored specifically concerning this research.

of the evolutionary biography of the different warscapes, and therefore for the identification within the contemporary multi-layered landscape of the permanences of the vestiges of the Great War at different degrees of recognisability.

3.3.2 Inside perspective: direct experience of conflict

The way of observing the landscape from a point of view within it offers mainly a horizontal perspective that coincides with the way in which, in the past but also in the present, this landscape was and is perceived by subjects within it.

Specifically, this translates into metaphorically immersing oneself in 'war landscapes' and essentially adopting the point of view of the soldiers who populated them in order to observe them in their entirety, through a 'close-up' view capable of capturing even the most everyday and spontaneous details. If aerial photography represented the most widespread example of a way of observing "from above", in this case it is the more traditional shots, on a "human scale in the landscape", that clearly express this "way of seeing" of the different warscapes.

During the war, thousands of photographs were taken by the official photographers commissioned by the various military generals to create those famous composite panoramas with a wide angle of view, admirable for their definition, with the aim of documenting the state of affairs of places in different time layers, in relation to the evolution of the conflict.[236] A great deal of evidence remains of this fundamental heritage of information, in particular all those snapshots catalogued as "publishable", "reassuring" in that they were not able to shock the sensibilities of the population or create excessive concern and alarm. In them, there was no reference to combat actions, while the common tendency was to represent the 'normality of war' in its more everyday dimension of life in the trenches.

Despite the misrepresentation of the true conditions of life "at the front", the result of the need to take photographs specifically for war propaganda purposes, these photographs are in any case a very useful source of information for understanding the state of the places and buildings during the war, and for investigating the degree of compliance and coherence of the fortifications built with respect to what had been conceived and planned in the militarisation projects. From this point of view, therefore, these photographs constitute a rich and fertile source of information in order to obtain more information on the types of materials used in the construction of the permanent structures, as well

236 At the end of the conflict in Italy alone, the number of military photographers working on the front reached a remarkable 600, and their camera equipment called 291 in various models. See BALELLI, 1995.

as the entrenchments, the soldiers' firing positions, and the obstacle and shoring systems facing the front lines.

In addition to this already dense photographic heritage there are, in dissimilarity and in other ways as a completion, all the thousands of snapshots taken by amateur photographers who, violating the internal censorship of the various countries, took their cameras with them to the front to document and make the event memorable, in the literal sense of the term.[237] From these other documentary sources, as well as from the photographic surveys carried out on the various battlefields following bombardments and battles, and secreted by censorship, one can obtain further valuable information for the "close-up" observation of the "wounds" inflicted by the conflict on the various warscapes, of the destructive impact that increased the degree of vulnerability of the structures, sometimes even causing their collapse.

There are many examples of this, as is evident in the cases below.

In the light of the previous considerations, it is evident how the vast and diversified heritage of historical photographs, which have become icons of the collective photographic subconscious of the Great War, can provide an important cognitive contribution to enter into relation with the different warscapes from a perspective close to them, which allows to establish a sort of mutual dialogue based on the ability to "listen" to the "infinite correspondences between things and in things"[238], the stories they want to talk about.

3.3.3 *Inner perspective: an internalized perception*

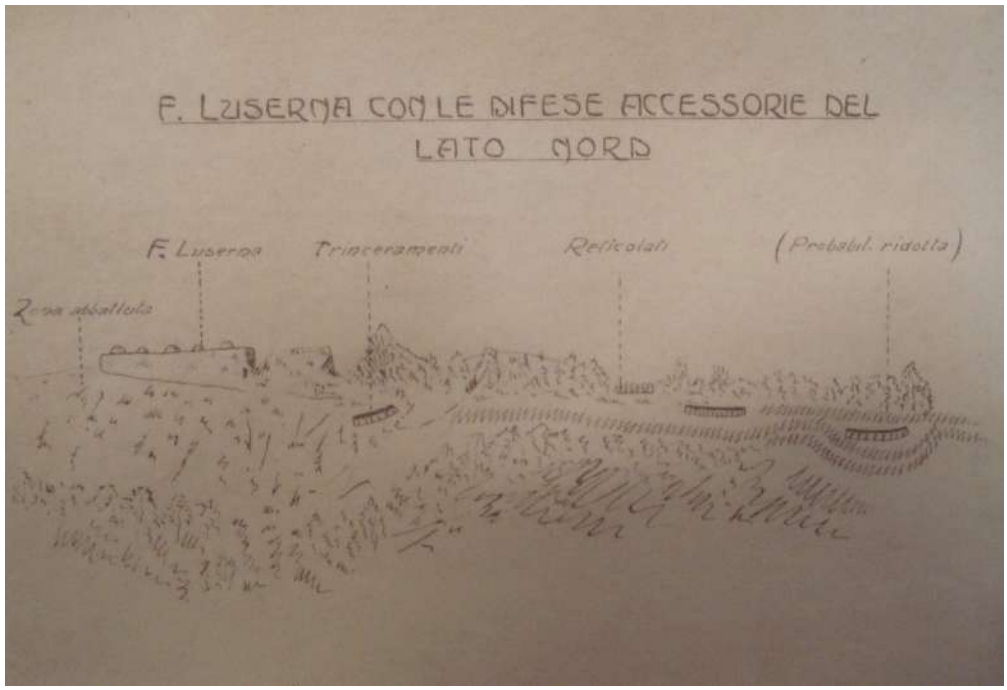
Intrinsically linked to the already described need to establish a dialogical relationship between subject and object, another interesting "way of looking" at the landscape stems from the awareness that what is considered reality is not actually the objective datum in itself, but its mental interpretation, a representation constructed in the mind of the observer on the basis of a previous cultural background that serves as a

237 The ban on photographing war zones was very often not imposed for security and confidentiality of war against the enemy, but reasons of internal control and censorship within individual countries. For example, the following circular of the Supreme Command of the Italian Army of 9 May 1916: 'Circular No. 537 of 14 January 1916 forbade the publication of photographs, sketches, and drawings on military subjects or relating to the zone of operations without first submitting them for approval to the military censorship office of the Supreme Command. It is now common for private newspapers or agencies to submit photographic censorship photographs that officers and soldiers undoubtedly took at the front. This kind of trade, which is ill-suited to military character, must be stopped. Therefore, the Commands to whom this letter is addressed will see to it that it is permitted only to persons expressly authorized by the Supreme Command. The S.M. Sub-Chief of the Army. Carlo Porro". In FABBRO, 2016

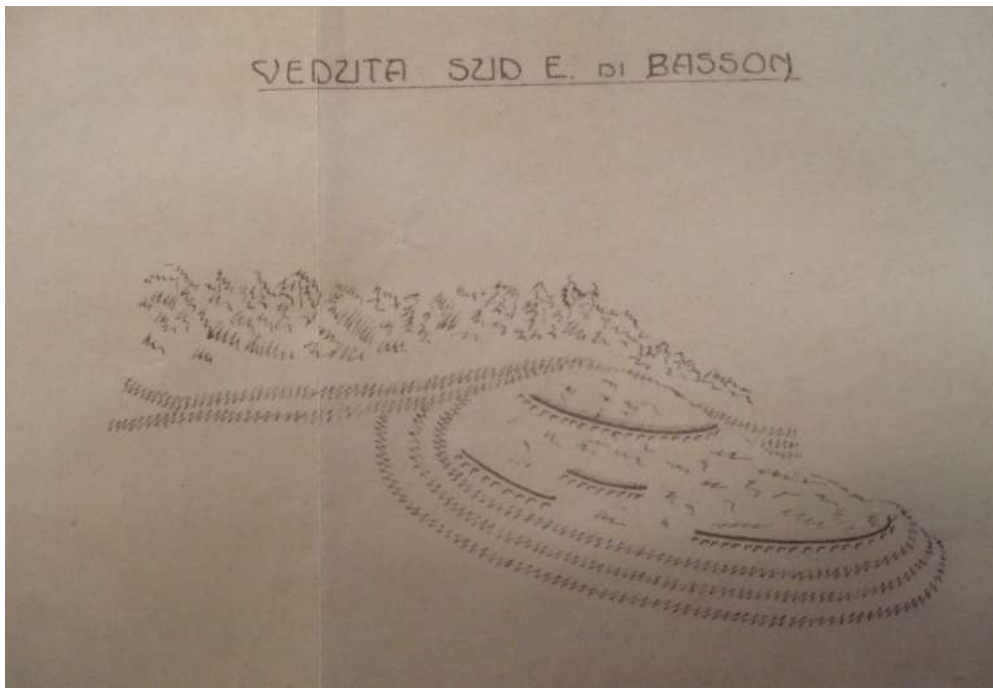
238 QUENDOLO, 2001.

Tab. 3.5 | Italian military reconnaissance of the Austro-Hungarian defensive positions on the Vezzena plateau (TN).

Sistemazione difensiva, Apprestamenti Militari austriaci (1915)
ISCAG, Raccolta documentale, Guerra Italo-Austriaca 1915-1918,
b. 565, fasc. 5. - Prima Armata, Comando III Corpo d'Armata.



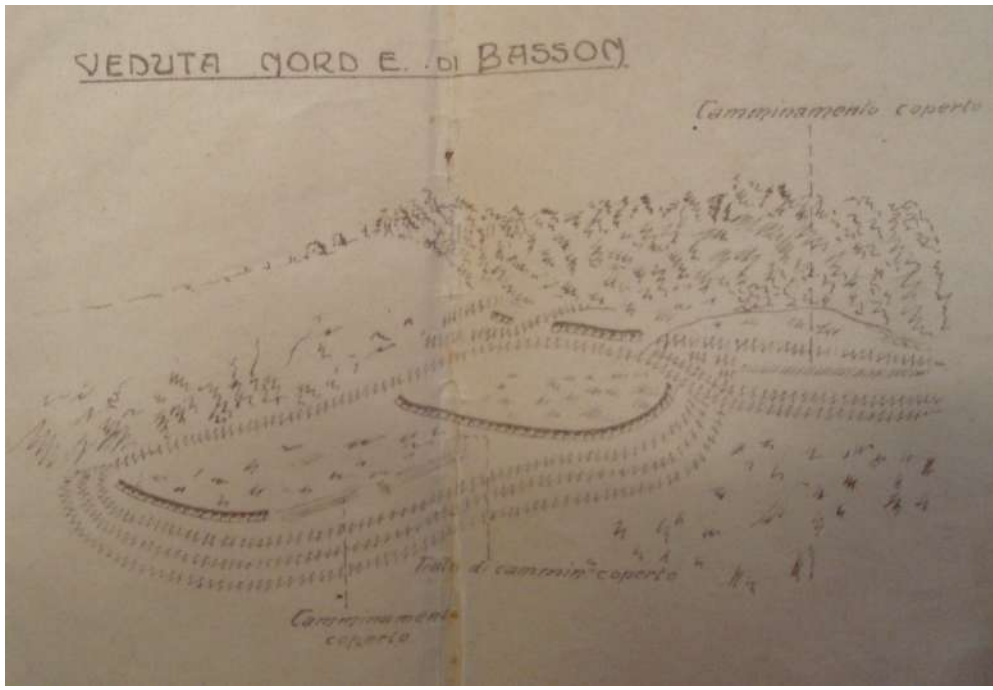
Sistemazione difensiva, Apprestamenti Militari austriaci (1915)
ISCAG, Raccolta documentale, Guerra Italo-Austriaca 1915-1918,
b. 565, fasc. 5. - Prima Armata, Comando III Corpo d'Armata.

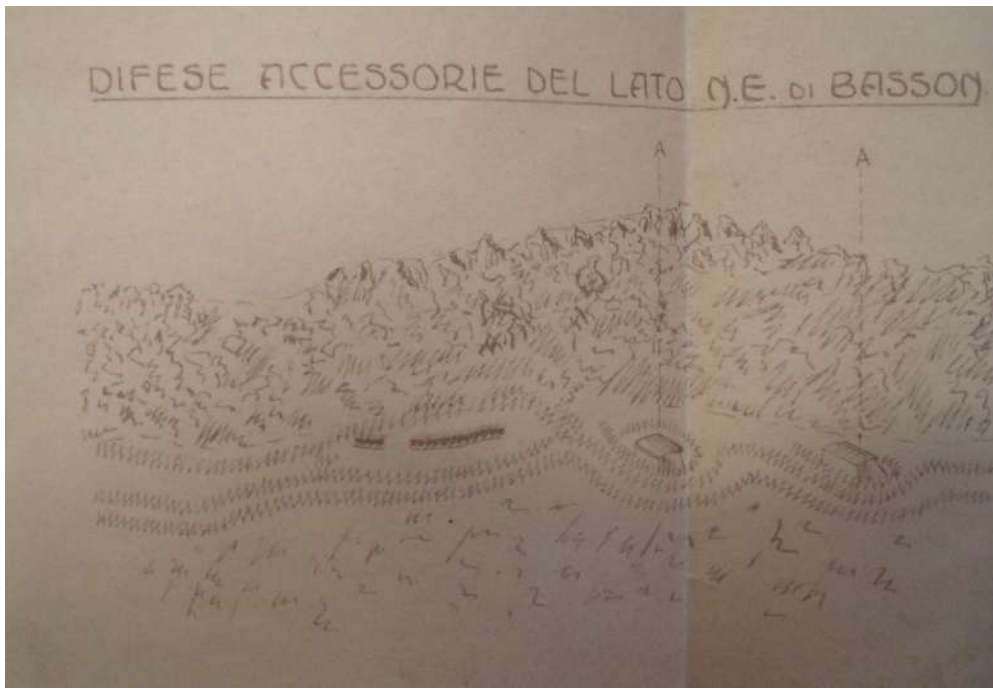


Tab. 3.6 | Italian military reconnaissance of the Austro-Hungarian defensive positions on the Vezzena plateau (TN).

Tab. 3.7 | Italian military reconnaissance of the Austro-Hungarian defensive positions on the Vezzena plateau (TN).

Sistemazione difensiva, Apprestamenti Militari austriaci (1915)
ISCAG, Raccolta documentale, Guerra Italo-Austriaca 1915-1918,
b. 565, fasc. 5. - Prima Armata, Comando III Corpo d'Armata.





point of reference and comparison.

If in the "from above" and "from within" views the landscape was considered the object to be investigated from different points of view, in this perspective of meaning the cognitive process can only take place through an internalisation of the landscape itself by the subject. Observer and observed, therefore, define each other, listen to each other, integrate and complete each other, defining the infinite possibilities of reality, true not in absolute terms but in relation to the specific cognitive relationship between "who looks" and "who is looked at". Through this "inner perspective", then, knowledge of landscapes becomes knowledge not of the object itself [the landscape], but rather a profound understanding of the conceptual idea that the observer's mind has of it.[239] With specific reference to the different warscapes, this approach is declined in the whole series of cartographic representations, sketches, paintings, mental maps that go beyond the objectivity of the photographic document to return a vision of the "war landscapes" filtered by the mind of the observer, contextualised in its objectives, which allows to capture those intangible meanings not designed in the plans of militarisation, but arising from the direct experience of war.[240]

It is clear how this perspective of observation opens the field to interdisciplinary reflections but, from the observatory of this research, a useful example to understand this particular "point of view" is represented by the drawings of espionage, elaborated by the different Countries to formulate a judgement on the strategic possibilities not only of the moment, but also in perspective in time.

Such representations, in fact, integrated the more "objective" data obtained from aerial and photographic reconnaissance with a wider set of information, based also on "hearsay", filtered by the "fear of the enemy", by what the imagination itself, more or less unconsciously, could make seem more likely. This does not mean that the maps, sketches and representations produced did not correspond at all to the real configurations of the different warscapes, but certainly, unlike simple photographs, they returned a critical elaboration of reality,

239 To better understand, an example is more straightforward: two different people visiting a city, if they were to draw a representative picture of it, would draw other things, the mental image they have made. Similarly, there cannot be a single image of the different warscapes as this depends on the internalization that each observer has developed when coming into contact with these places.

240 Declinations of this approach can be found in painting, for example, where the great pictures of the past depict the grandeur of battles to celebrate the power of armies. Or in poetry, where soldiers at the front expressed their emotions in poetry. These ways of seeing are fundamental in that they restore, at a distance of time, a precise perception of the landscape, but this should not be misleading, as is often the case. It is not possible to "write history" based exclusively on these elements, as they are not objective but filtered by the personality of those who produce them.

filtered through the selective capacity of the observer to communicate the details considered most significant.

In this regard, for example, the coloured tempera drawings of the Austro-Hungarian fortification system, surveyed by Italian officers engaged in reconnaissance along the Eastern Alpine Arc during the General Staff trips, kept in the Archives of the Historical Office of the Army General Staff in Rome, are significant. They have made it possible to investigate and deepen the intense military reconnaissance activity of the border areas.[241] (TAB. 3.5-3.6-3.7).

3.4. Warscapes as Meta-Reality: a "transcendent look" to overcome fragmentation.

In the light of all the considerations presented above, it is evident how "war landscapes" constitute a complex system, made up of both discrete elements and continuous phenomena in a constant relationship of reciprocal influence. It is a multi-layered palimpsest conceived as the composition of different thematic layers, heterogeneous in form and meaning, juxtaposed one next to the other at different times, but at the same time mutually integrated.

The biographical analysis of the dynamics of transformation that have accompanied these landscapes from their conception to the present day has made it possible to better understand not only the different functions and uses that the landscape has assumed over time, but also the underlying key processes (driving forces) that have determined these changes.

Through this lens of observation, it has been possible to better define the issue of fragmentation/fragility that currently characterises the various warscapes, recognising that this is not a "problem to be solved" but rather one of the possible conditions of their existence, which can be accepted when it is understood that the intrinsic nature of these landscapes is precisely change, their "dynamic character".

The problem, therefore, is not the fragments themselves, but whether these fragments remain isolated, "broken pieces" of a whole that no longer exists, studied and analysed in their singularity and not as part of a larger, more complex system.

In this sense, the different "modes of observation" of the landscape presented in the previous chapter certainly provide an important contribution to the understanding of these "fortified systems", but they

241 For a more in-depth analysis of this topic, see the contribution by Sara Isgrò in the book "Il sistema di fortificazione austro-ungarico nelle ricognizioni dello scacchiere orientale, storia, disegno e architettura nelle iconografie di viaggio degli ufficiali di Stato Maggiore", Aracne 2017.

define a partial knowledge, necessary but not sufficient to be able to grasp the complexity as a whole.

What emerges is a sort of existential limit in the ability to use only logic and rationality to understand the true essence of these warscapes.

As already introduced, there is therefore a need to overcome the barriers of traditional analytical study in order to identify a new view capable of transcending the reality of the visible, to be able to capture the meta-realistic dimension of these warscapes, which identifies and characterises them. In other words, it means adopting a new point of view in which the focus is not on the individual parts that make up these landscapes [the vestiges as fragments], but on the meta-reality that is generated by their "being in relation", that is to say, to that "intangible substance" that is "woven" in a specific and exclusive way at the very moment when the various fragments come into reciprocal tension, creating a magnetic field, an energy, a quid value that, going beyond the physical reality of the fragments themselves, binds and substantiates the whole, and makes it unique and unrepeatable.

And this is intrinsically linked to the concept of multi-scalarity, to the need to observe closely but also to "look away", to be both external and internal observers, recovering a systemic view to be able to grasp this "intangible substance".

The ability to recognise this "intangible wholeness" refers to that "poetic seeing " capable of perceiving the auratic dimension of "things" [the "landscapes of war"], which reveals how "the thing is what it is not, that is to say that it is not only a finite thing [...] but also different from itself and coinciding with the other: a fragment of the Absolute, a revelation of the Infinite in the forms of the finite ".[242]

In other words, this means going back to investigating wartime landscapes, but adopting a holistic approach that recognises how "the whole is more than the sum of its parts "[243], how the fragments of the remains increase their potential if they are put into reciprocal relation, how the different "ways of looking" at the landscape, previously presented, are to some extent incorporated into this new transcendent perspective.

Introduced by the South African statesman Jan Smuts in the 1920s, holism is a philosophical principle according to which the understanding of a system cannot be obtained exclusively through the knowledge of its individual components, since the functional sum of the parts is always greater, or at least different, than the same parts

242 COMOLLI, 1993.

243 ZERBETTO, 1992.

taken individually.[244] Clearly abandoning a deterministic approach, the link with GestaltPsychologie is evident: the totality of perception is characterised not only by the sum of the individual sensory activations, but by something "more" that allows us to understand the form in its entirety.[245]

In this perspective of meaning, the experiential dimension of knowledge acquires renewed importance, as affective and multisensory participation that allows us to gather from each perceptive experience a global image to which the mind can attribute meaning.

Specifically, this means adopting an approach that focuses on the warscape and studies it in relation to how it is perceived by man, through a cognitive process that is both inductive and deductive, which investigates not only the theoretical and methodological aspects of spatial analysis, but also the relationships between the natural, cultural, social and historical factors that have defined its development. [246]

It is therefore proposed to integrate the traditional analytical models, which proceed by successive spatio-temporal decompositions, with a new perspective that focuses on the need to recover a global knowledge of the organism-landscape, studying in particular the potential and fragility of its connections and constituent links. In this sense, since the landscape is a phenomenon in continuous transformation, the holistic approach also represents a proactive method for interpreting the future trajectories of change of these warscapes, the prediction of which should represent an important source of inspiration for the figures who will have to plan and manage these changes, ensuring that this intangible yet substantial wholeness, which is "more than the whole of the parts", is not betrayed.

In conclusion, therefore, returning to investigate the "war landscapes" with the awareness of adopting a holistic approach to better understand their "potential and fragility", is essentially declined in two distinct directions of analysis, which integrate and complete each other reverberating the double tangible and intangible dimension of this

244 MATTACCHIONI, 2018.

245 For a more in-depth look at the holistic approach applied to landscape studies, see ANTROP, VAN EETVELDE, 2017.

246 In this regard, the concept of holism relates to the "Totalcharakter" already mentioned in the famous statement "Landschaft ist der Totalcharakter einer Erdgegend", commonly attributed (but not confirmed) to Alexander von Humboldt (HARD, 1970; ZONNEVELD, 1995; KUNSTER, 2008; ANTROP, VAN EETVELDE, 2017). By arguing how nature forms a deeply interconnected whole system, whose many parts interact with each other, von Humboldt was the first to recognize how "the whole is more than the parts that compose it," fully embodying what, a century later, would be argued by Gestalt theory (VON HUMBOLDT, 1807; WULF, 2015).

approach: on the one hand, in the possibility of identifying new reading keys through a renewed systemic view able to find a "possible order" in the complexity by identifying distinct "classes of warscapes", characterized by specific indicators and related "future driving forces of change" (chapter 4); on the other hand, in the need to investigate more deeply the auratic dimension of these warscapes in order to understand how to consciously decline future "valorisation practices", with particular reference to the processes that led to their consecration as "places of memory" (chapter 5).

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Chapter 4

War-scapes classes: proposal of an order matrix to “re-read” complexity in a systemic key

4.1 The search for a multiscalar approach to recognizing vestiges as a “system”

In the light of the above considerations, the need to identify new keys to understand better the complexity that characterizes the different "war-scapes" emerges strongly in response to the widespread inability to recognize them as a "system." In this sense, returning to investigate the different warscapes from a holistic perspective provides a crucial contribution to help solve this "problem of scale" by proposing an approach that, moving away from the individual observation of the single fragments (without losing any information), can focus on the networks of relations between them, and thus understand the works as a whole as a "system".[247]

This is a multi-scalar approach that integrates the specific knowledge of the particular with a new outlook that can accommodate a broader, overall vision, apparently blurred but which allows us to see relationships that are difficult to recognize “up close.” In other words, this means going back to studying the constituent elements of the various “war landscapes” through an understanding of their reciprocal interactions and the tangible but also visual connections underlying one part and another. To a certain extent, this means recovering the original “systemic view” according to which these “fortified landscapes” were conceived and designed better to understand the functioning of the entire “war machine.” This “way of looking” at the different warscapes makes it possible, for example, to recognize the various permanent fortifications not as isolated works but as elements of a “multi-component device”

247 The need to regain a systemic outlook is explored in relation to the reflections in Chapter 3.

designed to function as such, in which the degree of efficiency of the individual parts was measured precisely in their practical operation about the system.[248]

In the same way, it means being able to recognize the intrinsic connections, "of function" but also "of meaning," between the forts themselves and the entrenched systems confined to them and insisting on their surroundings. As is evident, this is an approach that is both inductive and deductive, which seeks to identify the correspondences between the reflections carried out on the biographical analysis of the "war landscapes" (further study in Chapter 3) and the information directly observable from the study of the single fragments (general reconnaissance dealt with in Chapter 2), to reconstruct the connective plots of these "fragile palimpsests of high complexity" and weave their meanings. The ability to observe the fragments of the vestiges no longer in their individuality but to metaphorically group them into sub-systems of works that are spatially close and, above all, connected by deep ties of functionality and mutual coherence thus makes it possible to overcome the fragmentation that characterizes today's "war landscapes" and reduce their complexity. In other words, it is a question of expanding to this observatory of reference particular reflections already widely discussed and diffused in the more specifically architectural sphere, which concerns the need not to extrapolate the permanences, even if isolated, of the remains "from their context, aligning them one next to the other like relics of a civilization closed in the cases of an increasingly gigantic museum. A practice [...] that extinguishes the profound sense that all things inherited from the past bear in their appearance and their matter".[249]

248 The fortified systems were in fact designed essentially according to the logic of functionality, and it is precisely in this sense that one can understand the reasons why, even before the outbreak of war, structurally obsolete constructions that were no longer able to fulfil the roles for which they had been designed were abandoned. For example, all the structures built in masonry that were unable to resist the destructive power of the new artillery: many permanent fortifications along all the front lines were in fact downgraded and the armaments were generally moved to open positions. Similarly, many forts built to defend lines behind the front, or built on the border between countries that later became allies, were downgraded and used essentially as support points for the 'front lines'. With regard to the latter, we would mention, for example, the fortifications built on the Italian-French border (barrage on the Colle di Tenda, di Nava, di S. Bernardo, del Melogno, on the Italian side; the Authion, Barbonnet and Tournoux forts on the French side).

249 DI BIASE, 1990, p.108. These considerations refer to the theoretical debate within the discipline of monument restoration regarding the need to look beyond the traditional dichotomy between materia signata and haecceitas, in order to recognise how the testimonial value of a given asset is formed as much in its material essence as in that "second essence" mentioned in Chapter 3. See MASIERO, CODELLO, 1990; QUENDOLO, 2001.

This "way of looking," which constantly moves between the different scales of observation, also makes it possible to identify, precisely among these new sub-systems recognized thanks to this particular gaze, the presence of certain repetitions, of common and recurring typological-constructive or functional characteristics. On the one hand, the recognition of these repetitions underlines the fact that the remains do not in themselves constitute unique and irreproducible works of art but are no less authentic for that[250], on the other hand, it makes it possible to reduce the number of this "highly complex heritage" by grouping the sub-systems of works that present similarities and affinities into specific "classes of warscapes." In other words, the analysis of these similarities and affinities makes it possible to classify the various "warscapes" concerning the typological nature of the works (permanent or field/temporary fortifications) and the context in which they were built (mountain, plain and coastal contexts). As is evident, this perspective expands to a network-level what was previously understood concerning the very close symbiotic relationship between the typological nature of the individual structures and the physical nature of the terrain on which they were built.[251]

Therefore, at an analytical level, adopting a holistic outlook means defining a new "matrix of order" capable of reinterpreting the articulated and fragile palimpsest of relics by recovering a general systemic perspective and arranging the typological-constructive peculiarities with the different orographical characteristics of the territories. This matrix, therefore, proposes a new way of looking at the heritage of the relics of the Great War to reinterpret and reorganize the heterogeneity and vastness of its constituent elements through a reduction in complexity, in the awareness that this reduction is not a simplification of the contents, but a necessary contribution to facilitate comprehension. Specifically, five different "classes of warscape" were identified: mountain fortifications and "strongholds" or "fortified walls" built-in lowland contexts, as regards permanent works; mountain defensive structures and open-field entrenched systems, as considers a field and temporary fortifications; towers and coastal fortifications, to defend territories from possible attacks "from the sea." Thanks to this classification, it was possible to return to analyzing the various works not in their individuality, as already tackled in the analysis of the status quo, but by organizing more organic and orderly research which, by moving to different scales, aims to bring out the level of recognizability of the remains as a "system." This is necessary to focus on the potential of this heritage, which is amplified

250 See Chapter 6.

251 See Chapter 3 for more details.

	Permanent fortification	Field fortification
Mountain areas	***Mountain forts***	***Mountain defensive systems***
Plain areas	***Plain strongholds***	***Open-field entrenched systems***
Coastal areas	***Coastal towers and fortifications***	

precisely if it is recognized as a system of works in a reciprocal relationship, and to understand better the fragilities and possible risks that may compromise its value as a testimony in the future. In other words, this "way of looking" represents a proactive approach helpful in defining an indispensable knowledge base against which future conservation and enhancement interventions can be directed. Applied knowledge, therefore, brings into tension the ability to "see things poetically" with the different ways of "taking care of them."[252]

4.1.1 Setting analysis parameters

From an operational point of view, the new reading of the palimpsest of vestiges through the synthesis matrix was conducted by elaborating specific files, reported below.

For each WarScape-Class, a representative sample of works was selected, at an international level, against which in-depth studies were developed at different scales of observation, both concerning the individual artifacts and to the current degree of recognizability of the close interconnections that substantiated the vestiges as a whole as a "fortified system." Specifically, some significant "fortified systems" were first analyzed at a general level to understand the reasons that determined their construction, both from a historical-political point of view and specifically in terms of structure. Such a look made it possible to reduce the number of individual fortified works, both permanent and field, and to understand the mutual support relationships that existed between them and that substantiated their meaning and existence. The ability to better recognize these networks of physical and visual connections that constituted the "war machine" arterial system is already an essential result in terms of proactive awareness towards future "care" practices. Going beyond the political boundaries and adopting the view instead

252 With regard to the possibility of "seeing things poetically", please refer to what has already been discussed in Chapter 3.2.

through the "Warscape classes," some significant "case studies" were selected, against which furthermore specific analytical sheets were developed, investigating the single vestiges on a detailed scale, without however losing the systemic view, i.e., the relationship with the network. As can be seen in the annexes below, in these analysis sheets, equal importance has been given to the in-depth study of the typological-constructive characteristics of the individual fortified systems (Constructive typology and materials) and of any restoration/recovery/enhancement projects that have been carried out in recent years (Enhancement project-New use), as well as to the examination of the degree of recognizability of the connections between the individual works and the network in which they are inserted. The main aspects analyzed are described below.

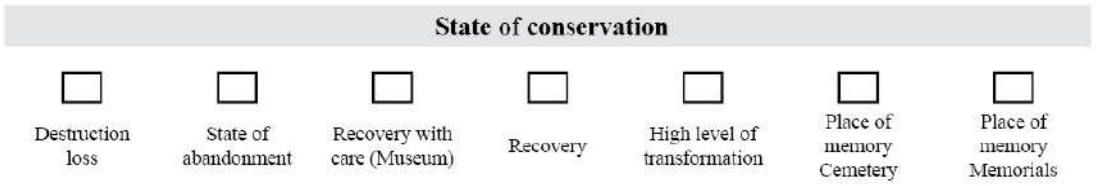
General Information

In this section, the historical-evolutionary contextualization of the object under analysis has been included, summarising the motivations that determined its construction, the transformative dynamics over time, and the main functional and defensive/offensive characteristics for which it was designed.

State of conservation

To understand the current state of conservation of the artifact, the following schematic diagram was proposed, from which the option that best suited the context under study was selected each time[253]. Although aware of the semantic simplifications that such a classification entails, it has made it possible to draw up a homogeneous comparison of all the areas analyzed while also highlighting the general differences in orientation and formal approaches according to the different countries. If for the categories "destruction/loss and state of abandonment," the classification methods were univocal and applicable to each context, as regards, in particular, the categories concerning the processes of recovery, restoration, and transformation of the artifacts, the issue was more delicate. While in Italy, for example, the traditional tendency to deal with the remains of the Great War has been noted, following a cautious and conscientious attitude, even if leading to very different formal results (in terms of both restoration and recovery), in other supranational contexts a greater frankness has emerged in working on the heritage of the Great War with interventions of different transformative impact. Precisely for this reason, in this type of filing, it was decided to classify the interventions on the existing structures in general terms of recovery,

253 Regarding the classification of the current state of conservation/fruition of places and artefacts, refer also to what has already been introduced in Ch.2.2.4.



distinguishing than the specific cases in which a particular attitude of caution was recognized (Recovery with care) for the conservation of the informative/evocative potential guarded by the materiality of the places/manufactures, which often resulted in the conversion of the works into museum spaces (indoors or outdoors), and the areas in which, on the contrary, the remains have undergone significant transformations that have led to the inclusion of new uses and functions with related changes in the original morphological-distributive structures, altering to a large extent (High level of transformation) the memorial value of the asset itself. Finally, the places of commemoration have been identified, such as war cemeteries and landmarks built after the conflict for memorial purposes[254].

Constructive typology and materials

In this section, developed mainly concerning the permanent works, the principal information regarding the typology and construction technology adopted in constructing the results has been summarised. In particular, the close relationship with the morphology of the territory has been highlighted, which very often determined the planning choices and construction techniques. In addition, where possible, information has also been added regarding the materials used and their state of conservation.

Current property

The indication of the current public or private ownership of the "asset" in question is an essential piece of information, projecting the reasoning in terms of future intervention.

Active role in WW1

The direct or partial involvement in the events directly related to the war conflict is essential to understand the complexity of the "signs of destruction," their semantic significance, and their importance for the future. Their direct or partial involvement in the events directly connected to the war constitutes essential data for understanding the complexity of the "signs of destruction," their semantic significance, and, therefore, the overall value of the testimony of the work itself.

254 See note nr.140 p.109.

WS-Network Recognizability

While analyzing the individual works in detail (both permanent and field), as indicated above, I paid particular attention to the ability to recognize the networks of relations that connected the various fragments into a single system. These relations are physical but also visual, such as connecting infrastructures, roads, labyrinthine entrenched lines, railways, cableways, optical networks, to name but a few. The possibility of recognizing these connective networks allows us to understand the current fragments of the remains not as isolated remnants of a broken system lost forever, but as "broken parts" waiting to be recognized and put in tension with each other again, to express their voice, their own story.

Enhancement project-new use

A specific section has been dedicated to the projects involving the works under analysis, developed in particular for the centenary celebrations. The objectives of the projects implemented and the necessary transformations to make them effective have been briefly summarised. Where known, information regarding the different stakeholders involved in the whole valorization process has also been included.

Reachability level

The location of the work in question in places and landscapes with different levels of accessibility has indirectly influenced its current state of preservation: for example, in areas with little accessibility, the vestiges were less subject to the dynamics of post-war anthropic transformation, unlike areas where the needs of reconstruction have sometimes led to their cancellation. However, the ease of access to these sites is also an essential aspect for the future in terms of sustainability and economic viability (more use and therefore more economic induced).

Safe use and access

Aspects of structural safety are closely linked to information on construction techniques and the state of preservation of materials. These data are essential in determining the future "care" of the asset in question to make it usable and visitable.

Community engagement

As has been highlighted in various disciplinary fields, the traditional top-down approach of intervention and management policies, even for historical heritage, is outdated. What is needed is an increase in community awareness of the value of cultural heritage (in this case, the heritage of

remains) which can achieve through the direct involvement of citizens by stimulating active participation in the different phases of projects for the enhancement and improvement of the existing cultural heritage, as well as for its future management and maintenance. In some cases, these new participatory methods supported by the Faro Convention (see chapter 6) have been implemented and have led to very satisfactory results.

Customer Experience Data

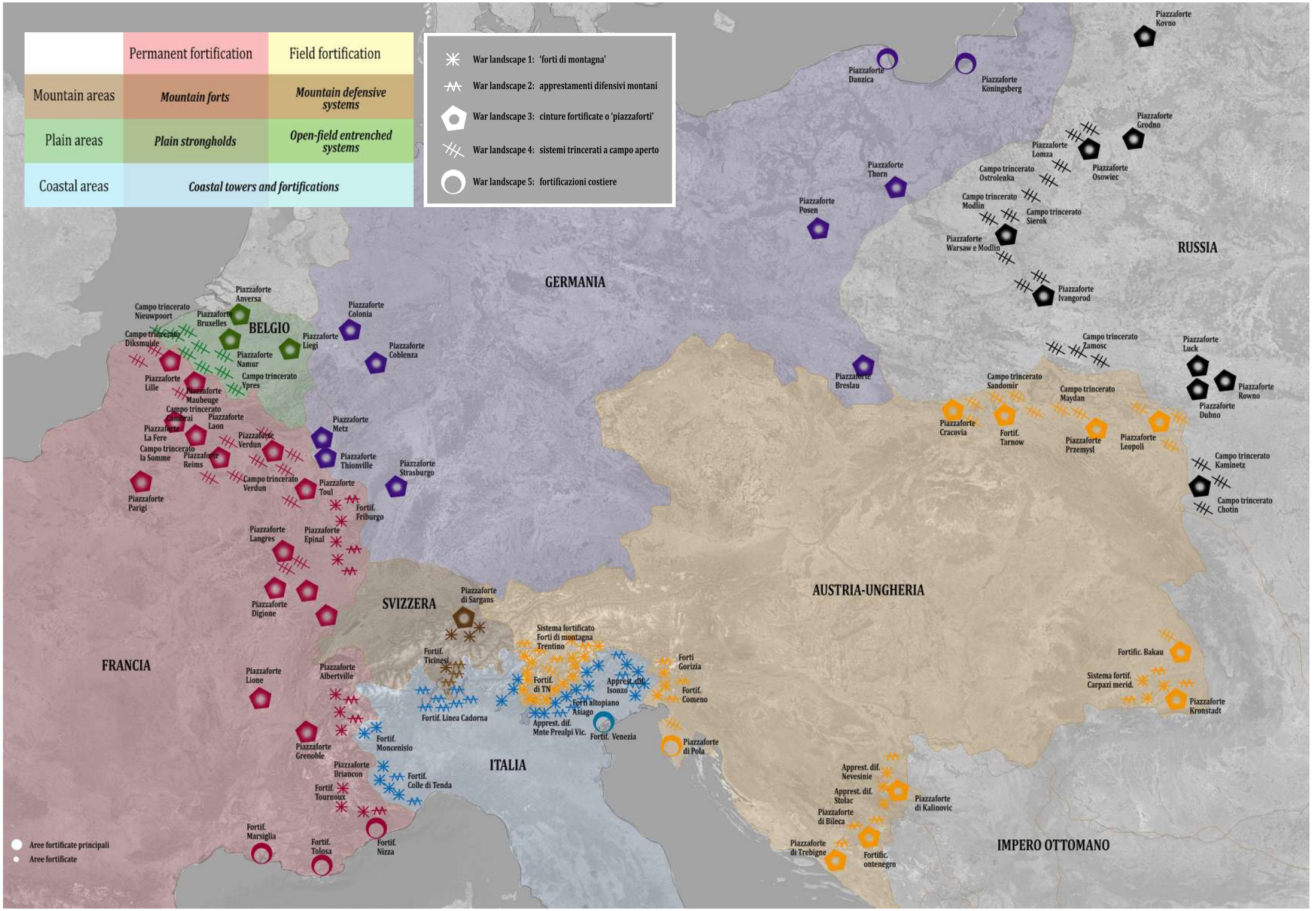
Through an analysis of the reviews left by tourists and visitors on the primary online review sites for sites, accommodation, hotels but also places to visit (such as Tripadvisor, for example), a sort of "index of appreciation" of the asset in question was drawn up, recording the impressions and perceptions of the users. This data is obviously to be considered relative and not absolute terms, but it allows us to understand the current trend of appreciation.

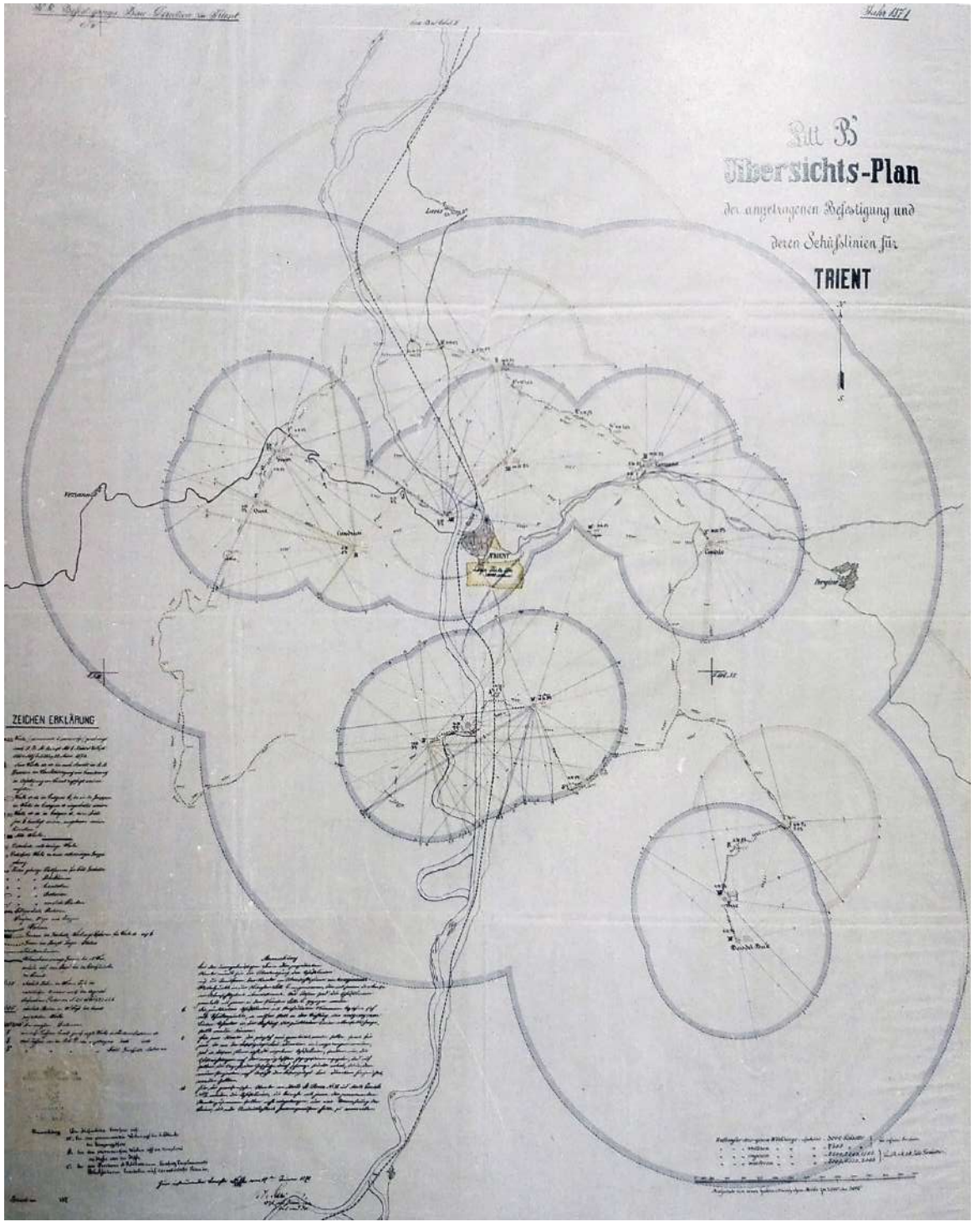
Online presence

This section indicates the "online presence" of the asset under analysis, measured in terms of the ability to find historical information about its evolutionary history as well as the ease of finding specific historical documentation.

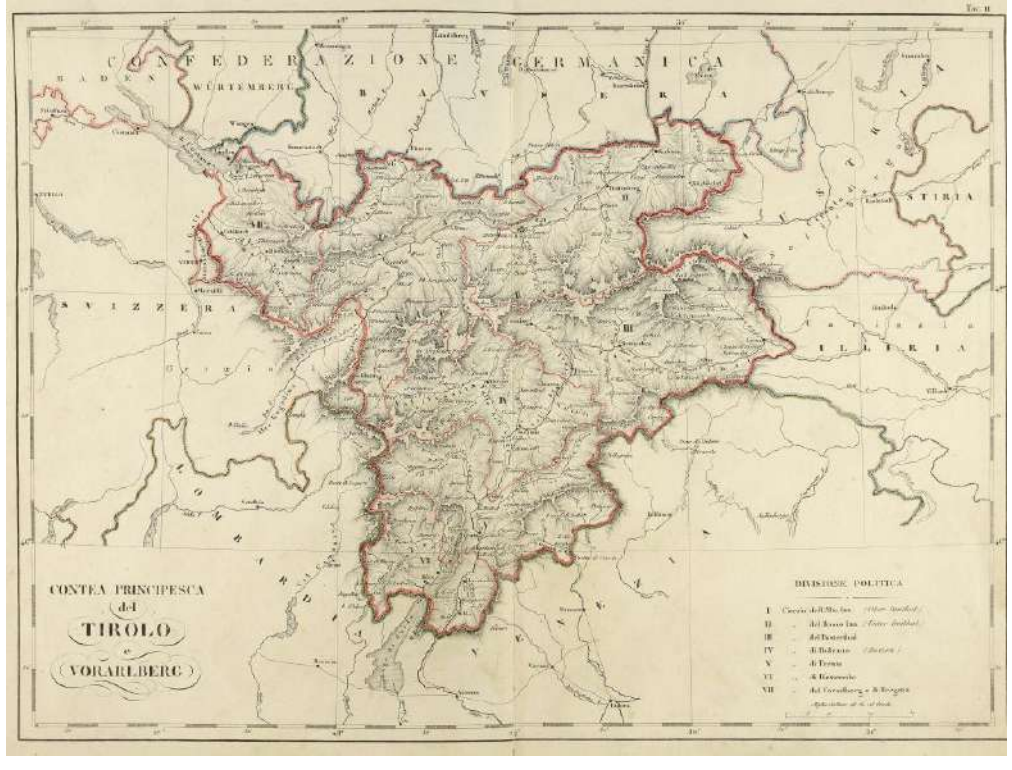
4.1.2 Critical reinterpretation of the status quo through a renewed "systemic look"

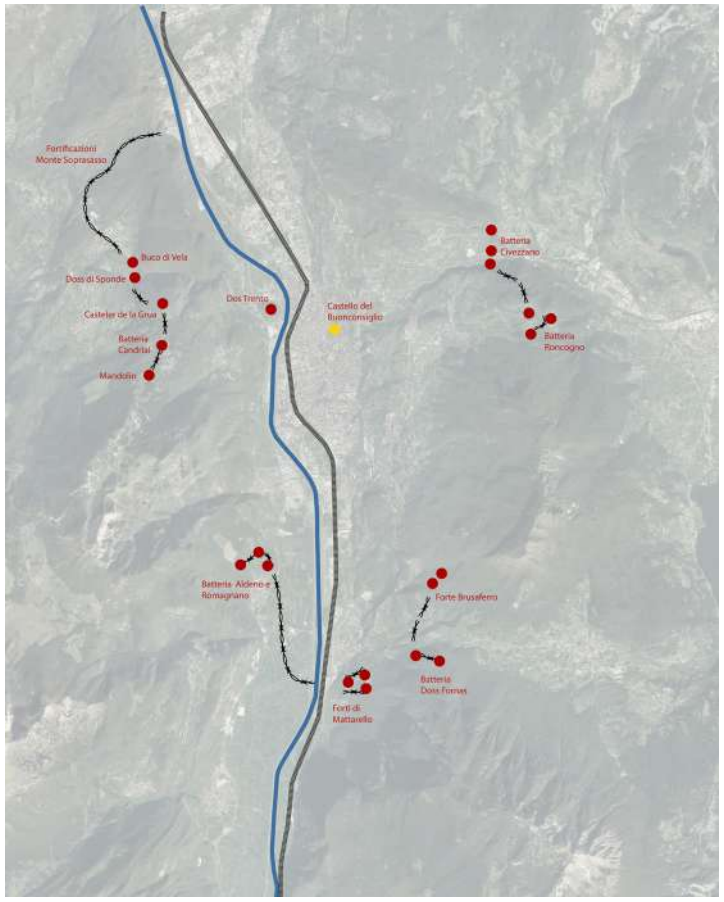
Below are the in-depth files prepared according to the scheme presented.

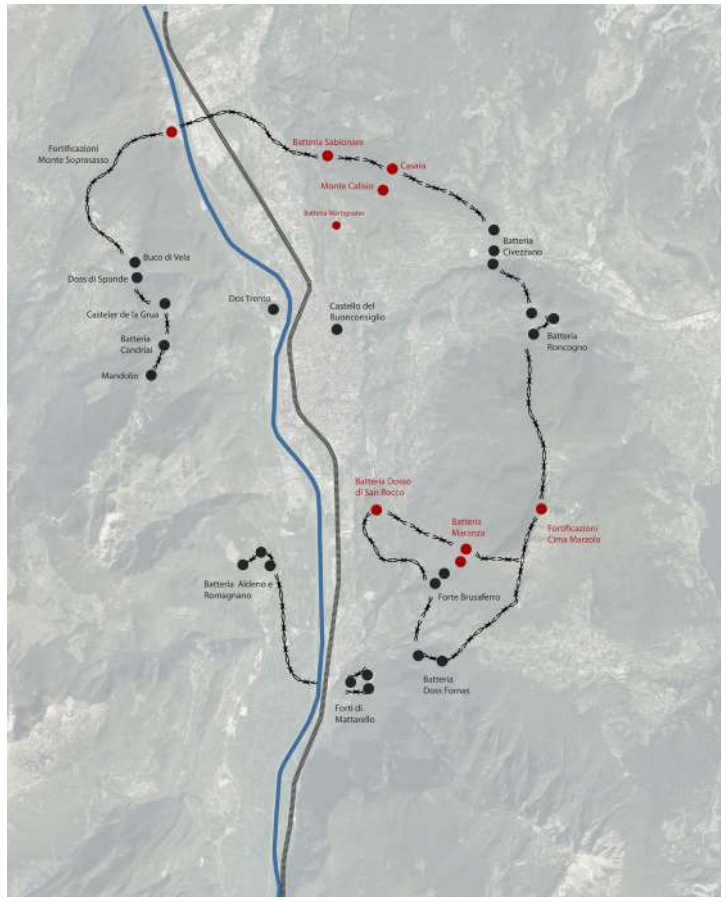

Permanent fortification
Field fortification
Mountain areas
Mountain forts
Mountain defensive systems
Plain areas
Plain strongholds
Open-field entrenched systems
Coastal areas
Coastal towers and fortifications
War landscape 1: 'forti di montagna'
War landscape 2: apprestamenti difensivi montani
War landscape 3: cinture fortificate o 'piazzaforti'
War landscape 4: sistemi trincerati a campo aperto
War landscape 5: fortificazioni costiere
GERMANIA
RUSSIA
BELGIO
SVIZZERA
FRANCIA
ITALIA
AUSTRIA-UNGHERIA
IMPERO OTTOMANO
Piazzaforte Kovno
Piazzaforte Danzica
Piazzaforte Koningsberg
Piazzaforte Grodno
Piazzaforte Lomza
Piazzaforte Osowiec
Campo trincerato Ostrolenka
Piazzaforte Thorn
Piazzaforte Posen
Campo trincerato Modlin
Campo trincerato Sierok
Piazzaforte Warsaw e Modlin
Piazzaforte Ivangorod
Campo trincerato Zamosc
Piazzaforte Luck
Piazzaforte Rowno
Piazzaforte Dubno
Campo trincerato Sandomir
Campo trincerato Maydan
Piazzaforte Cracovia
Fortif. Tarnow
Piazzaforte Przemysl
Piazzaforte Leopoli
Campo trincerato Kaminetz
Campo trincerato Chotin
Piazzaforte Breslau
Piazzaforte Anversa
Piazzaforte Bruxelles
Campo trincerato Nieuwpoort
Campo trincerato Diksmuide
Piazzaforte Lille
Piazzaforte Liegi
Piazzaforte Colonia
Piazzaforte Coblenza
Piazzaforte Namur
Campo trincerato Ypres
Piazzaforte Maubeuge
Campo trincerato Cambrai
Piazzaforte Laon
Piazzaforte La Fere
Campo trincerato la Somme
Piazzaforte Reims
Piazzaforte Verdun
Campo trincerato Verdun
Piazzaforte Metz
Piazzaforte Thionville
Piazzaforte Strasburgo
Piazzaforte Toul
Fortif. Friburgo
Piazzaforte Parigi
Piazzaforte Langres
Piazzaforte Epinal
Piazzaforte Digione
Piazzaforte di Sargans
Sistema fortificato Forti di montagna Trentino
Fortif. Ticinese
Fortif. di TN
Apprest. dif. Isonzo
Forti altopiano Asiago
Forti Gorizia
Fortif. Comeno
Fortif. Linea Cadorna
Apprest. dif. Mnte Prealpi Vic.
Fortif. Venezia
Piazzaforte di Pola
Piazzaforte Lione
Piazzaforte Albertville
Piazzaforte Grenoble
Fortif. Moncenisio
Piazzaforte Briancon
Fortif. Colle di Tenda
Fortif. Tournoux
Fortif. Marsiglia
Fortif. Tolosa
Fortif. Nizza
Fortific. Bakau
Sistema fortif. Carpazi merid.
Piazzaforte Kronstadt
Apprest. dif. Nevesinie
Apprest. dif. Stolac
Piazzaforte di Bileca
Piazzaforte di Trebigne
Fortific. ontenegro
Piazzaforte di Kalinovic
Aree fortificate principali
Aree fortificate

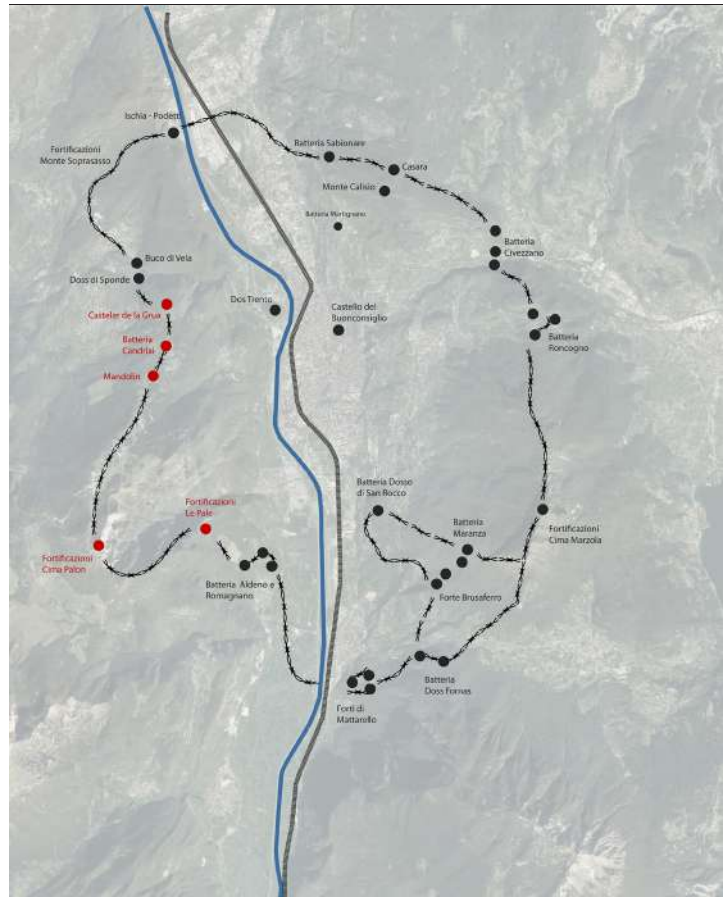


After the Villafranca armistice (July 11, 1859) and the consequent loss of Lombardy in favor of Piedmont, the Austrian military authorities decided to reinforce all the borders of South Tyrol by elaborating a great plan of fortification organized in two main lines of the barrage to be strengthened through the construction of armed road cuts, barbette constructions, and warehouses in the rear. General Huyn proposed the construction of a first line of "external" defense parallel to the frontier with Lombardy (with the construction of the forts of Nago, San Nicolò, Strino, Lardaro, and Gomagoi), and of a second barrage in a more backward position, entrusting the "Doss Trento", together with the forts of Rocchetta, Buco di Vela, and Doss di Sponde, with the most internal protection of the Adige Valley. Only after the cession of the Veneto region (following the peace treaty between Austria and the Kingdom of Italy of October 3, 1866), however, did the Saliente Trentino take on the value of a "strategic bastion" to be defended and fortified along the entire southern border, and a series of studies and projects began that continued for many years and proposed different solutions for the permanent and field fortification of the southern Tyrol. In Lieutenant Colonel Salis-Soglio's project, the area around Trento was once again confirmed as the center of gravity around which to build the double defensive wall commonly known as the "Trento Fortress". As shown in the figure on the right, according to this project, the western side included fortifications on Monte Grum, Monte Croce, the field fort of Candriai, and a series of entrenchments covering the entire area from Monte Soprasasso to Sopramonte and then up the ridge of Mount Bondone, fortified with a series of guard posts and Blockhaus. Instead, the southern side had a dense network of entrenchments that connected the Romagnano forts, the intermediate battery on the Adige Valley, and the San Rocco fort, up to the fortified hill of Brusaferro. To the east instead, the slope had a strategic value to prevent the attack from the Valsugana, so fortifications were planned on Dosso del Bue, Monte Fae, and above Bosentino, and entrenchments that ran along the Marzola, Chegul, and the Cimirlo pass, up to the barrage of Civezzano. Finally, on the north-eastern side, there were fortified positions on Mount Calisio.









For the time being, these fortification projects were not implemented, mainly for economic reasons, but they were largely taken over by Lieutenant Field Marshal Franz Thun-Hohenstein, to whose firmness we owe the actual construction of the Trentino stronghold a few years later. After submitting the project studies to Schoenfeld, who fully supported them, on October 13, 1878, the field marshal obtained the emperor's approval to start the work planned in field style, mainly for economic reasons.
As seen in Fig. YY, the defensive system of the city was divided into five external sectors and one internal one (insisting on Doss Trento): A, barrage of Civezzano, sella Roncogno, with battery on Cimirlo; B, barrage of Valsorda, with the crossfire of the Brusaferro and Doss Fornass batteries; C, Trivelline battery with the forts of Mattarello; D, batteries of Aldeno and Romagnano; E, fortifications from Monte Soprasasso up to Bondone, with battery on Monte Cuel and near Candriai. The conclusion of the works took place in June 1879, but Thun realized that the camp structures as they had been built were very precarious. Therefore he decided to ask the Ministry to rebuild in "Trentino style", that is with more solid forms and structures (in permanent style) the most strategically important posts: Mattarello, Brusaferro, Doss Fornass, sella Roncogno, Cimirlo Batteries.

The last twenty years of the 19th century, known as the "Vogl era" from the name of the engineer Colonel Julius Vogl, outlined a very precise typology of mountain fortifications and tenaciously supported the need to build a series of border barriers since the central strongholds had already been substantially built.
As far as the Trento stronghold was concerned, however, in the first half of the 1980s, Field Marshal Salis-Soglio proposed a reinforcement plan because the "Trentino style" did not guarantee an adequate resistance level. As can be seen in Fig.ZZ, the reinforcement of the southern sector was proposed, approved, and carried out with the construction of a fort on Dosso San Rocco and the Maranza battery, and of the northern sector with the construction of the forts and batteries of Martignano and the fortified positions on Calisio. Solis-Soglio also confirmed the proposals he had put forward in previous years and integrated the eastern fortified system with field emplacements on the eastern mountain slope, from Sella Roncogno to Marzola reconnected to the new Maranza battery and Doss Fornass.

In the first years of the 20th century, the main objective was to complete the Tyrolean defense system as soon as possible and therefore concerning the Trento stronghold, efforts were concentrated on strengthening the weaker slopes, particularly the western side of Mount Bondone (see Fig.CC). The decision to fortify the Monte Bondone area with new field posts and the reinforcement of the existing ones near Candriai dates back to when General Conrad became the Chief of Staff of the Austrian army. Since 1908 the construction of the military road had begun, which climbed up from Trento, intercepted Sardagna, Vanezze up to Viote, and then connected the new 8 Stützpunkte built as semi-permanent field works in earth and concrete. The main fortified points foreseen in case of war were at Casteler de la Grua and Blockhaus Mandolin, while in time of peace, the only measure to be taken was the construction of a field battery on the top of Palon and Pale.
This was the conclusion of the construction of the great Piazzaforte of Trento, after almost a century of transformations and modifications: a unique defensive system of its kind, which declined the strictly relational principles that substantiate the development of "fortified walls" to a mountain context, combining the physical and visual relations of the permanent and field works with the morphological conformation of the territory.

Entrenched system Monte Bondone
State of abandonment

Entrenched system Monte Cornetto
State of abandonment

Rock tunnels Monte Calisio
State of abandonment

Casara Fort
State of abandonment

Batteria Roncogno
Recovery with care (museum)

Entrenched system Monte Celva
State of abandonment

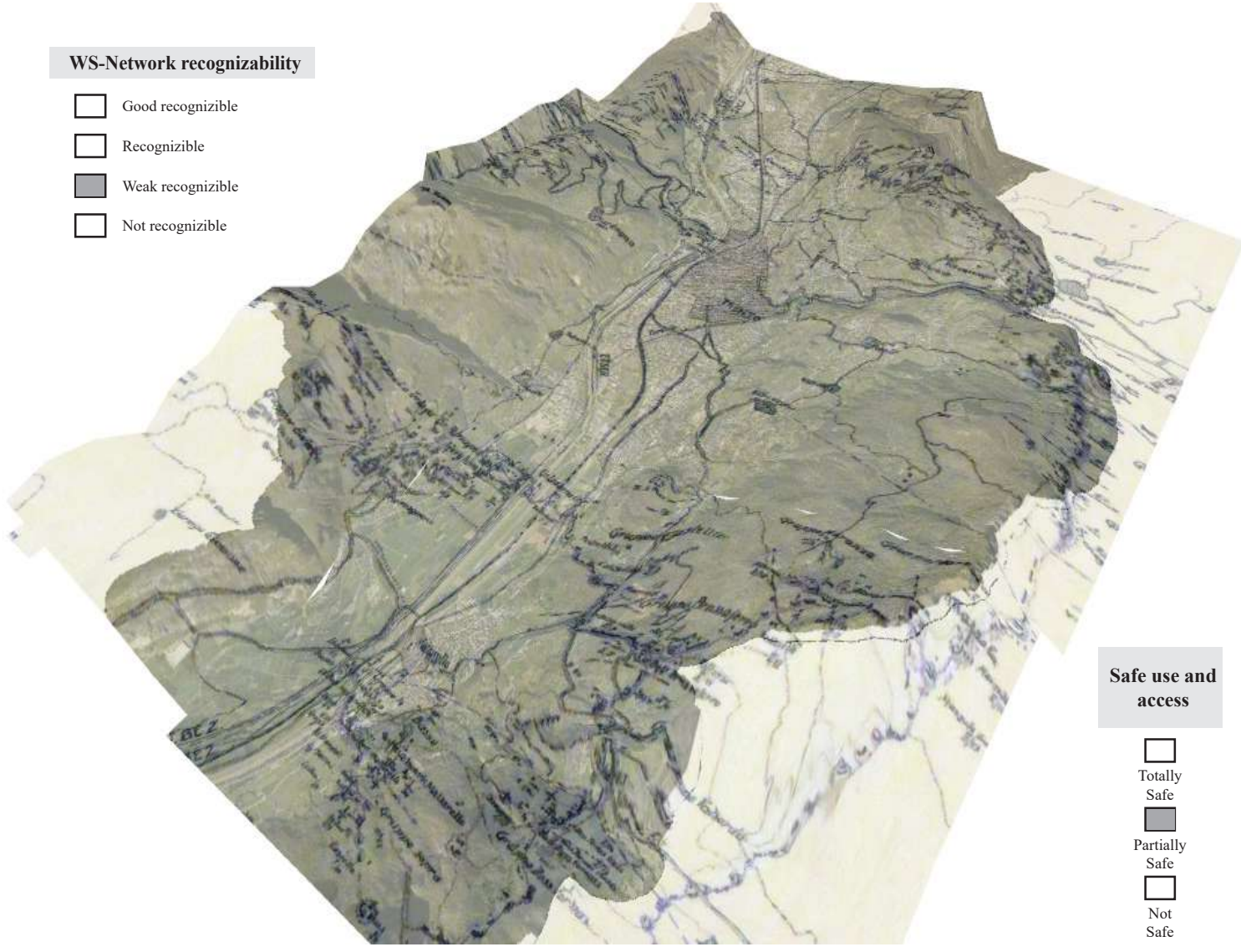
Doss di Sponde Fort
Recovery - New use

Batteria Candriai
Destruction - State of abandonment

Romagnano Fort
Recovery

WS-Network recognizability

- Good recognizible
- Recognizible
- Weak recognizible
- Not recognizible



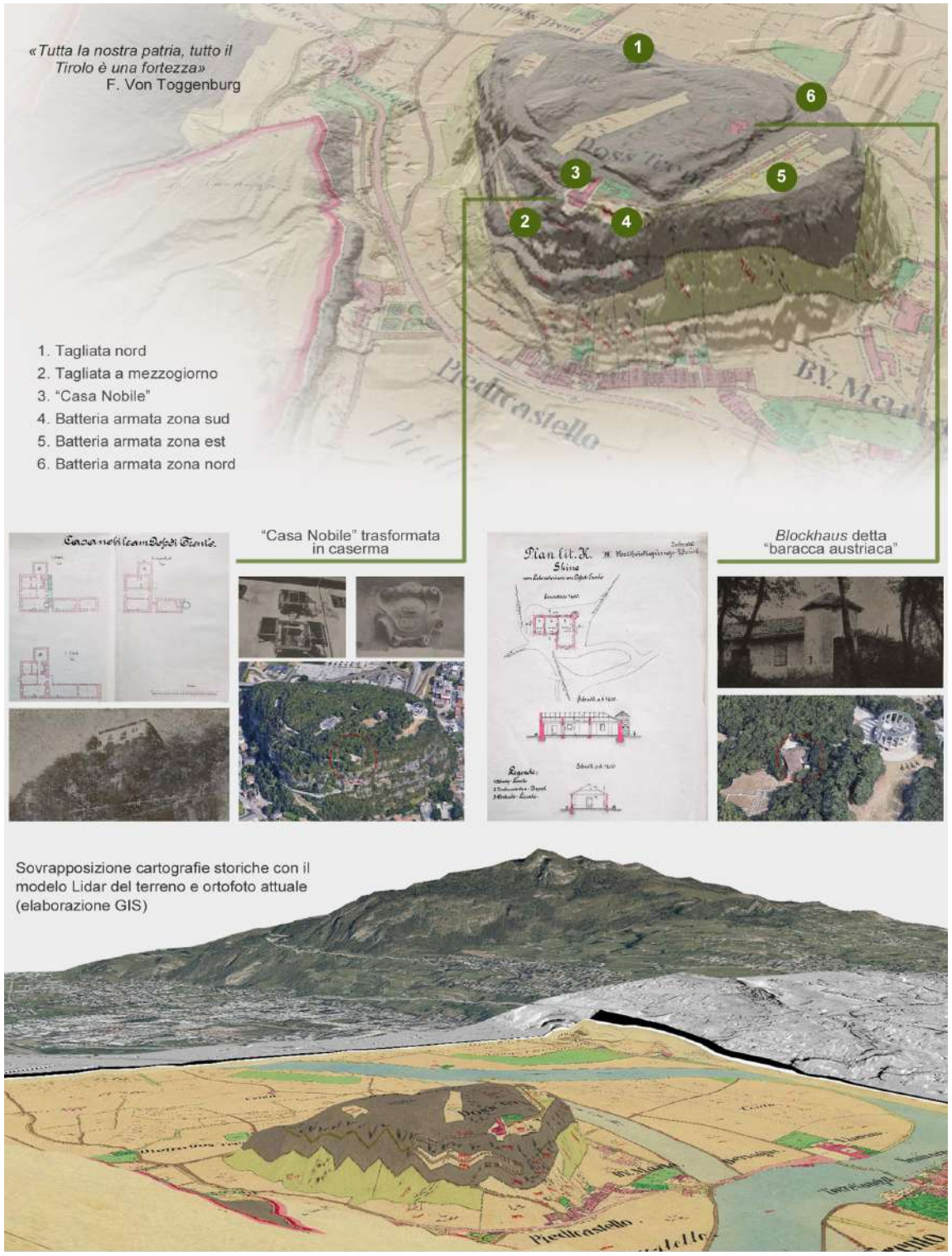
Safe use and access

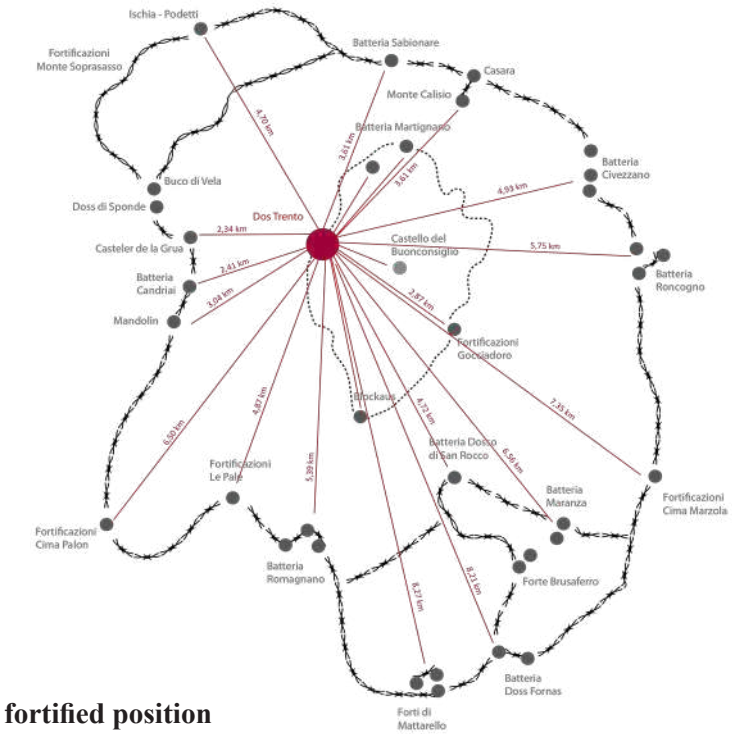
- Totally Safe
- Partially Safe
- Not Safe

Batteria Marzola
State of abandonment

Blockhaus Brusaferro
State of abandonment

San Rocco Fort
State of abandonment





The centrality of the fortified position of Doss Trento

Within the framework of Trento's stronghold, the city's defensive structure was set up along two lines of protection, an internal one hinging on the strengthening of the castle's structural system, and an external one based on the fortified position of Doss Trento. On the internal level, the city walls were adapted by building bridges connecting the bastions equipped with hoists capable of transporting the new artillery pieces, and further walls and palisades were built inside the urban nucleus, in order to delimit a closed and impregnable perimeter between Buonconsiglio, via Suffragio, via San Marco and Port Aquila. With regard to the external defense, these militarization projects entrusted the "Doss Trento" with the main task of protecting the city, providing for the construction of new fortified works and the adaptation of the contexts previously used in military operations to the new defensive needs against the advance of an army both from the west and from the Adige Valley. In detail, the project provided for the transformation of the seventeenth-century "Casa Nobile" of the Prince-Bishop (located at the southern edge of the hump) into a barracks capable of housing approximately two hundred soldiers, the construction of a small Blockhaus near today's Battisti Monument, and the positioning of two batteries, each armed with two 30-pound mortars and as many 18-pound cannons, located both on the eastern side of the hill to protect the city and the southern access roads, and on the northern side to defend the narrow gorge of the Vela torrent. In order to strengthen this small fortified citadel, in a short time was decided the construction of an additional armed battery (located on the southern side of the hill), and the expansion of the main barracks, providing a superelevation and the adaptation of the new coverage to the function of the impluvium, in order to support at least in part the insufficient water supply of the rocky spur. As can be seen in Fig.3, the three-dimensional elaborations carried out through the georeferencing of the tables of the Habsburg Cadastre by means of GIS software and the relative superimposition with the current DTM data (freely available at the provincial level), have allowed a better understanding of the general situation of the entire area in the mid-nineteenth century, and to effectively recognize the strategic position of the hump in the network of relations in which it was inserted. Thanks to the Hapsburg Cadastre, it is also possible to highlight another important "sign" that was decisive for the clearly separate urban and social development of the entire area of "Doss Trento" and Piedicastello with respect to the urban area: the great "wound" brought by the construction of the new railway line and the consequent shifting of the Adige River bed.

Tab. 4.5 | WarScape CLASS: MOUNTAIN DEFENSIVE SYSTEMS __Sentiero della Pace (Trentino) - Italy

General information

The Sentiero della Pace (Path of Peace) is a wide-ranging project carried out from 1986 to 1993 by the Autonomous Province of Trento to recover important portions of camp fortifications linked to the war front in the Trentino area. The current hiking trail of relevant historical memory covers more than 600 kilometers connecting the Stelvio Pass to Marmolada, and crosses very different environments and landscapes, such as the perennial snows of the glaciers and the mild landscape of Lake Garda, but united by having been "marked" by the events linked to the Great War. To walk it in its entirety would take no less than a month, but the Path of Peace can be discovered and traveled even in short distances, always reserving for those who undertake it continuous surprises, penetrating the places of conflict and nature at the same time, along former military roads, walkways, trenches, meeting fortifications, places symbolic of great battles, daring operations, and heroic resistance. This long itinerary was realized by the men of the Consorzio Lavoro Ambiente and of the Servizio Ripristino e Valorizzazione Ambientale of the Autonomous Province of Trento and was later extended to the Altopiano dei Sette Comuni including the area of Ortigara. For the time, it represented one of the first "pilot projects" that allowed to start focusing the attention on the many possibilities of intervention on the pre-existing structures, addressing issues related not only to the restoration/restoration but also to the destination of use and the future management and maintenance of this kind of artifacts.

The route is divided into eight areas of territorial reference: Passo del Tonale - Cima Presanella, Adamello - Val Rendena - Val Giudicarie - Val di Concei, Valle di Ledro - Alto Garda, Vallagarina and Rovereto, Altipiani di Folgaria e Lavarone, Altopiano dei Sette Comuni (Veneto), Valsugana - Lagorai, Val di Fassa.

On the Centennial occasion, a large part of the Sentiero della Pace (Path of Peace) was subject to safety measures, if not actual restoration. Today the path has become a hiking trail characterized by a common signage that facilitates the recognition of the system and the relationship between the different elements of the same.


Veldretta - Cima di Brenta
State of abandonment


Postazioni - Madonna di Campiglio
State of abandonment


Trincee Nagià Grom - Val di Gresta
Recovery


Punta Serauta - Marmolada
Recovery


Museo Grande Guerra - Marmolada
Recovery


Trincee Nagià Grom - Val di Gresta
Recovery


Monte Vignola - Avio
State of abandonment


Villaggio militare - Passo Tonale
State of abandonment


Punta Linke - Stelvio
Recovery


Monte Pasubio - Rovereto
State of abandonment


Forra del Lupo - Terragnolo
State of abandonment


Passo Paradiso - Passo Tonale
State of abandonment

Fort I
State of abandonment

Fort IV
Recovery

Fort v
State of abandonment

Fort VII
State of abandonment

Fort VIII
State of abandonment

Fort IX
State of abandonment

Fort X
State of abandonment

Fort XI
State of abandonment

Fort XII
State of abandonment

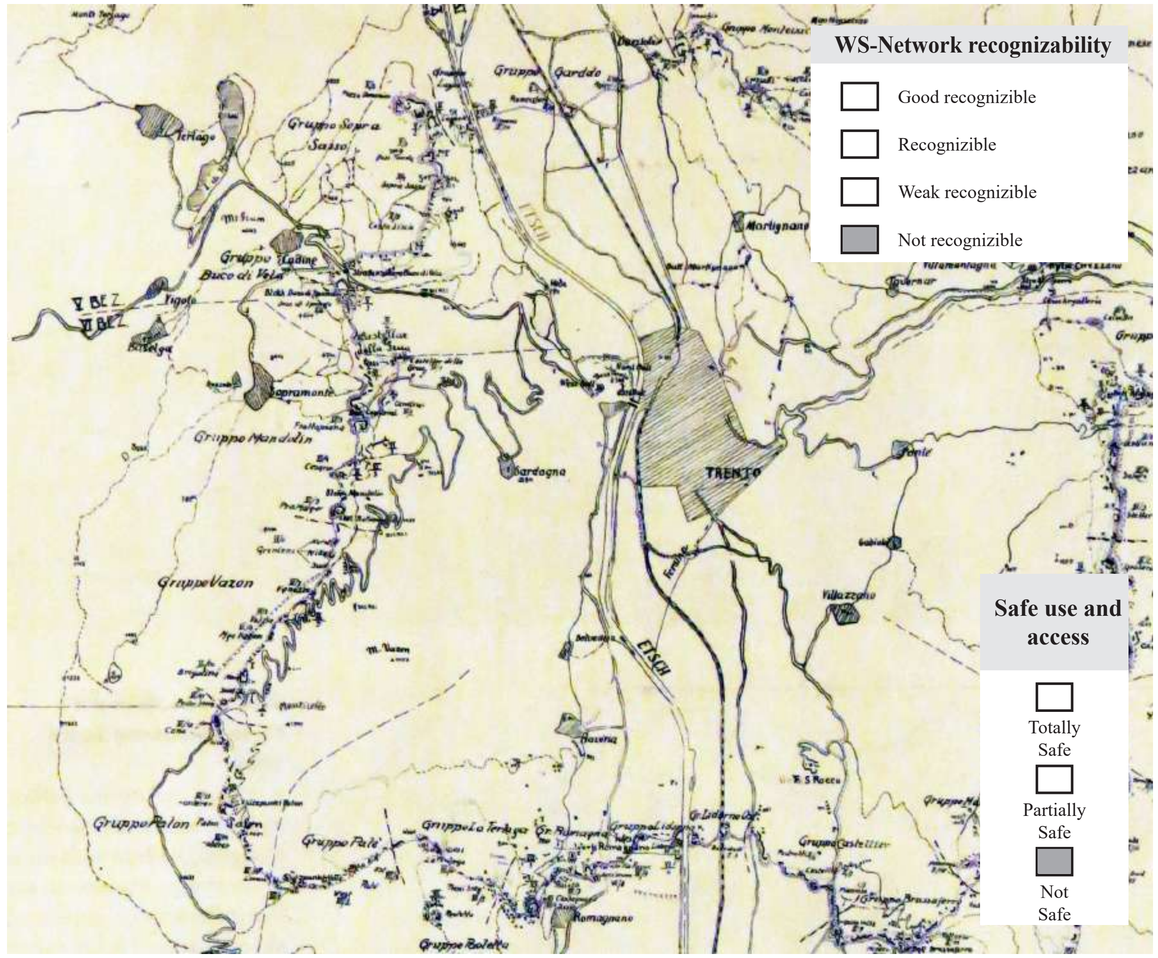
Fort XIV
State of abandonment

Fort XV
State of abandonment

Fort XVII
State of abandonment

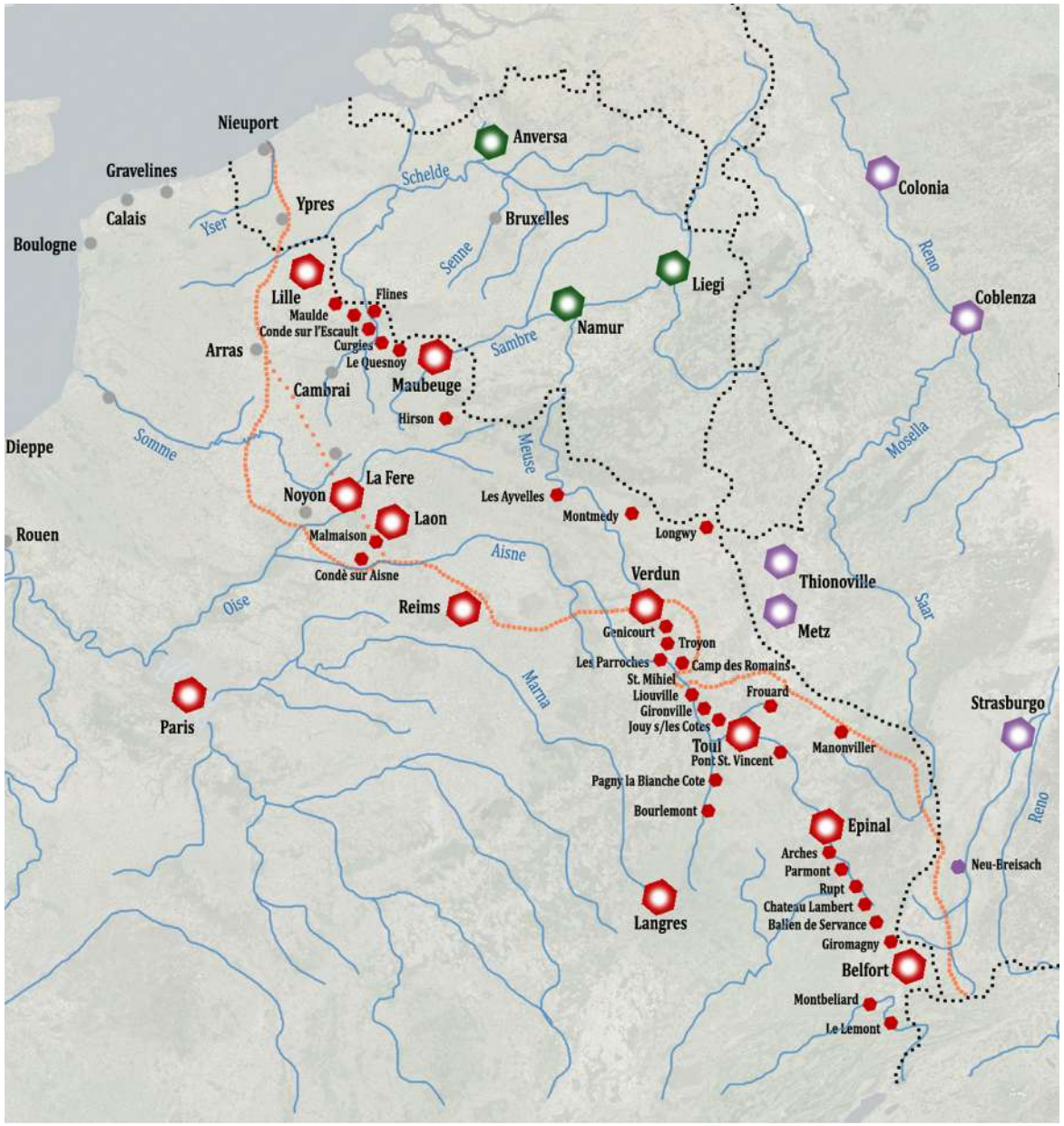
General information

The “red line” formed the external line of defense of the stronghold of Trento and rested on the peaks surrounding the Adige Valley. Since the permanent fortifications were obsolete compared to the advances of the artillery, numerous strongholds were built partially in cement and others excavated in the rock at the beginning of the twentieth century. Despite the fact that a century has passed since their construction, many of these vestiges are still visible today. They are located in places with little anthropization and difficult to access. The entrenched camp of Monte Bondone, in particular, was formed by a series of defensive posts and entrenchments that started from Fort Cadine (Bus di Vela) and developed along the mountainside, intercepting Fort Dos di Sponde and arriving as far as Sardagna. In the surroundings of the built-up area, there are numerous parallel lines of trenches that are still visible today because they are located in inaccessible and impervious places. The system then intercepted the Batteria Candriai and subsequently articulated it in discontinuous and parallel segments until it connected with Forte Mandolin, which today no longer exists. In Vaneze, the entrenched line is no longer visible because it has been reabsorbed in the dynamics of post-war transformation that led to the construction of houses. Subsequently, the entrenchments continued towards the Norge locality up to Vason, and finally, climbing along the mountainside, arrived up to Palon peak. In these places, the traces of the remains have been almost entirely erased by the construction of ski slopes. Continuing downhill, you met the fortifications of the Pale, still well preserved. Finally, the entrenched lines descended as far as Garniga Vecchia and then up to above the village of Romagnano (currently where the restaurant “Mas de la Fam” is located). From that point, an electrified fence ran as far as the other side of the Adige, thus closing the access to the city of Trento with a formidable barrage. Today, almost the entirety of this system has not been recovered nor interested in other valorization projects, despite the fact that many of these vestiges are still present, even if not perfectly preserved.



Tab. 4.6 | **WarScape CLASS: MOUNTAIN DEFENSIVE SYSTEMS** __ **Monte Bondone (Trento) - Italy**

Tab. 4.7 | WS - CLASS: PLAIN STRONGHOLDS __ "SERE DE RIVIERS" FORTIFIED SYSTEM (France)



Il Fronte Occidentale - Fortificazioni francesi, tedesche, belghe

- Piazzaforte francesce
- Piazzaforte tedesca
- Piazzaforte belga
- Linea del Fronte (circa 1914/15)
- Confini di stato
- Forti, ridotte, postazioni di combatimento

General information

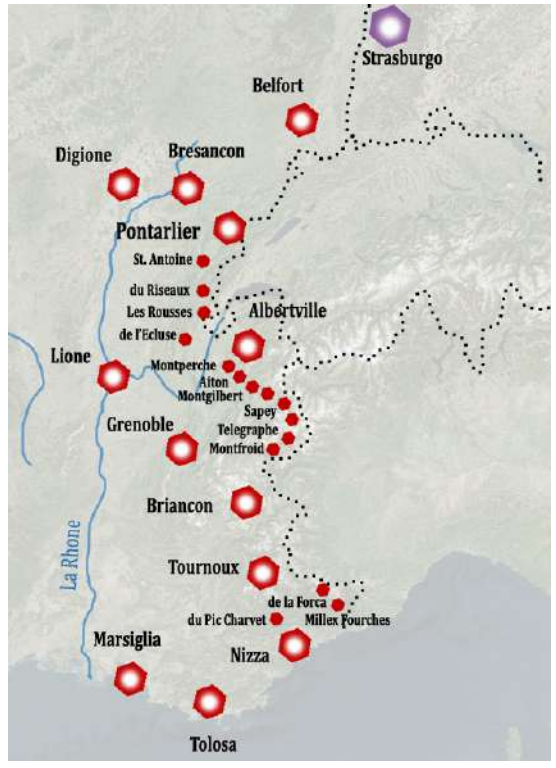
To remedy the situation of vulnerability created by the French defeat in the war against Prussia, it became evident that it was necessary to reinforce the frontiers through a general reorganization of the defense system which was entrusted to the new Minister of War, General Séré de Rivières.

He developed a new type of fortress that "made school" at an international level: filtering the teachings of his predecessor Vauban, especially the in-depth study of the places about the morphology of which the fortifications were to be built, Séré de Rivières theorized the concept of the stronghold, particularly suitable for flat French terrain and consists of a system of detached forts, located 5 or 10 km apart and arranged radially at about 10/12 km from a central core.

A stronghold was constituted by a crown of forts arranged radially around a city, at a distance of about a dozen kilometers from its center. At the center of the stronghold were the central warehouses of food, materials, and ammunition, from which supplies departed for the strong and the front line through a network of narrow-gauge railways along which were arranged intermediate deposits. Every fort could carry out the protective shooting on its neighbors to discourage the advance of the infantry; besides the main forts, there was a series of temporary works destined to serve the troops that occupied the intermediate spaces between a fort and the other.

In addition to the permanent fortifications, there were also defensive redoubts intended to house the infantry, "combat shelters" that allowed the troops to safeguard themselves from bombardment, but also temporary housing, positions for intermediate batteries intended to receive artillery pieces in addition or replacement of the artillery of the forts. Behind the line of forts lay a series of installations intended for logistical support.

Three different types of forts can be described: arrest forts, redoubt forts, and square forts. In addition, it is possible to differentiate between forts that have been modernized and those that have remained in their original state. The fort of arrest was by definition isolated from the system and therefore had to be able to function independently and ensure its defense, often large, had a field of fire in all directions. The forts of redoubts and squares could instead count on the support of their neighbors and generally had to defend themselves only on one front. The artillery was therefore concentrated in the direction of the nearby forts and the area to be controlled.



The main strongholds of the defensive line were, starting from the southern border towards Italy and the Mediterranean:

- the coastal strongholds of Nice, Toulouse, and Marseille;
- Albertville, Briançon, Tournoux, and Lyon starting from the southern border with Italy (modernization of the mountain fortresses);
- the cities of Besançon and Pontarlier in the Ural Mountains region;
- the cities of Belfort and Epinal in the Vosges, and the region of the Upper Moselle;
- the cities of Toul and Verdun, and the central part of the Meuse;
- from Montmédy to Dunkirk, passing through the cities of Maubeuge and Lille.

As can be seen from the elaborations on the side, this particular type of fortification was well suited to lowland contexts. In the following cards, some particularly significant strongholds will be examined in-depth and, only as an example, some specific fortifications.

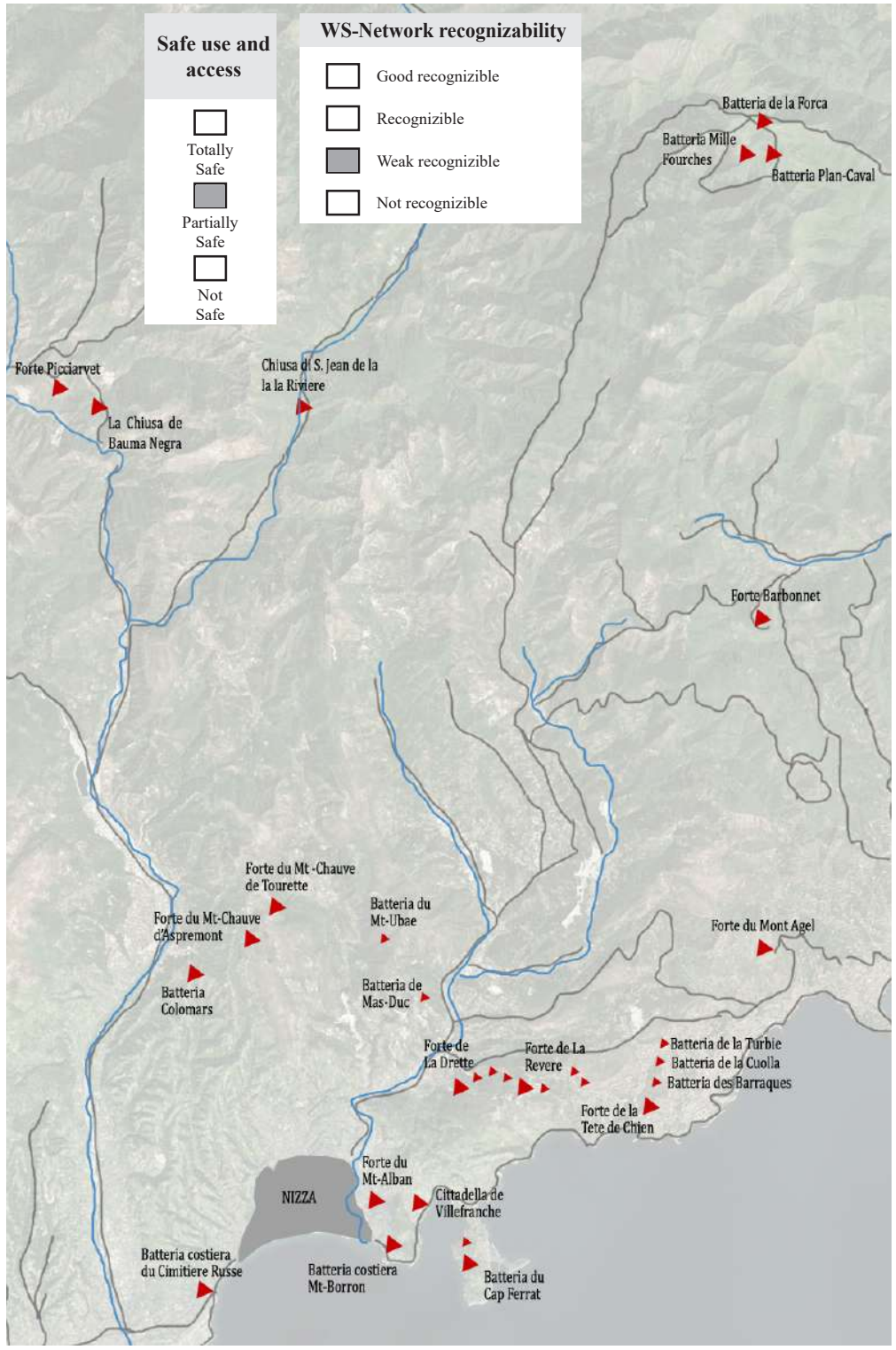
Picciarvet Fort
State of abandonment

Mont-Chauve de Tourette Fort
State of abandonment

After the war of 1860-70, relations between France and Italy (allied with Germany) became so complicated that it became necessary to fortify the border between the two states. It was conceived the first line of advanced defense constituted by two forts (Fort Picciarvet and Fort Barbonnet), three works in battery (Mille-Fouches, Plan-Caval-Forcha), and two locks (S. Jean de la Riviere and Bauma Negra). On the other hand, in a more backward position, to protect the city of Nice, a new defense plan was devised as the ancient fortifications of Monte Alban and the citadel of Villefranche would not have been able to cope with an enemy attack. For this reason, the city was surrounded by a belt of 6 detached forts, 3 infantry casemates, and 25 artillery batteries for inland defense, in addition to 3 batteries for coastal defense. The fortification plan foresaw that the strategic passages were defended by advanced fortifications such as Fort Barbonnet which monitors Bevera Valley and the Col de Braus, Fort Pic Charvet which dominates the Var and Tinée valleys, and Bauma Négra and Saint-Jean-de-la-Rivièr and forbidding the Tinée and Vésubie valleys.
The first fortifications of the Nice fortress were the forts the Drette, the Revere, and the Testa di cane, which were built in 1879 in a strategic and prominent position to monitor the coasts and the different points of the Paillon valley. Further west, two structures were built in 1885, on the Monts Chauve Tourette and Aspremont, while the Bay of Villefranche was protected by the coastal batteries of Cap Ferrat and Mont Boron.
As for all the constructions of the Sere de Riviers Line, in 1885 the gunpowder crisis disrupted also this war device: the artillery was dislocated in various batteries and the black powders from the powder magazines were moved in warehouses carved inside the rock. Some of the forts already built were modernized with special concrete reinforcements (except for Drette, Revere, and Testa di Cane), while forts under construction were built with the new construction techniques, such as the fortress of Mont-Agel. After 1900, the fort did not receive any significant modernization.
When Italy entered the war alongside France and England, breaking the Triple Alliance, the defensive function of these fortifications ceased to exist.

Mont-Chauve d'Aspremont Fort
New use - support civil aviation

de La Revere Fort
Recovery



de La Forca Fort
State of abandonment

Barbonnet Fort
Recovery

du Mont Angel Fort
New use _ Air Force Radar Station

de La Drette Fort
Recovery

Tab. 4.9 | WS - CLASS: PLAIN STRONGHOLDS _VERDUN STRONGHOLD (France)

Sartelles Fort
State of abandonment

Du Chana Fort
State of abandonment

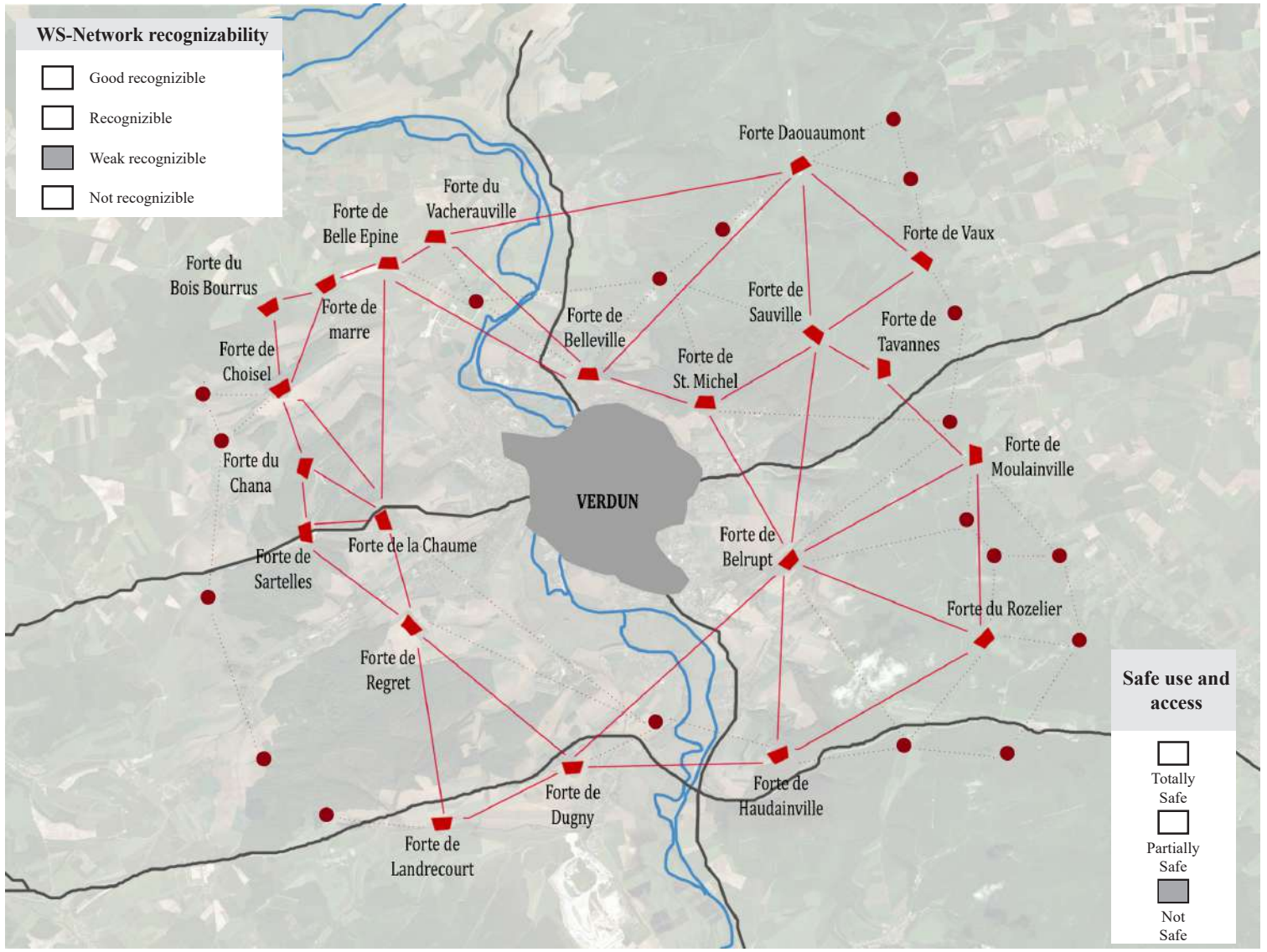
Vacherauville Fort
State of abandonment

Belleville Fort
State of abandonment

Tavennes Fort
State of abandonment

Belrupt Fort
New use - Military Games

Landrecourt Fort
State of abandonment



Sauville Fort
State of abandonment

De Regret Fort
State of abandonment

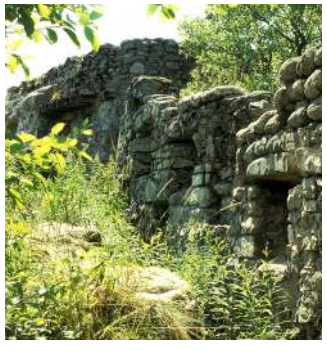
Moulaiinville Fort
State of abandonment

Dugny Fort
State of abandonment

Du Rozelier Fort
Destruction -State of abandonment

General information

The Vosges Front represents the former frontier of the Reich and France from 1871 to 1918, today located in Alsace and Lorraine and is the only sector of the Western Front of the Great War involved in mountain fighting. The German Empire annexed Alsace and part of Lorraine with the Treaty of Frankfurt in May 1871. From August 4, 1914, the French army received the order to advance in Alsace to take possession of the valleys and the main cities. The mountain slopes were scattered with trenches and shelters built mainly in masonry. Among the events that took place at these locations, the Battle of Hartmannswillerkopf was a series of skirmishes fought for control of Hartmannswillerkopf Peak in Alsace in 1914 and 1915. The peak was a pyramidal rocky outcrop in the Vosges Mountains, about 5 km (3.1 mi) north of Thann, with a height of 956 m (3,136 ft) and a view of the Alsatian plain, the Rhine Valley, and the Black Forest in Germany. The location, therefore, was strategic. Hartmanswillerkopf was captured by the French army during the Battle of Mulhouse in August 1914, but the German armies did not give up and counterattacked. As the conflict unfolded, however, it gradually shifted the focus to fighting on the Marne, the Aisne, and further north. For the remainder of 1914 and 1915, both sides made intermittent attempts to capture Hartmanswillerkopf. The operations were costly, and eventually, after another period of attacks and counterattacks that lasted until the new year of 1916, both sides accepted a stalemate, with a fairly stable front line along the western flank that lasted until 1918.



Entrenched system, barracks in the Vosgi
State of abandonment

State of conservation

Destruction loss	State of abandonment	Recovery with care (Museum)	Recovery	High level of transformation	Place of memory Cemetery	Place of memory Memorials
■	■	□	□	□	□	□

Current state and enhancement projects

In the area of the northern Vosges many parts of the original frontline of the war can be found in their original state. An example is the former front at the Chapelotte. This area has been strewn with remains of the First World War, complete with French and German trenches sometimes not more than a distance of thirty meters from each other.
The Violu Nord and the Bernardstein show a multiple of quiet witnesses of the Great War in the Vosges like the remains of trenches, shell holes, barbed wire, fortifications and block houses. This is also the only place in France where the frontline of the Great War crossed the old German borderline from 1871, what is still visible by the border stones from that time.
Some of these vestiges have been the subject of studies and research, bringing the involvement of enthusiasts and volunteers who have promoted interventions of cleaning and arrangement. However, there is a lack of long-term and large-scale planning, taking care of these essential entrenched systems, and not only of the great memorials built after the war.

Active role in WW1

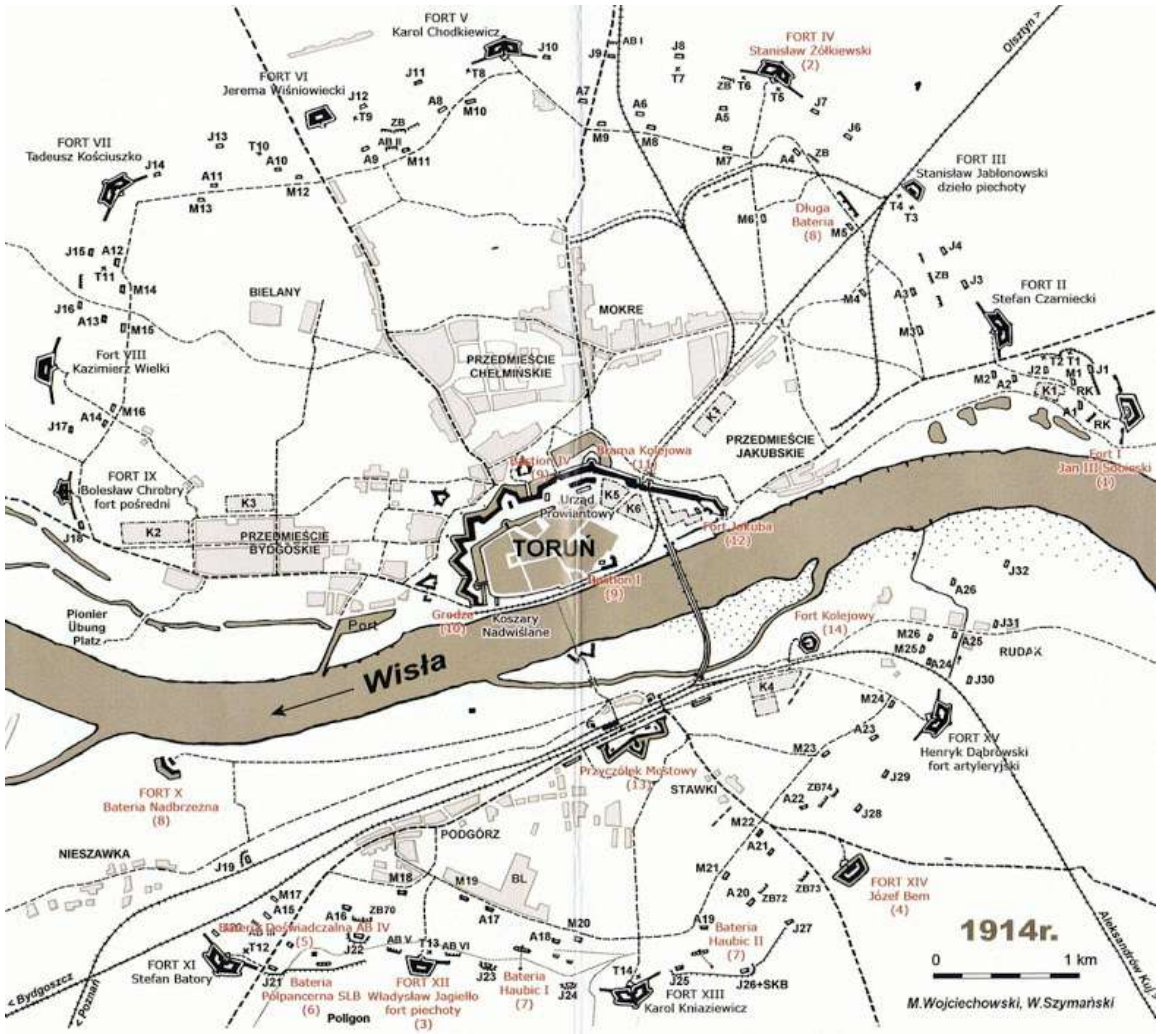
- ■ Active
- □ Partially active
- □ Inactive/Declassed

WS-Network recognizability

- □ Good recognizible
- □ Recognizible
- ■ Weak recognizible
- ■ Not recognizible

General information

Toruń Fortress represents one of the most important strongholds on the Eastern Front, even though it did not play a significant role in World War I or any subsequent conflict. It was built in 1872-1894 by the Kingdom of Prussia, as the city's fortifications no longer provided sufficient protection due to improvements in artillery techniques, including the introduction of rifled barrels and smokeless powder. It consisted of a chain of forts surrounding the city, as well as numerous smaller fortifications that complemented it, and was intended to defend Prussia's eastern border with the Russian Empire. Initial plans called for the construction of five main and two medium forts. In the period 1877-1884, Forts II and XI were built, followed by Forts IV, V, VII, XV, XIII, and IX. Constant changes in artillery and siege techniques, especially the introduction of an anti-construction shell in 1883, made some of the fort's plans obsolete even before it was finished. Because of this, the importance of the main artillery forts was diminished in favor of infantry forts; some artillery forts were redesignated into infantry forts and more small forts were built. Over time the number of objects to be built increased. Forts III, VI, VIII, X, XII, and XIV were added in the years 1888-1893. The last to be built was Fort I, which was the most technically advanced. In 32 years about 200 forts were built. Mainly the fortress consisted of seven main forts, six medium-sized ones, six artillery batteries, 32 shelters for the infantry, and 52 mid-range shelters (used for artillery and ammunition storage). The Toruń fortress complex was constantly modernized by the Prussian government, even shortly before the beginning of World War I.



Fort I
State of abandonment

Fort IV
Recovery

Fort v
State of abandonment

Fort VII
State of abandonment

Fort VIII
State of abandonment

Fort IX
State of abandonment

Fort X
State of abandonment

Fort XI
State of abandonment

Fort XII
State of abandonment

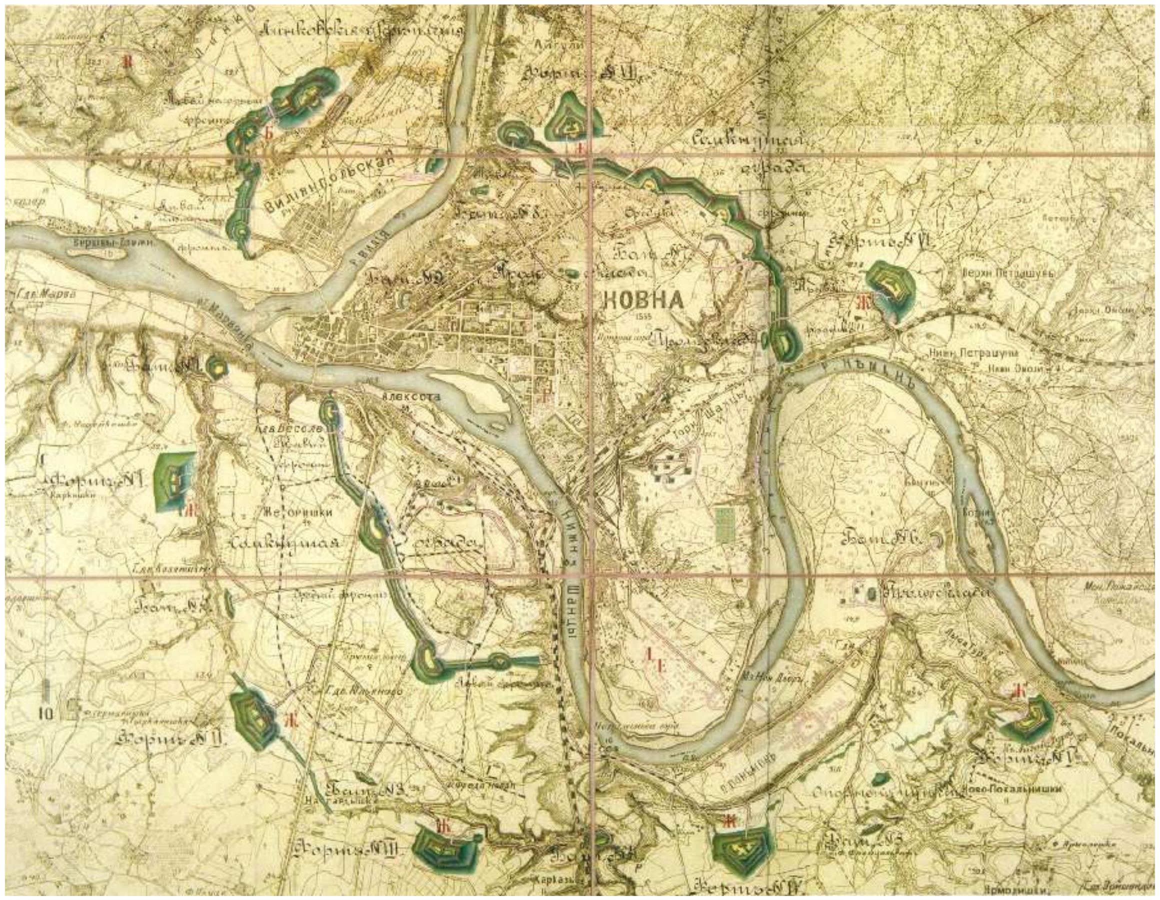
Fort XIV
State of abandonment

Fort XV
State of abandonment

Fort XVII
State of abandonment

General information

The fortress of Kaunas, in Lithuania, represented the largest and most articulated fortified system built by the Russian Empire (over 65 square kilometers) to protect the western borders of the country. The military and defensive vocation of the place was present since ancient times, but it was after the French invasion of Russia in 1812, when the French managed to overcome very easily the Nemunas right near Kaunas, that it became clear the importance of building a renewed defensive system around the city to represent an obstacle to attacks from the west, preventing further incursions towards Riga and Vilnius. Given the favorable orography of the place, it was decided to start the construction of a large fortress, under the supervision of generals Nikolay Obruchev, Konstantin Zverev, and Ivan Volberg. As originally planned, the fortress comprised a huge site, consisting of seven fortifications and nine defensive batteries arranged in concentric circles. The plan included supporting buildings and infrastructure, such as barracks, new roads, and an ammunition depot, for the construction of which more than 4000 civilians were employed. The first phase of construction was completed in 1887. During 1890 began the work of modernization and strengthening of the fortifications, as well as the construction of other forts, through the implementation of modern construction techniques that included the massive use of reinforced concrete. An expansion and reconstruction initiative was launched in 1912, involving twelve new forts, batteries, support buildings, and defensive structures, scheduled for completion in 1917. The older forts were to be completely surrounded by the new construction, which was to employ the latest military technology. During the first implementation of the plan, new defensive trenches were built and the old forts were reinforced with concrete. However, when operations on the Eastern Front began during World War I, work on the fortress was halted. In 1915, Germany and the Central Powers began an offensive against Russia and advanced towards Lithuania and Kaunas. The German army reached the fortress of Kaunas in July 1915. The battles to conquer this stronghold were very hard as the Russian troops resisted with courage and strength, but after 11 days the fortress was conquered. The Germans began slow and progressive despoliation of the fortress in order to reuse the materials and armaments in other front-line positions.



Constructive tipology and materials

The first fortifications were built with bricks reinforced with thick earthen ramparts, which were incorporated into the surrounding relief, making them more difficult to break. They were symmetrical, usually five-sided, with positions for infantry and artillery. These fortifications were built according to the standard Russian brick fort design of the time. Therefore, the first seven fortresses were very similar; they differed only in the arrangement of their interiors, their integration to the morphological conformations of the places, and in some construction details. Batteries were built between the adjacent fortifications; these were fortifications containing various types of artillery, located along the outer lines of the fortress and usually erected on hills.

Tab. 4.12 | WS - CLASS: PLAIN STRONGHOLDS __KAUNAS STRONGHOLD (Russian Empire)

Tab. 4.13 | WS - CLASS: PLAIN STRONGHOLDS __KAUNAS STRONGHOLD (Russian Empire)

Fort I
State of abandonment

Fort III
State of abandonment

Fort V
State of abandonment

Fort VI
State of abandonment

Fort IX
Recovery

State of conservation

Destruction loss	State of abandonment	Recovery with care (Museum)	Recovery	High level of transformation	Place of memory Cemetery	Place of memory Memorials
■	■	■	□	□	□	□

Current state and enhancement projects

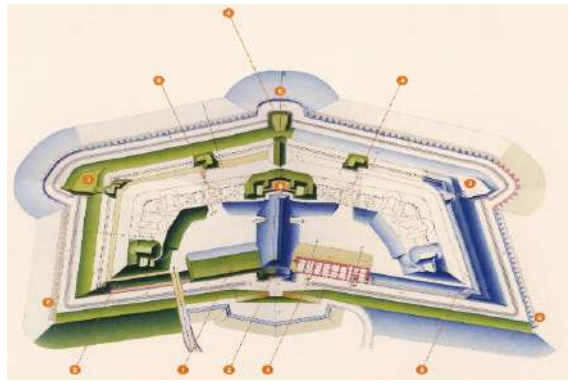
All 13 forts still exist but show different pathologies of degradation, and are not in a good state of preservation. Two of the forts have been turned into museums, among which fort nr.7 is considered the museum of the whole fortress, while fort nr. 9, built-in concrete, remembers the Lithuanian victims of the Second World War. The museum was established by the Soviets to represent German Nazi brutality (some 15,000 Jews were killed in the fortresses), but the site is now expanded to include Soviet massacres as well. The remaining forts are all abandoned and difficult to access except by muddy, rutted paths. As the photographs show, the masonry is overgrown with grass and there are injuries that compromise the structural stability.

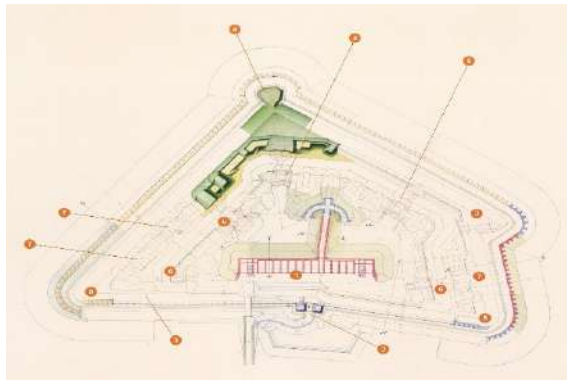
Active role in WW1

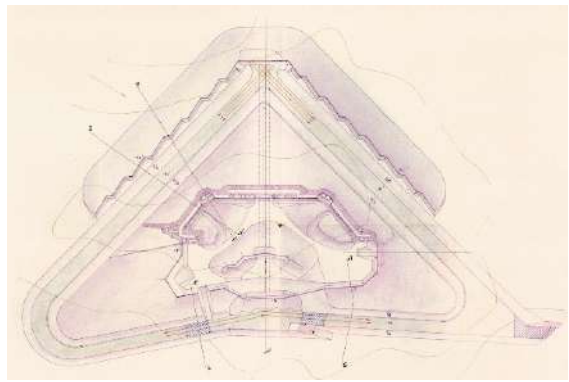
- ■ Active
- □ Partially active
- □ Inactive/Declassed

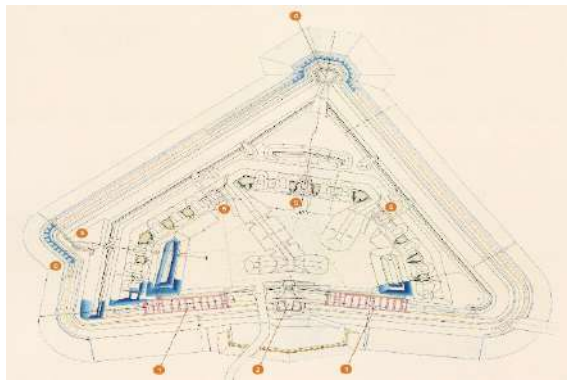
WS-Network recognizability

- □ Good recognizible
- □ Recognizible
- ■ Weak recognizible
- □ Not recognizible



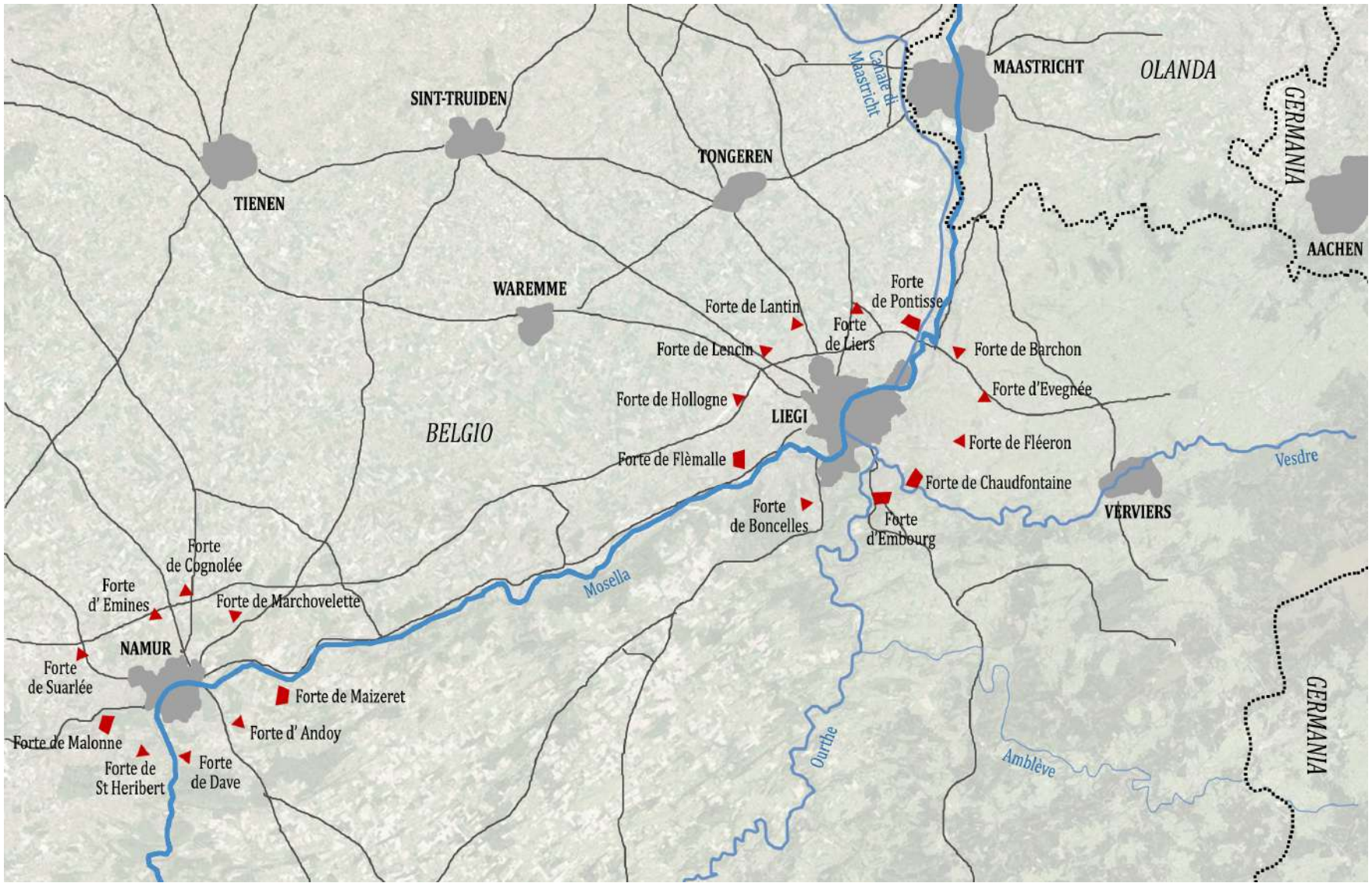






General information

By 1888, obsolete bastioned fortifications were the only existing fortifications in Liège and Namur. The citadel and Fort de la Chartreuse dominated Liège, while the citadel at Namur was one of the largest in Europe, although it was useless against an attack by a modern army using modern artillery. Brialmont argued that France and Germany were destined to return to war, and they would do so by choosing the Meuse Valley as their battlefield, which was therefore essential to defend. Both Liège and Namur were the keys to Belgium, through which ran an extensive network of railways and roads. The Treaty of Brialmont made a good impression on the army and, with the help of some influential officials in the Ministry of Defense, the project was approved. Brialmont's construction plans were far more extensive than the final funding would have allowed and he was forced to save money. Brialmont's designs were simple and economical. The forts were either triangular or trapezoidal, depending on the terrain. He chose the triangular track to reduce the number of accompanying features needed and to adapt the track more easily to the terrain. The trapezoidal track was more easily adapted on narrower stretches of terrain. The Meuse forts were the first forts built in modules with standardized construction. The Brialmont forts were also the first to be built entirely of concrete, a mix of cement composed of sand, stones, and water. Portland cement, invented in 1824, was the most common cement compound used in both concrete and mortar. The cement was not reinforced with metal bars, as this was an innovation in the mid-1890s. The forts of the Meuse formed the strong points of the fortified regions of Namur (Region Fortifiee de Namur - RFN) and Liege (RFL). The main line of defense consisted of the new permanent forts manned by artillerymen, engineers, specialists, and small infantry units guarding the forts. Fieldworks consisting of gun batteries, trenches, and redoubts supported the mainline. In his many theses on the defense of the state, Brialmont established the following criteria for the mainline of defense: it should be far enough from the city to hinder bombardment: a besieger should be kept out of artillery range and sight of the city; the distance between forts should not exceed the average range of their artillery to ensure mutual support; an enemy should be forced to attack three adjacent forts together; finally, the fort should command the area of action of its artillery and, in particular, the intervals between it and its neighbors should be visible so that signals can be seen and fired in direct view. Brialmont was forced to work within the constraints of a wholly inadequate budget.



During the war the Germans had to cross into Belgium but that meant finding themselves fighting with forts around the city of Liège. The Germans thought they could take them by a stroke of the hand, but they did not treasure the lesson of Port Arthur, which showed that strokes of the hand were often not effective. However then the Germans tried to build a heavy field howitzer to be used by the troops: Rausenberger designed a 420mm howitzer called Gamma weighing 1150kg, that could hit the target from a distance of 14600m. The problem was the transport, but they managed to make modifications and transport it in pieces, reducing the range to 9400m, more than enough. In the beginning, the German infantry tried to conquer the Liege forts but failed. But then with cross-attacks, the Germans had the better of it. The 420mm howitzer Gamma fired for the first time against Fort Pontisse: the bullet opened the concrete layer, the sand and reached the concrete structure of the fort and exploded inside generating death and destruction. Then the battery turned towards Fort Embourg. And they all fell one after the other. It took only 4 days and 2 cannons to force one of the most powerful fortified systems in Europe to surrender.

Tab. 4.15 | WS - CLASS: PLAIN STRONGHOLDS __NAMUR STRONGHOLD (Belgium)

Active role in WW1

- Active
- Partially active
- Inactive/Declassed

WS-Network recognizability

- Good recognizible
- Recognizible
- Weak recognizible
- Not recognizible

State of conservation

- Destruction loss
- State of abandonment
- Recovery with care (Museum)
- Recovery
- High level of transformation
- Place of memory Cemetery
- Place of memory Memorials


Fort d'Emines


Fort de Cognolée


Fort de Marchovelette


Fort de Maizeret


Fort d' Andoy


Fort de Dave


Fort St. Heribert


Fort de Malonne


Fort de Suarlée

Tab. 4.15 | WS - CLASS: PLAIN STRONGHOLDS __LIEGI STRONGHOLD (Belgium)


Fort de Barchon


Fort d' Evegnée


Fort de Flèeron


Fort Chaudfontaine


Fort d' Embourg


Fort de Boncelles


Fort de Flémalle


Fort de Hollogne


Fort de Loncin


Fort de Lantin


Fort de Liers


Fort de Pontisse

Fort VII
State of abandonment

Fort 51 1/2
Recovery - Military Museum

Fort 41a
State of abandonment

Fort 4
State of abandonment

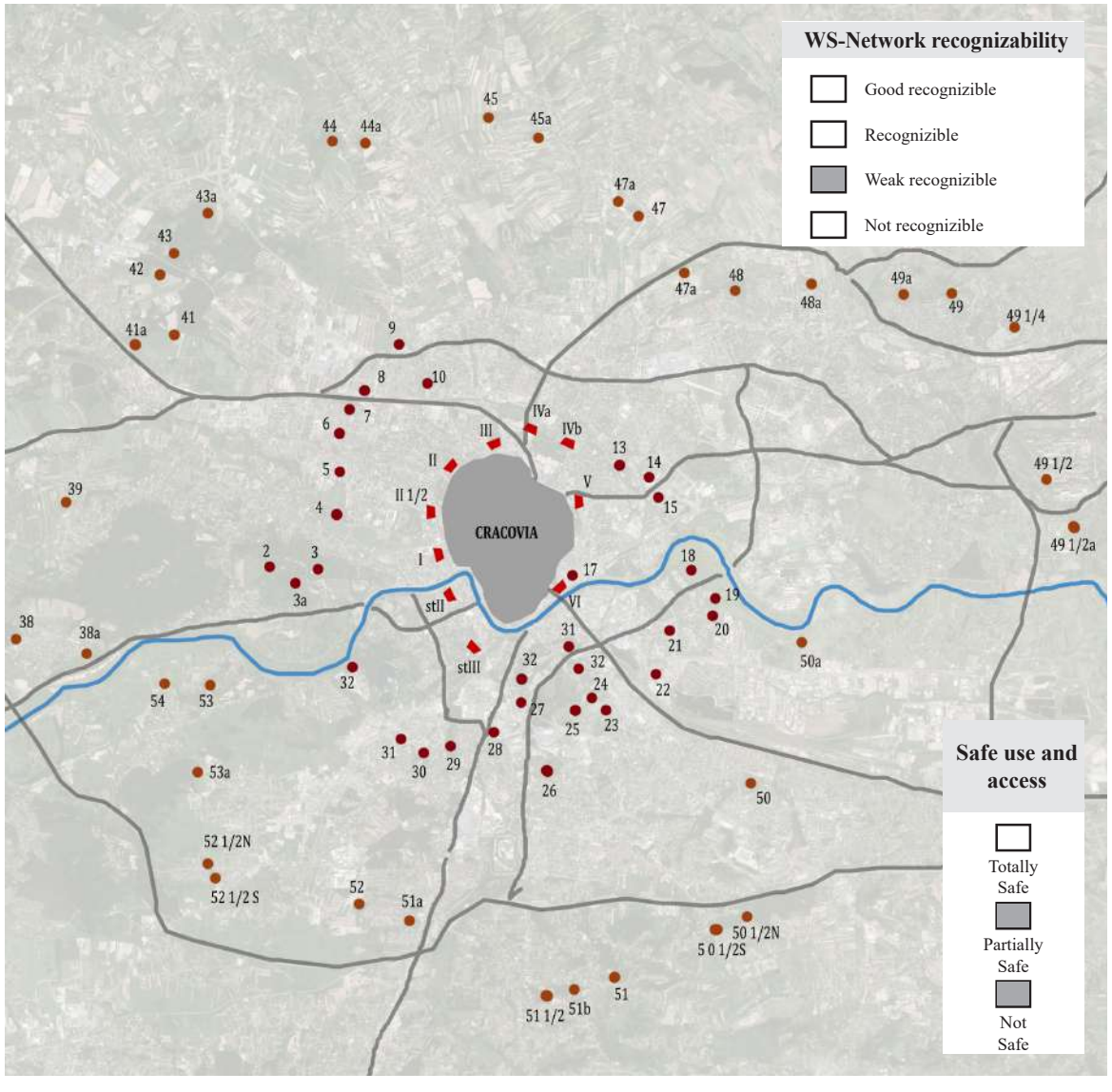
Fort 14
State of abandonment

Fort 30
Recovery - New use

Fort 44
Recovery - New use

Fort 50
State of abandonment

Fort IV a
State of abandonment



Fort 48
State of abandonment

Fort 49 1/2
State of abandonment

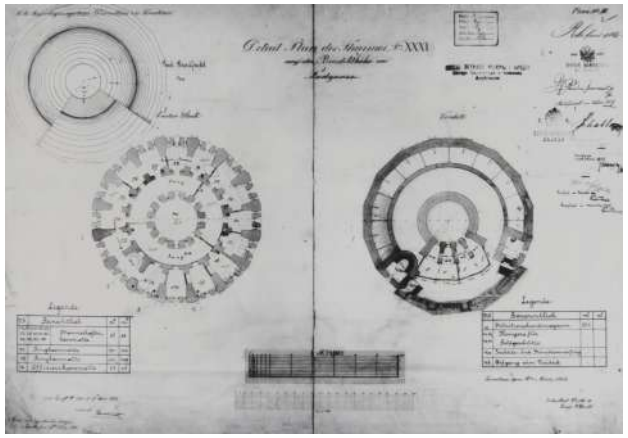
Fort 52
State of abandonment

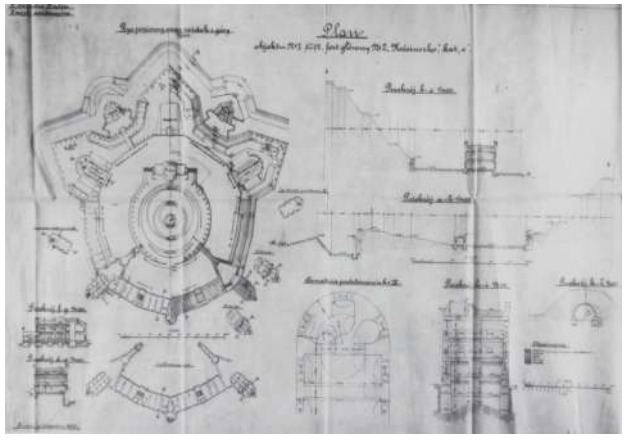
Fort 74 1/2
State of abandonment

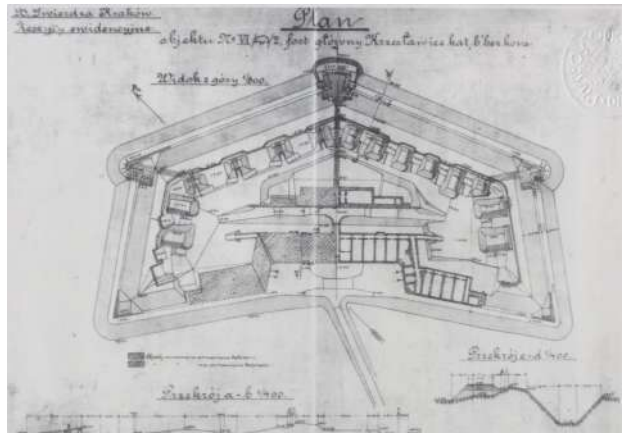
Fort XIX
State of abandonment

Fort Bastion III
Recovery - New use

Tab. 4.16 | WS - CLASS: PLAIN STRONGHOLDS __KRAKOW STRONGHOLD (Galizia)



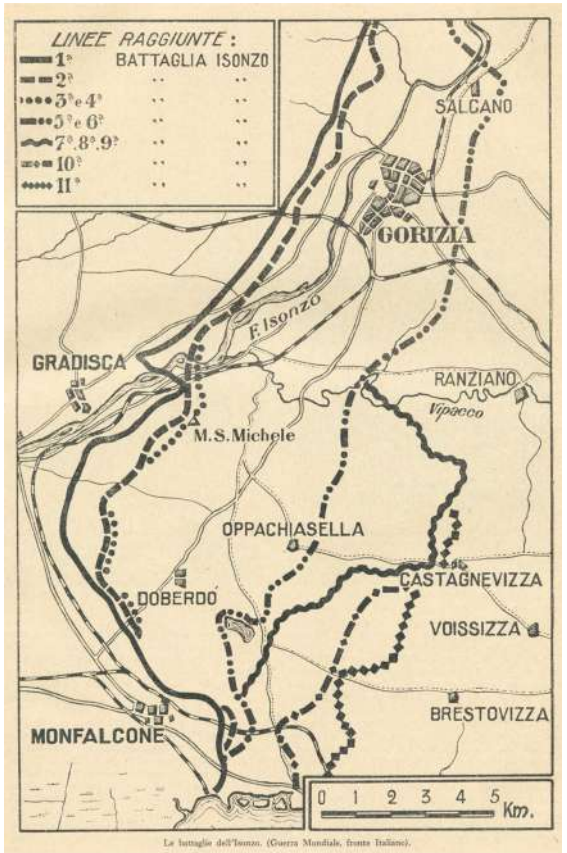




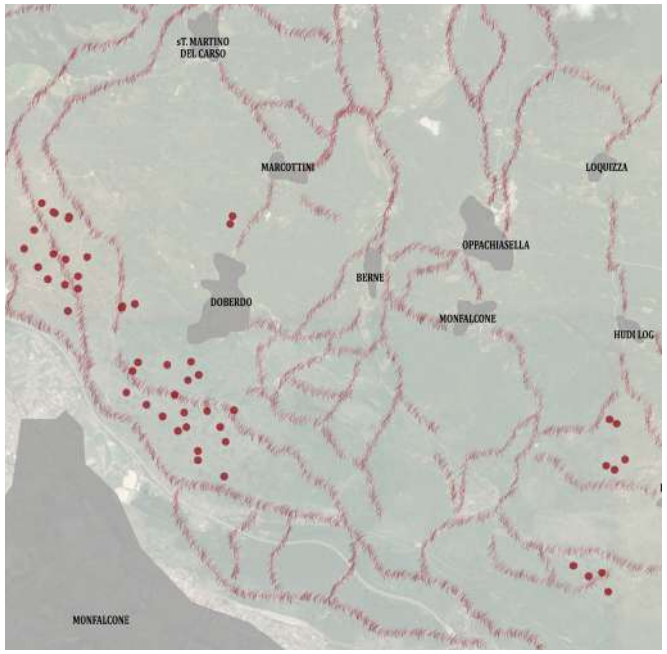
The study of the fortifications of Krakow was supported by the discovery of some files of the Atlas Twierdzy Krakow, preserved at the War Museum of Rovereto but not yet studied nor investigated. Despite the difficulty of reading them, since they were written in Polish, the comparative analysis of the project drawings, in particular the architectural plans, with the period photographs and with the study of the current state of permanence allowed to better understand the state of conservation of the fortress and the level of interventions that were carried out. As an example above, comparisons have been made with three particularly significant forts: the fort 31 Sw. Benedykt, with a circular plan, was built essentially with brick walls; the fort 2 Kosiuszko, very famous for its type of construction, covered by a grassy hill; the fort 49 Krzeslawice, with a polygonal plan.

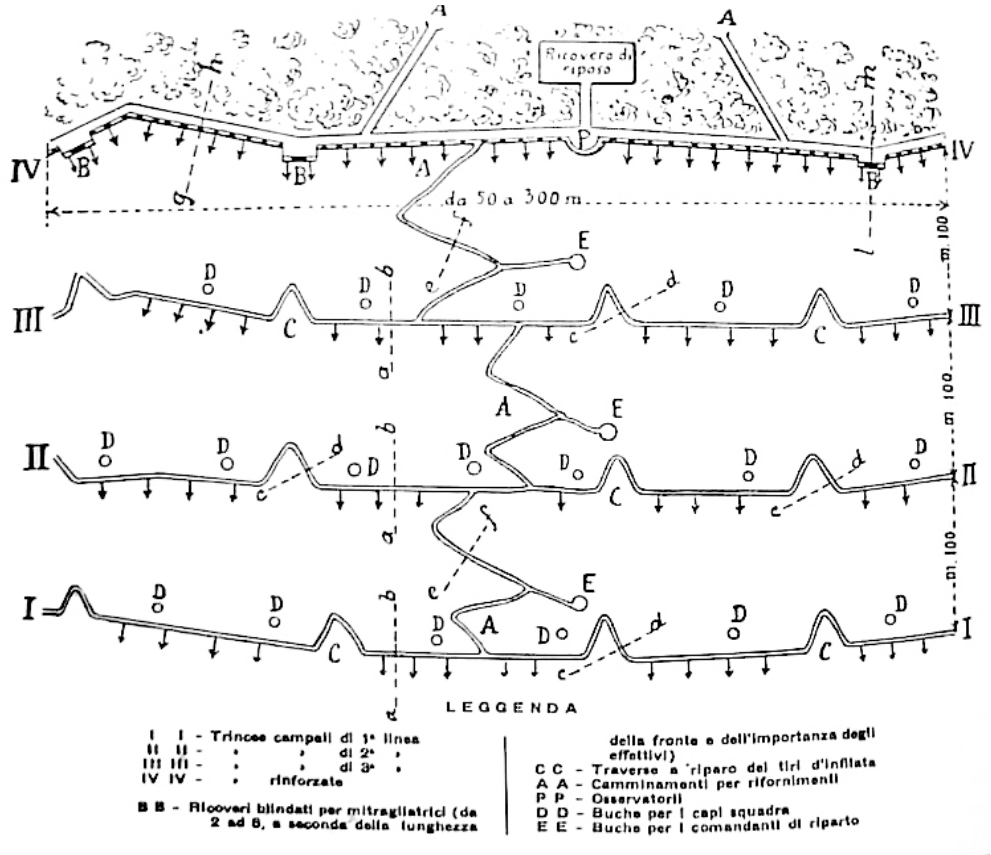
General information

The most important battles of the Great War on the Italian front were fought mainly on the Karst of Doberdò and on the Karst of Comeno, transforming in a short time that land into a sacred cemetery where thousands of young lives were sacrificed in the name of the homeland. When the Kingdom of Italy entered the war on May 24, 1915, the dual monarchy immediately began the construction of a strong defensive line that ran from the Alps to the sea, based essentially on a powerful entrenched system of emplacements, caves, walkways, shelters and infrastructure links between the front line and the rear. All the few hilltops and the high reliefs were fortified with forts and observation posts, while the flat area of the Lower Isonzo was chosen as the main battlefield. Since the beginning of the conflict, the Austro-Hungarians imposed the choice of the terrain on which to fight, always reserving the possibility of a wide control over the surrounding land. In this way, while on the Altopiano di Doberdò, from Mount San Michele to Mount Sei Busi, from Mount Cosich to the hills of Monfalcone, the first five battles of the Isonzo were fought, on the Altopiano di Comeno the works for the construction of a complicated defensive system articulated on multiple lines of trenches and strongholds were started. More than in other areas of the conflict, in this case, the morphological nature of the terrain determined the typological-constructive choices of the fortifications: on the plateau of Doberdò, in fact, the insufficient time available added to the particular nature of the karst soil did not allow to reach the depth of excavation of trenches and emplacements necessary to withstand the increasingly massive Italian bombardments. The solution adopted was the construction of parapets in masonry or sacks filled with stones (the earth was scarce because of the karst terrain): if on the one hand, this type of construction guaranteed protection, on the other hand, it represented a danger in case of bombing, as the masonry would have collapsed inside the trenches, burying the occupants. On the Karst of Comeno, on the other hand, trenches were adopted in all excavation, deep at the height of a man and equipped with very low parapets; the tracks followed the “Greek” trend, which is broken up with many traverses. Wherever possible, lines of entrenchments were dug in a parallel position to the front ones, at a distance of about 50/70m, equipped with caves where the troops could take shelter during the enemy fire. A capillary system of walkways connected the sinkholes to the trenches, always protected by multiple rows of reticulate, obstacle fields formed by double or triple lines of Frisian horses.

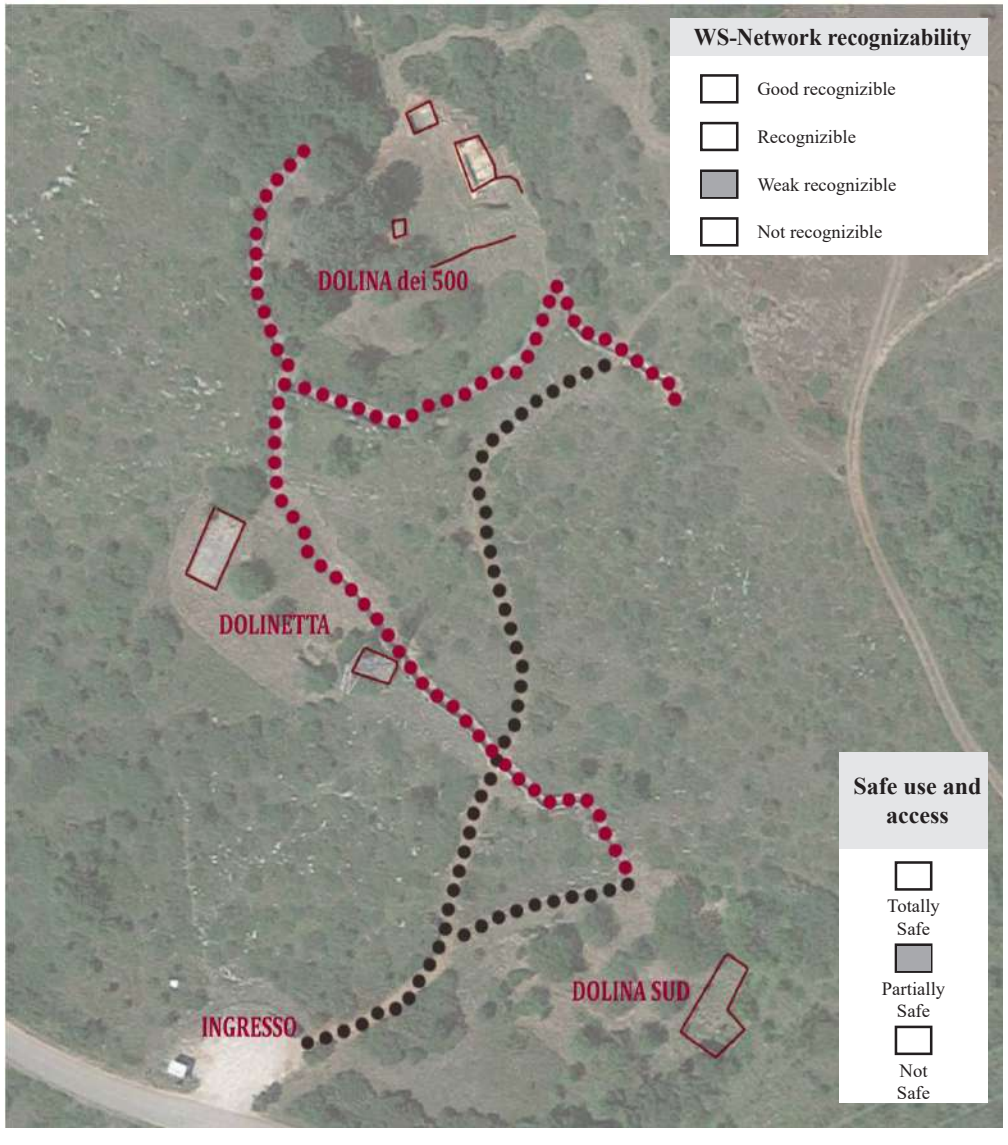


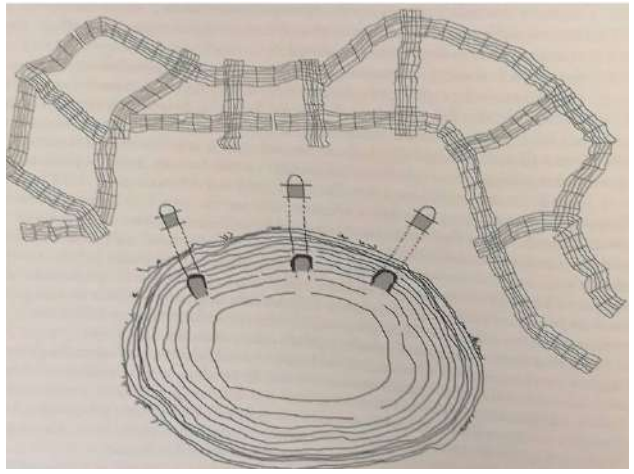
Le battaglie dell'Isonzo. (Guerra Mondiale, fronte Italiano).





Tab. 4.19 | WS - CLASS: OPEN FILEDS ENTRENCHED SYSTEMS __ALTOPIANO (Italy-Austria)





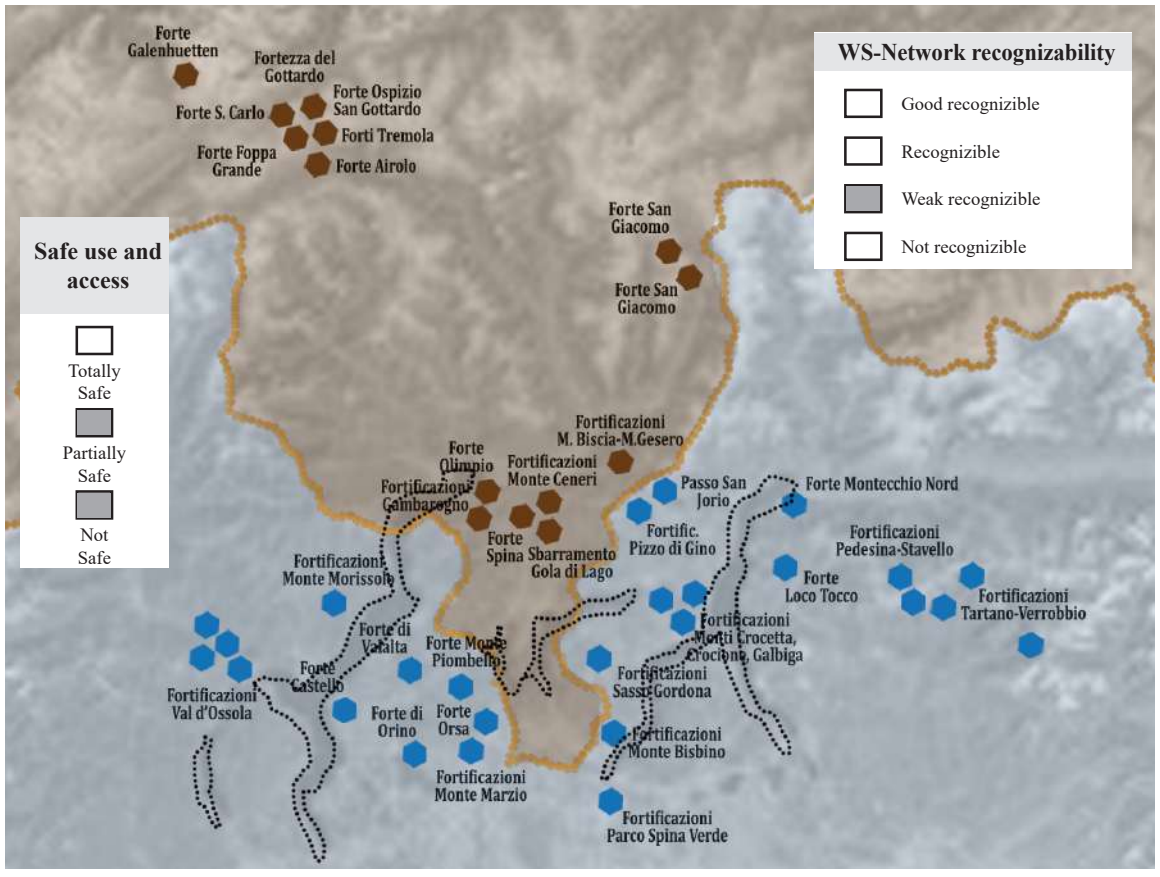
General information

The Comeno Karst is the plateau that rises to the east of the Gorizia Valley and is currently almost entirely included within the Slovenian borders. From a morphological point of view, it is characterized by the presence of hundreds of dolines that would make it similar to a lunar landscape if it were not for the lush vegetation that covers it. During the Great War, the imperials did not miss this formidable bulwark naturally predisposed to defense: a great stone fortress that rose on three sides on the attacking troops, with a vast rear area behind and morphology of the land suitable for digging caves, shelters, and trenches. The Karst was one of the most important and harsh battlefields because of the particular morphology of the land, consisting not of land but hard rock, without water and very arid. Abnormal geological forms characterized the karst landscape of the plateaus of Doberdò and Comeno compared to the normal fluvial landscapes, which were decisive for the typological choice of the fortifications to be built in these places. The dolines are karst macro forms determined by the solubility of the calcareous rock, inside which the water tends to penetrate, widening the underground circulation routes and reducing the surface hydrography. From the morphological point of view, the doline is a closed basin, a basin that would fill with water to originate a pond if the bottom walls were impermeable, but the water is usually absorbed through underground routes. Dimensionally, these cavities have a variable diameter between 10 and 1000m, with depths between 2 and 200 meters. In plan, the form can be circular, elliptical, or irregular, while the vertical section shows developments in height very variable with the diameter. In the militarization plans, as seen from the images below, the sinkholes were heavily militarized with the construction of military shelters reinforced by containment walls, caves, and shelters.

As an example, we report the detail of the area of "Monte Sei Busi", one of the first outposts that the Italian commands garrisoned on the front of the Karst of Doberdò. The position of Monte Sei Busi and the entire first ridge of the Karst was particularly exposed to artillery fire. For this reason, all the small ravines, the cavities, and the karst sinkholes were used and exploited by the two armies to build shelters and walkways able to transfer the troops to and from the front lines in safer conditions. The sinkholes of this site ideally represent all these natural karst cavities, an "ideal" place of refuge for the combatants that allowed them to escape the sight of the adversary, becoming a place of rest, rest, sleep, and where ammunition and food supplies flowed. In them were set up villages, commands, warehouses, improvised cemeteries.

General information

The Cadorna Line is a system of fortifications to protect the border of Italy with Switzerland. The work was carried out between 1916 and 1918 for fear of possible Austro-German aggression through Switzerland. The promoter was General Luigi Cadorna, chief of staff of the Italian army until 1917.
The defensive line, which initially included a dense network of roads, military mule tracks, trenches, artillery emplacements observatories, and various logistic structures, is today complex military archaeology protected as historical and cultural heritage. In September 1915, when Italy entered the war, the danger that the enemy forces would unleash an offensive using the route of the cantons of German-speaking Switzerland to reach Milan was real. After a careful examination of the situation, Cadorna was convinced of the real danger and ordered to build with the utmost urgency a powerful and permanent defensive line from the Valley of the Gran San Bernardo to the Orobic Alps total of 72 km of the frontier. This barricade, designed by the technical office of the Supreme Command, included 88 cannon emplacements, 11 of which in caverns, several kilometers of trenches, about 300 kilometers of truck roads, and almost 400 kilometers of cart roads and mule tracks, involving twenty thousand workers, for a total cost of 105 million lire at the time (quantifiable today at about 150 million euros). The direction of the jobs comes entrusted to general Ettore Gambetti. After the declaration of war on Germany, work on the construction sites of the North Frontier Defense Line, as it was officially called, became spasmodic. Work was carried out seven days a week, twenty-four hours a day, with teams, working eight-hour shifts each. In the spring of 1917, the defensive line reached its maximum extension, at the very moment when fears of an offensive from Switzerland were losing more and more consistency. The divisions of the Territorial Militia and the artillery were sent to the Veneto region, and the defense of the area was entrusted to the Royal Guard of Finance. The fortifications were dismantled and then partially exhumed in 1933 to integrate them into the emerging Alpine Wall. But even during the Second World War, the defensive line was not affected by war operations since the battles took place on other fronts. After the war, starting from 1950, the Cadorna Line was abandoned entirely, and, little by little, the vegetation began a slow but progressive process of obliteration and re-appropriation.




Besano Fortified position
State of abandonment


Dordona Trenches
State of abandonment


Monte Bisbino Trenches
State of abandonment


Monte Morissolo Cavern
State of abandonment


Monte Orsa Fortified position
State of abandonment


Monte Pravello Trenches
State of abandonment


Monte Orsa Fortified position
State of abandonment


Sasso Gordona Trenches
State of abandonment


Monte Morissolo Cavern
State of abandonment


Brembana Valley Trenches
State of abandonment


San Jorio Fortified position
State of abandonment


Brembana Valley Trenches
State of abandonment

Tab. 4.21 | WarScape CLASS: MOUNTAIN DEFENSIVE SYSTEMS __ EcoMuseo Prealpi Vicentine - Italy

General information

Financed by the Ministry of Cultural Heritage and Activities following the promulgation of law no. 78/2001, the "Project for the Protection of the Historical Heritage of the First World War on the Vicentine Highlands" was developed starting from the awareness of the extraordinary consistency of the material remains left by the Great War and still visible in the contemporary landscape, although often in a serious state of degradation. Thanks to the economic resources made available at the national level, it has been possible to plan an articulated system of actions of recovery and valorization of many "places of memory" in the Prealps of Vicenza, organized in 19 priority areas of intervention, from the battlefield of Ortigara to the complex system of tunnels of Mount Pasubio, from the defensive lines of Mount Cengio to the Italian fortifications. The general aim pursued was the "implementation of memory", a recovery of the memory of historical events before the material works, in the awareness that the peculiarity of this territory represents an irreproducible heritage, whose disappearance would build an irreparable wound for the identity of the territories that contain it. The objectives that the project has sought to achieve were:

- conservation and recognizability of the traces of the historical event of the territory during the war;
- research of the quality of the historical, natural, and anthropized environment and its correct collective fruition;
- preservation of the territory object of the intervention;
- organization of the management modalities of the system

Based on a specific program agreement that has attributed to the Regency, the role of leader, the institution has therefore organized and coordinated the various phases necessary to achieve the objectives: from the constitution of a special working group to the elaboration of the executive projects of the various areas, to the organization of the tenders, to the assignment of the works or the realization of the same in direct administration, to the coordination of the various territorial realities, of the relative administrations, of the weapon associations. All this allowed the realization of important interventions on the identified sites, from the Fortresses (Campolongo, Verena, Interrotto, Lisser, Campomolon, Enna, Maso, Barriola) to the battlefields (Ortigara, Cengio, Pasubio, Novegno, Cesuna, etc.), giving back to the visitors a huge heritage of works and paths that still show an extraordinary evocative power and connotation of the territory. The project also included the creation of the Great War Ecomuseum of the Veneto Region, organized in three thematic areas: Prealpi Vicentine, Dolomiti Bellunesi and Piave, Grappa and Montello.

	Permanent fortification	Field fortification
Mountain areas	***Mountain forts***	*Mountain defensive systems*
Plain areas	*Plain strongholds*	*Open-field entrenched systems*
Coastal areas	*Coastal towers and fortifications*	

WarScape Class - Mountain Forts	Tab. 4.22	Cadine Fort
	Tab. 4.23	Civezzano Tagliata
	Tab. 4.24	Zaccarana Fort
	Tab. 4.25	Mero Fort
	Tab. 4.26	Pozzi Alti Fort
	Tab. 4.27	Danzolino Fort
	Tab. 4.28	Nago Fort
	Tab. 4.29	Larino Fort
	Tab. 4.30	Strino Fort
	Tab. 4.31	Corno Fort
	Tab. 4.32	Tenna Fort
	Tab. 4.33	Carriola Fort
	Tab. 4.35	Mattarello Fort
	Tab. 4.36	Interrotto Fort
	Tab. 4.37	Punta Corbin Fort
	Tab. 4.38	Verena Fort
	Tab. 4.39	Campolongo Fort
	Tab. 4.40	Bernadia Fort
	Tab. 4.41	Tre Sassi Fort
	Tab. 4.42	Cherle Fort
	Tab. 4.43	Sommo Alto Fort
	Tab. 4.44	Verle Fort
	Tab. 4.45	Belvedere Fort
	Tab. 4.46	Cima Vezzena Fort
	Tab. 4.47	Luserna Fort
	Tab. 4.48	Dosso del Sommo

Trentino, Italia

Forte Cadine

General information

This fort, planned by Major Gustav Hermann of the Trento Corps of Engineers, is part of the permanent group of Austrian fortification which defended end enclosed the main connecting routes of the regional capital. Conceived together with the blockhouse Doss Sponde this fort was intended to form a rampart barrage, straddling the descending road from Cadine to Trento: it was in fact the end of the line of defence that started from Bondone and crossed Candriai and Sopramonte, where the bunkers of Campozin and Mandolin were positioned. The main guard is formed by three placements for heavy artillery and two places for riflemen. An external courtyard accessed the kitchen and captain's sleeping courtyards, meanwhile there was access connecting the fort to the casemate Doss di Sponde. In 1915 it was disarmed and the artillery was placed nearby. Between 1918 and 1949 it served as the powder magazine of the Italian army. Occupied by the Germans in the Second World War, in April 1945 it was subjected to a failed attack by a resistance group.

State of conservation

Destruction loss	State of abandonment	Recovery with care (Museum)	Recovery	High level of transformation	Place of memory Cemetery	Place of memory Memorials
☐	☐	■	☐	☐	☐	☐

Current ownership

Private	Public
☐	■

Active role in WW1

- ☐ Active
- ☐ Partially active
- ■ Inactive/Declassed

WS-Network recognizability

- ■ Good recognizible
- ☐ Recognizible
- ☐ Weak recognizible
- ☐ Not recognizible

Constructive tipology and materials

The construction is made of well-worked red limestone ashlar, in bridge form, upon the rock of the gorge around the Vela stream. It had casemates for artillery, tunnels for riflemen and placements in barbette. It is modeled in the form of a bridge and rests on the rocky shoulders of the gorge of Vela. It was directly connected to Doss di Sponde by a long pothole.
It is characterized by being one of the first built in masonry and earth. Characteristic of this cut was the fact that the closure of the road axis was not entrusted to a single door but to the entire body of the artifact. For its construction was diverted the stream Vela and made to pass under the fort itself.

Enhancement project - New use

The fort is one of the pilot cases of the Great War Project, promoted by the Autonomous Province of Trento. The conservative restoration project not only concerns the building, which has been transformed into a museum, but also the "restoration of the original layout" of the external areas and the missing parts of the walls, thus "redefining the barrier dimension" of the complex, which had been lost over time. Inside these restored spaces, a minimal and multimedia installation will help the visitor to understand the complex fortified system of Trentino and the daily life inside a fortification.

Reachability level

■ Easily reachable

□ Hardly reachable

Safe use and access

■ Totally Safe

□ Partially Safe

□ Not Safe

Community Engagement

The enhancement project was managed by the client, without following a bottom-up policy, neither in the decision-making phase nor in the implementation phase. Involvement took place only after the intervention was executed.

Customer Experience Data

High degree of appreciation for the museum layout and the type of conservation restoration carried out.
40% - Excellent
47% - Very Good
10 % - Good
3% - Weak

On-line Presence

Historical information regarding the subject property can be found online fairly easily. There is a specific site to the activities of the Museum where it is also possible to book visits, as well as learn about the history of the artifact and its involvement in the wartime.

Historical and current photographic documentation

Trentino, Italia

Tagliata Civezzano (sup+inf)

General information

The forts around Civezzano were composed by two different parts: the “Obere Strassensperre” and the “untere Strassensperre”.
The Civezzano “Obere Strassensperre” was a wall construction placed on present day state road 17 between Civezzano and Cognola. It had only one level, with placements for riflemen and machine-gunners aimed at the road and 13 loopholes for riflemen on the defence side (fronte di gola). The fort became a powder magazine and was ultimately dismissed by the Italian Military Property Office.
Civezzano’s “Untere Strassensperre” can be found two metres from road level, where the mouth of the Fersina is narrower. It consisted of the battery, carved into the rock and on the front, on the left bank of the stream, a wall made in 1896 acted as shelter for the riflemen and as a break in the Valsugana railway. it was the only work of the fortified belt of Trento to remain in perfect efficiency for the whole duration of the First World War.

State of conservation

Destruction loss	State of abandonment	Recovery with care (Museum)	Recovery	High level of transformation	Place of memory Cemetery	Place of memory Memorials
☐	☐	■	☐	☐	☐	☐

Current ownership

Private	Public
☐	■

Active role in WW1

- ☐ Active
- ■ Partially active
- ☐ Inactive/Declassed

WS-Network recognizability

- ☐ Good recognizible
- ■ Recognizible
- ☐ Weak recognizible
- ☐ Not recognizible

Constructive tipology and materials

The “Obere Strassensperre” was made of squared limestone and remodernised in 1914. It was a work made entirely of limestone ashlars with earth cover to soften the blows. It develops on a single level and adapts to the soft movement of the road. Originally, a massive iron door inserted in the arch that crosses the road, completely blocked the transit. It also has pictorial decorations inside, a sign of a strong link with the nineteenth-century conception of these fortifications. The other, was a fortification carved into the rock, with a defensive casemate situated at the rear. The two parts were connected by a large wall with rifle loopholes, while a large iron door barred the carriageway.

Enhancement project - New use

In recent years, restoration work has affected the roof and the interior to maintain, preserve, save the history and memory. Today it is a place-museum for appreciated exhibitions, concerts, cultural evenings and shows. Since then, the fortress of Civezzano has undergone a total metamorphosis. Not in the structure that, with skill, attention and great professionalism has benefited from a conservative restoration that respects the history and the testimonies that have re-emerged. Rather, in its relocation to the center of important cultural events offered to the community.

Reachability level

Easily reachable

Hardly reachable

Safe use and access

Totally Safe

Partially Safe

Not Safe

Community Engagement

The enhancement project was managed by the client, without following a bottom-up policy, neither in the decision-making phase nor in the implementation phase. Involvement took place only after the intervention was executed, but now the works are really appreciated.

Customer Experience Data

Although they are not major works, and therefore not part of the main tourist routes, these fortifications are appreciated by local communities and visitors.

On-line Presence

As regards the “Obere Strassensperre”, historical information regarding the subject property can be found online fairly easily. Information about the “Untere Strassensperre” can also be found but with more difficulty.

Historical and current photographic documentation

Trentino, Italia

Forte Zaccarana - Werk Tonale

General information

Fort Tonale was built between 1908 and 1914, at an altitude of over 2,000 m, on the ridge that divides the Strino valley from the Vermiglio valley. Designed by the lieutenant of the Austro-Hungarian military engineers Hugo Hartmann, it was built with the task of blocking the Val di Sole together with Fort Presanella, built on the opposite side of the valley. It was the most recent fort of the group of works on the Tonale, and was very well equipped: 6 rotating domes each with a 100mm howitzer.
Epression of the functional needs adapting to the morphological characteristics of the site, the fort, built in armored concrete casemate, was articulated on levels placed at different heights forming a set of masses and rounded volumes. It was subdivided into specialized parts: lodgings, batteries, observation posts and close defense. During the war it was subjected to uninterrupted bombardment by the Italian forts located on the opposite side, in particular by Corno d'Aola. Considering its restoration useless, it was gradually abandoned.

State of conservation

- ☐ Destruction loss
- ☐ State of abandonment
- ■ Recovery with care (Museum)
- ☐ Recovery
- ☐ High level of transformation
- ☐ Place of memory Cemetery
- ☐ Place of memory Memorials

Current ownership

- ☐ Private
- ■ Public

Active role in WW1

- ■ Active
- ☐ Partially active
- ☐ Inactive/Declassed

WS-Network recognizability

- ☐ Good recognizible
- ■ Recognizible
- ☐ Weak recognizible
- ☐ Not recognizible

Constructive tipology and materials

It was the most modern of the Tonale barrage: it was a work in compressed concrete, articulated in three blocks (block of the casemates, block of the batteries and blockhouse of counterscarp). It was equipped with electrical and telephone systems, forced air ducts, an engine room, floodlights to illuminate the moat and the slope facing the fort. Some rooms were connected by tube intercoms similar to those found on ships. An armored concrete tunnel served as a connection to a circular observation post and the moat. Almost destroyed in the early stages of the conflict, after 1930 it was affected by the work of the "recuperanti" companies: the explosives used to separate the iron from the concrete led to the collapse of the roof and other structural parts.

Enhancement project - New use

The fortress, owned by the Municipality of Vermiglio, has recently undergone restoration work as part of the territorial project called “On the trail of the Great War”. The works, carried out in 2009, mainly concerned the safety of the fort with the elimination of unsafe concrete blocks and the removal of rubble from the facade and some internal rooms. The project also led to the creation of the signage of the paths and information panels inside and outside the fort. A panoramic orientation table, equipped with optical tubes, makes it possible to understand the relationship with the surrounding landscape and with the network of the fortified system of the high Val di Sole.

Reachability level

☐ Easily reachable

☐ Hardly reachable

Safe use and access

☐ Totally Safe

☐ Partially Safe

☐ Not Safe

Community Engagement

The enhancement project was managed by the client, without following a bottom-up policy, neither in the decision-making phase nor in the implementation phase. Involvement took place only after the intervention was executed, but now the works are really appreciated.

Customer Experience Data

High degree of appreciation for the fortified sysyem around Tonale Pass, in particular fot the conservation project.
50% - Excellent
36% - Very Good
12 % - Good
2% - Weak

On-line Presence

Historical information regarding the subject property can be found online fairly easily. There are also some local sites regarding the fortification system of the valley.

Historical and current photographic documentation

Trentino, Italia

Forte Mero

General information

Located at an altitude of 1827 m on the right side of the valley of Strino, along the old road that came from the hospice of San Bartolomeo, was built between 1911 and 1913 to complete the barrage of Tonale.
It was conceived as an intermediate armored structure equipped with light armament for close combat: it was conceived to control the territory between the Tonale fort and the Presanella fort and as a barrage of the old Tonale road; its position also guaranteed visual and shooting dominion over the Presena glacier.
The building is an armored concrete block with a rectangular plan on two levels. The building was defended by 7 Schwarzlose machine guns and by several levels of reticulations; the roof was covered with earth and grass.
It was a modern construction: it was equipped with both perimeter and internal lighting by means of a generator; thanks to the Strino power station it was connected by telephone with the Tonale Pass and Fort Zaccarana and by optical telegraph with the Tonale and Fort Presanella.

State of conservation

- ☐ Destruction loss
- ☐ State of abandonment
- ■ Recovery with care (Museum)
- ☐ Recovery
- ☐ High level of transformation
- ☐ Place of memory Cemetery
- ☐ Place of memory Memorials

Current ownership

- ☐ Private
- ■ Public

Active role in WW1

- ■ Active
- ☐ Partially active
- ☐ Inactive/Declassed

WS-Network recognizability

- ☐ Good recognizible
- ■ Recognizible
- ☐ Weak recognizible
- ☐ Not recognizible

Constructive tipology and materials

The fort was presented as a single compact monolithic block of quadrangular shape in concrete, armored with steel beams, with hood polygonal with rounded corners and covered with a turf turf to dampen the explosions. A structure organized on two floors, reminiscent of the classic Blockhaus structure.
A particular and connotative aspect of this fort, as well as of fort Zaccarana, concerns the presence, on some walls of the part placed more to valley, of some spots of color still visible with which the Austro-Hungarian army had tried to camouflage the fort in the surrounding context.

Enhancement project - New use

The recovery was born in 2008 and is part of the project "On the trail of the Great War", promoted by the municipal administration of Vermiglio and supported by the Autonomous Province of Trento. The works included an intervention of deforestation and elimination of vegetation, the securing of the place with the removal of unsafe concrete blocks. The interventions made accessible a small part of the ground floor, near the entrance, with the staircase leading to the upper floor. Inside, information panels have been inserted; outside, a panoramic orientation table shows the relationship between the fort, the landscape and the other military architectures present in the territory. It's a sort of outdoor museum.

Reachability level

☐ Easily reachable ☐ Hardly reachable

Safe use and access

☐ Totally Safe ☐ Partially Safe ☐ Not Safe

Community Engagement

The enhancement project was managed by the client, without following a bottom-up policy, neither in the decision-making phase nor in the implementation phase. Involvement took place only after the intervention was executed, but now the works are really appreciated.

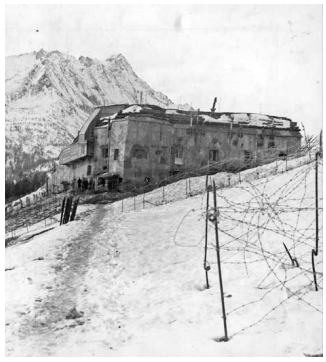
Customer Experience Data

High degree of appreciation for the fortified sysyem around Tonale Pass, in particular fot the conservation project.
50% - Excellent
36% - Very Good
12 % - Good
2% - Weak

On-line Presence

Historical information regarding the subject property can be found online fairly easily. There are also some local sites regarding the fortification system of the valley.

Historical and current photographic documentation



Trentino, Italia

Forte Pozzi Alti - Werk Presanella

General information

Built between 1906 and 1912 on a rocky spur at an altitude of 1895 m on the right orographic side of Val Vermiglio, it dominated the northern side of the wide saddle of Tonale and a long stretch of the access road to the pass, forming a "pincer" with Fort Zaccarana on the opposite side. The fort was a compact work, in the form of a large parallelepiped, with an armored cover. Equipped with three modern revolving armored domes for howitzers and an observatory in another revolving dome, it was completed by two armored casemates, placed towards the valley, for close combat. The building was perfectly self-sufficient with rooms for optical signals, stores for provisions, ammunition and wood, infirmary, lodgings, kitchen, warehouses; it could accommodate up to 130 soldiers. The fort has recently undergone restoration work that has taken it out of the state of neglect it had been in for decades.

State of conservation

- ☐ Destruction loss
- ☐ State of abandonment
- ■ Recovery with care (Museum)
- ☐ Recovery
- ☐ High level of transformation
- ☐ Place of memory Cemetery
- ☐ Place of memory Memorials

Current ownership

- ☐ Private
- ■ Public

Active role in WW1

- ■ Active
- ☐ Partially active
- ☐ Inactive/Declassed

WS-Network recognizability

- ☐ Good recognizible
- ■ Recognizible
- ☐ Weak recognizible
- ☐ Not recognizible

Constructive tipology and materials

Even though it belongs to the last fortification phase in Trentino, Fort Presanella (called Pozzi Alti by the Italians) still preserves some of the characteristics of the fortresses of the previous periods, such as the presence in a single building of artillery positions and accommodation for the troops. Fully responding instead to the requirements of the fortresses of the latest generation are the search for the greatest possible adherence to the profile of the land and the detachment of positions for observation and close defense from the main body, to which they are connected through protected passages (poterne).

Enhancement project - New use

The restoration project, started in 2008, aimed to restore the readability of the building without erasing the signs of history. It was decided not to remove all the rubble and not to rebuild in order to leave intact the charm of the ruin. The works led to the cleaning of the building from the vegetation and the securing of some rooms, to make them accessible to the public. The setting up of the fort has been conceived as an open-air museum with didactic-informative panels; inside the fort some soldiers' silhouettes cut in Corten steel give the indications on the route; a panoramic orientation table shows the relationship between the fort, the landscape and the other military architectures present on the territory.

Reachability level

☐ Easily reachable

▩ Hardly reachable

Safe use and access

☐ Totally Safe

▩ Partially Safe

☐ Not Safe

Community Engagement

The enhancement project was managed by the client, without following a bottom-up policy, neither in the decision-making phase nor in the implementation phase. Involvement took place only after the intervention was executed, but now the works are really appreciated.

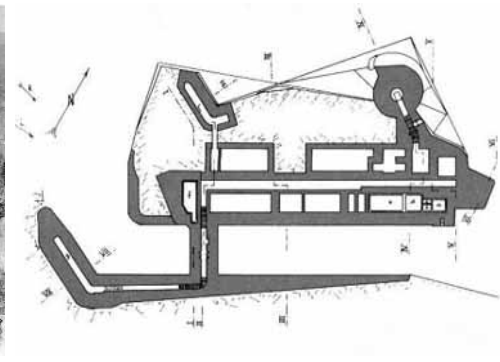
Customer Experience Data

High degree of appreciation for the fortified sysyem around Tonale Pass, in particular fot the conservation project.
50% - Excellent
36% - Very Good
12 % - Good
2% - Weak

On-line Presence

Historical information regarding the subject property can be found online fairly easily. There are also some local sites regarding the fortification system of the valley.

Historical and current photographic documentation



Trentino, Italia

Forte Danzolino e Revegler

General information

The Danzolino fort was born with the purpose of reinforcing the already existing doublet formed by the Revegler fort and the Larino, to have the usual pincer so dear to the Austrians. Designed by Captain Oskar Meiss von Taufen, it was built between 1860 and 1861 at an altitude of about 800 meters at the confluence of the Rio Marac.The doublet, had been considered by the strategists of the time, an insuperable road obstacle. After the First World War, it was used by the Italian State Military, as a munitions depot. In 1941 it was returned to the military authorities after it had been private property for some years.

State of conservation

- ☒ Destruction loss
- ☒ State of abandonment
- ☐ Recovery with care (Museum)
- ☐ Recovery
- ☐ High level of transformation
- ☐ Place of memory Cemetery
- ☐ Place of memory Memorials

Current ownership

- ☐ Private
- ☒ Public

Active role in WW1

- ☐ Active
- ☐ Partially active
- ☒ Inactive/Declassed

WS-Network recognizability

- ☐ Good recognizible
- ☐ Recognizible
- ☒ Weak recognizible
- ☒ Not recognizible

Constructive tipology and materials

It was a casemate built of stone. At the outbreak of war was used as a warehouse (common fate of other obsolete works). It works on two floors: in the upper floor there were six casemates and some loopholes while in the lower floor there were only loopholes. It was surrounded by a moat.

Enhancement project - New use

The Danzolino fort was blown up in 1947 and now the ruins belong to the ecomuseo of Chiese Valley.

Reachability level

- [x] Easily reachable
- [ ] Hardly reachable

Safe use and access

- [ ] Totally Safe
- [x] Partially Safe
- [ ] Not Safe

Community Engagement

No data.

Customer Experience Data

No data.

On-line Presence

Historical information regarding the subject property can not be found online easily.

Historical and current photographic documentation





Trentino, Italia

Forte Nago

General information

The defensive system of the Alto Garda included a barricade aimed at cutting the Nago-Passo San Giovanni-Mori-Rovereto route. Erected between 1860 and 1861, the two forts of Nago constituted what at the time the Austrian military strategists considered the best technological solution of the moment: a fort on the road, supported by another fort above. A similar strategic solution was repeated at the gates of Trento with the forts of Cadine and in the Giudicarie with forts Larino and Revegler. The two forts consist of casemates unarmed limestone exposed well worked chisel and lime. The forts are set on two floors, with two overlapping lines of gunboats. At the upper work were the garrison's quarters; the lower fort acted as a cut-off and barred the road with a gate; its armament consisted of 2 10 cm cannons. The two works were connected by a staircase, interrupted by a powder magazine. The garrison consisted of 5 officers and 148 men. Considered obsolete at the outbreak of the Italian-Austrian conflict, the Nago forts were disarmed and the artillery was placed in caves.

State of conservation

Destruction loss	State of abandonment	Recovery with care (Museum)	Recovery	High level of transformation	Place of memory Cemetery	Place of memory Memorials
☐	☐	☐	■	☐	☐	☐

Current ownership

Private	Public
■	☐

Active role in WW1

- ☐ Active
- ☐ Partially active
- ■ Inactive/Declassed

WS-Network recognizability

- ☐ Good recognizible
- ■ Recognizible
- ☐ Weak recognizible
- ☐ Not recognizible

Constructive tipology and materials

Fort Nago was a road cut between Torbole and Nago formed by two works in casemate with masonry of great thickness, almost entirely above ground, covered with limestone worked with chisel, with vaults and brick arches, today without plaster. As always in these works belonging to the first defensive moment was not excluded a decorative research entrusted to the ashlars delimiting the loopholes and entrances.

Enhancement project - New use

The most substantial restoration works were carried out on the upper fortress. In 1969 a first restoration slightly modified the structure; in 1987 the destination as a restaurant was confirmed and some works were started. The upper fort, abandoned for some years and used as a deposit, was transformed into a multipurpose center. In 2000 the intervention was concluded with the recovery of the connecting staircase between the two forts and the restoration of the underlying powder magazine.Currently the upper fortress houses a restaurant on the ground floor and a multipurpose space and exhibition on the second floor. The lower fort is intended for catering.

Reachability level

■ Easily reachable

□ Hardly reachable

Safe use and access

■ Totally Safe

□ Partially Safe

□ Not Safe

Community Engagement

The main restoration was started by the municipal administration of Nago-Torbole, with the support of the Superintendence for Architectural Heritage, in the second half of the nineties. But only top-down approaches.

Customer Experience Data

The fort is more famous for the restaurant than for the restoration project.

On-line Presence

Historical information regarding the subject property can be found online fairly easily.

Historical and current photographic documentation

Trentino, Italia

Larino Fort

General information

Fort Larino is the main one of a trio of fortifications erected between 1860 and 1862 to defend the valley of Chiese from a possible Italian attack. In this first phase the barrage of Lardaro was composed by Fort Larino, Reveglér and Danzolino. Although they were about twenty kilometers from the border with the Kingdom of Italy, the three forts enjoyed a dominant position. In their construction were adopted the most efficient solutions of the time: a fort on the road (Reveglér), supported by a fort above (Larino) and one on the opposite side (Danzolino). The Larino and Danzolino forts, placed one in front of the other, were able to cover all the dead angles. The location on opposite valley slopes favored the military solution "a tenaglia", a particularly effective strategy. Fort Larino, situated on the northern side of the Reveglér river, at an altitude of 700 m, is a classic example of a first generation fort. Rather large, in the shape of "L" with the sides to the south and to the valley on one level, has a fortified courtyard to anticipate the actual entrance.

State of conservation

☐ Destruction loss
☐ State of abandonment
■ Recovery with care (Museum)
☐ Recovery
☐ High level of transformation
☐ Place of memory Cemetery
☐ Place of memory Memorials

Current ownership

☐ Private
■ Public

Active role in WW1

☐ Active
☐ Partially active
■ Inactive/Declassed

WS-Network recognizability

☐ Good recognizible
☐ Recognizible
■ Weak recognizible
☐ Not recognizible

Constructive tipology and materials

Aesthetically it is a beautiful example of fortified architecture, built with granite ashlars worked with chisel. The fort presents the formal refinement of the facades characteristic of the nineteenth-century fortified architecture where the structure in rough stone was covered with granite ashlars worked with chisel. Internally, a sequence of spaces with brick vaults follows one another on a single level and externally a large moat surrounds the building, protected on the roof by large amounts of earth. The roof is covered by earthy mantle with shaved grass, to dampen the energy of the projectiles. The turf was adopted to prevent the plants, growing, could damage the roof of the fort with their roots, compromising the watertightness.

Enhancement project - New use

The fortress, abandoned soon after its completion as it was considered unsuitable from a defensive point of view, has maintained its typological and constructive characteristics almost intact. The first restoration interventions concerned the safety of the structure with cleaning and waterproofing works and a series of interventions aimed at the conservative restoration and functional adaptation of the fortified complex in a museum space. The project thus creates a museum space articulated and complete with store-center, conference room and storage usable and accessible to anyone.

Reachability level

Easily reachable

Hardly reachable

Safe use and access

Totally Safe

Partially Safe

Not Safe

Community Engagement

The Autonomous Province of Trento, in collaboration with the municipalities of the valley and the BIM of Chiese, has promoted a project of historical and monumental enhancement of the Lardaro barrage.

Customer Experience Data

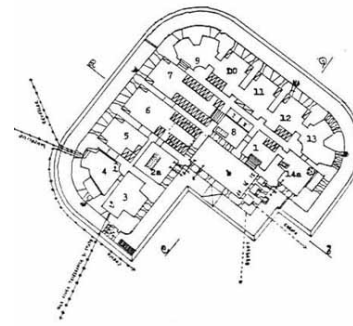
Good degree of appreciation for the museum and the fort.

40% - Excellent
40% - Very Good
10% - Good
10% - Weak

On-line Presence

Historical information regarding the subject property can be found online fairly easily. There are also some local sites regarding the fortification system of the valley.

Historical and current photographic documentation



Trentino, Italia

Strino Fort

General information

The Tonale pass was one of the first for which the Austrian General Staff prepared a defense plan: the first project for the barrage dates back to 1848, but the first interventions date back to 1860, when the construction of the Strino road cut began. Forte Strino was built between 1860 and 1861 at an altitude of 1538 m; located near Vermiglio, it takes its name from the river that laps it. It is a two-storey casemate covered with square stones, semicircular, with an L-shaped plan, equipped with a watch tower and a moat. In 1898 it was reinforced with the addition of an underlying fort for close combat, called Nahkampfanlage Strino, or Fort Velon, from the location where it stood. Made of hewed stone with the insertion of vertical armored shields, Fort Velon had an armored concrete roof and was equipped with light armament. In 1906 the two works were connected with stairs protected by a concrete vault. The entire complex was disarmed in 1915 and transformed into a sector telephone exchange, connecting it to the more modern forts of the Tonale barrage.

State of conservation

☐ Destruction loss
☐ State of abandonment
■ Recovery with care (Museum)
☐ Recovery
☐ High level of transformation
☐ Place of memory Cemetery
☐ Place of memory Memorials

Current ownership

☐ Private
■ Public

Active role in WW1

☐ Active
☐ Partially active
■ Inactive/Declassed

WS-Network recognizability

☐ Good recognizible
■ Recognizible
☐ Weak recognizible
☐ Not recognizible

Constructive tipology and materials

On the ground floor there are the gunboats, while the riflemen are on the second floor; the roof was made of wood. The passage of time and the progress of artillery, made more and more evident the inadequacy of the structure, which lacked appropriate defenses in the event of an outflanking frontal (through the old road and old paths) and lateral (from the Forcella di Montozzo). Aware of the vulnerability of the fort, at the end of the century the Austrian General Staff decided to adapt it: the artillery positions were rebuilt and the roof was replaced by one in stone and cement, with a parapet and loopholes. It was equipped with a power generator, telephone, optical signals and drinking water coming from the Strino river. It was armed with four 12 cm cannons and four 10 cm cannons.

Enhancement project - New use

The building was left for years in a state of abandonment until the municipal administration of Vermiglio, with the help of the Autonomous Province of Trento, decided to promote a project of recovery of the fort. In 1997, at the end of the works, the Fort Strino Committee of Vermiglio was established; since 2008 visits and activities in the fort are managed by an association. Currently it houses a collection of materials of the First World War; a model, in territorial scale, offers a picture of the battle lines, the dislocation of the fortifications and the troops of the two opposing sides. Inside there is also a projection room.

Reachability level

- ■ Easily reachable
- □ Hardly reachable

Safe use and access

- ■ Totally Safe
- □ Partially Safe
- □ Not Safe

Community Engagement

After the restoration project a Committee for the management was established. This association comprehends also volunteers. Mixed approach: also bottom-up initiatives.

Customer Experience Data

Excellent degree of appreciation for the museum and the fort.

48% - Excellent
42% - Very Good
8 % - Good
2 % - Weak

On-line Presence

Historical information regarding the subject property can be found online fairly easily. There are also some local sites regarding the fortification system of the valley.

Historical and current photographic documentation

Trentino, Italia

Corno Fort

General information

The fortress was built in the years from 1890 to 1892 according to the style of Vogl, is located in the valley of Chiese, in southwestern Trentino in the cadastral municipality of Praso. The purpose of the fortified barrage of Lardaro was to prevent an eventual advance of the Royal Italian army in the region of Tyrol. The fortress controlled from above the Giudicarie Valley acting as a pincer with the fort Cariola built on the opposite side of the valley. The fort has a volume of 18.000 cubic meters, 53 rooms and develops on six levels following the orography and the profile of the rocky spur on which it is built. The fort was armed with six M/80 type cannons on a fortress mount and three howitzers for close range shooting. It was therefore equipped with revolving steel domes and armor for cannons that were later removed. It was disarmed even before the outbreak of the First World War as it was obsolete and outdated, and the armament was transferred into a cave at Peschiera, the name of the mountain above the fort.

State of conservation

Destruction loss	State of abandonment	Recovery with care (Museum)	Recovery	High level of transformation	Place of memory Cemetery	Place of memory Memorials
☐	☐	■	☐	☐	☐	☐

Current ownership

Private	Public
☐	■

Active role in WW1

- ☐ Active
- ☐ Partially active
- ■ Inactive/Declassed

WS-Network recognizability

- ☐ Good recognizible
- ■ Recognizible
- ☐ Weak recognizible
- ☐ Not recognizible

Constructive tipology and materials

Designed by Captain Adolf Kroneiser, who was also the director of works, it was built according to the criteria of the "Vogl" style, therefore equipped with rotating steel domes and armor for cannons. The fort adapts very well to the rocky salient, is arranged on 4 levels and has an irregular plan. The highest part housed warehouses, dormitories and other service rooms. The armament of the fort was situated in the lower part, with 6 cannons of 12 cm M 80 were placed in armored casemate. Fort Corno was connected to Fort Larino and to the bottom of the valley through an equipped path along the rocky wall of Doss dei Morti, scattered with small cave posts. Modernized in 1909-1910, it was equipped with 3 howitzers of 10 cm in a revolving armored dome and with two observatories in the dome.

Enhancement project - New use

The Autonomous Province of Trento, in collaboration with the municipalities of the valley and the BIM of Chiese, has promoted a project of historical and monumental enhancement of the Lardaro barrage. Forte Corno has been subjected to a conservative intervention that led to the reconstruction of the original coverage with the use of an innovative material such as Reinzink sheet metal. The intervention was carried out on the basis of Austrian drawings of the time and a detailed photographic documentation. The municipality of Praso has commissioned the University of Trento to create a multimedia tour inside the fort, inaugurated in summer 2014.

Reachability level

- ■ Easily reachable
- □ Hardly reachable

Safe use and access

- ■ Totally Safe
- □ Partially Safe
- □ Not Safe

Community Engagement

The restoration project involved several stakeholders including the university and local associations in the management of the property. Mixed Approach.

Customer Experience Data

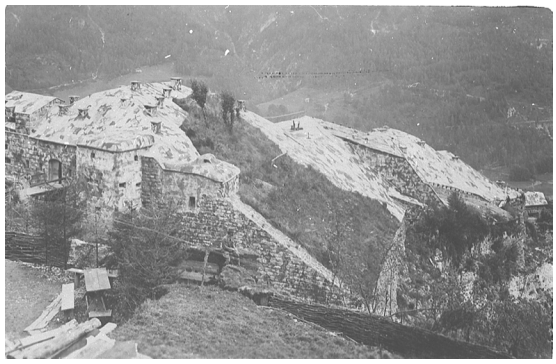
Excellent degree of appreciation for the museum and the fort.

52% - Excellent
28% - Very Good
20 % - Good

On-line Presence

Historical information regarding the subject property can be found online fairly easily. On the internet there is a lot of information about the restoration project and also about the museum set up.

Historical and current photographic documentation



Trentino, Italia

Tenna Fort

General information

Together with Fort San Biagio, located in front of it, it closed the Valsugana at Levico. The two forts make up the Tenna barrage, conceived as an outpost of the fortress of Trento, already equipped with a defensive belt with Fort Cimirlo and Fort Roncogno on one side and the complex of Civezzano on the other. The Tenna fort also controlled access to the Monterovere road that led to the fortifications located in Lavarone and on the Vezzena plateau. Built between 1884 and 1890 on the hill that divides the lakes of Levico and Caldonazzo, at an altitude of 608 m, Fort Tenna was a two-story structure made of squared ashlars. In the years preceding the Great War, a reinforcement of this fortified line was planned, as an alternative to the barrage of Valsugana initially foreseen near Grigno, with the construction of the forts Busa Grande and Panarotta, which were never realized. Considered obsolete, at the outbreak of the conflict it was disarmed and the batteries were placed in the open, near the fort and partly on the Brenta hill.

State of conservation

- ☐ Destruction loss
- ☐ State of abandonment
- ☐ Recovery with care (Museum)
- ■ Recovery
- ☐ High level of transformation
- ☐ Place of memory Cemetery
- ☐ Place of memory Memorials

Current ownership

- ☐ Private
- ■ Public

Active role in WW1

- ☐ Active
- ■ Partially active
- ☐ Inactive/Declassed

WS-Network recognizability

- ☐ Good recognizible
- ☐ Recognizible
- ■ Weak recognizible
- ☐ Not recognizible

Constructive tipology and materials

The fort was of uncovered type, that is, there was no camouflage to hide it from the view of the enemy. Built using a masonry of stones, later reinforced with a layer of concrete. The front and roof were further covered with earth. Enjoyed a double line of fire, and was protected all around by a moat and various reticulated; only a bridge located to the north, allowed the entrance to the fort. The moat had a total length of 280 meters, was 6 m wide and 4 m deep. The fort, one of the examples of mountain fortifications of the Vogl period, has an irregular quadrilateral base.

Enhancement project - New use

Starting from 2009 the fort has been involved in works promoted by the Autonomous Province of Trento. The project aimed to safeguard the wartime artifact, but also to allow a reading of the modifications made after the war period, including the demolitions made in the '30s by the inhabitants of Tenna. The project, curated by arch. Cinzia Broll, has provided for the reconstruction of internal stairs, the consolidation of the vaults, a new wooden ceiling, the consolidation of the masonry parts, the removal of debris and uncultivated vegetation and the recovery of the original moat that over the years had been submerged by excavation materials and vegetation.

Reachability level

Easily reachable

Hardly reachable

Safe use and access

Totally Safe

Partially Safe

Not Safe

Community Engagement

The restoration project was developed through a top-down approach. Currently, efforts are being made to engage the community regarding management.

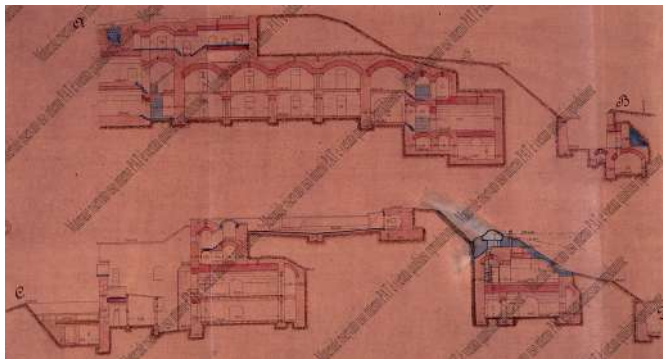
Customer Experience Data

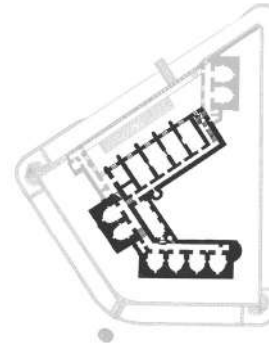
The fort is currently closed even if it has been restored.

On-line Presence

Historical information regarding the subject property can be found online fairly easily.

Historical and current photographic documentation





Tab. 4.32 | WarScape CLASS: MOUNTAIN FORTS

— Trentino Salient - Italy (Austro-Ungarian)

Tab. 4.32 | WarScape CLASS: MOUNTAIN FORTS

__ Trentino Salient - Italy (Austro-Ungarian)

Trentino, Italia

Carriola Fort

General information

Fort Cariola (also known as Carriola) is a fortification of the Austro-Hungarian Empire built on the slopes of Mount Nozzolo, at an altitude of 1054 m on the orographic left of the Chiese River. It was the most modern as well as the southernmost fort of the Lardaro barrage. Built between 1909 and 1915, its position made it a linking fort between the Austro-Hungarian defenses of that valley and those of Alto Garda. It was divided into three nuclei: the main casemate for the garrison's lodgings, the block of the howitzer battery and a large concrete hood as a fighting post. The barracks and the stables were housed in two separate buildings, located in a hollow. It was armed with 4 x 10 cm howitzers, 2 x 6 cm rapid fire cannons and 19 machine guns; the searchlights were powered by an electric generator. During the Great War, it was bombarded by Italian artillery, but it was not seriously damaged.

State of conservation

- ■ Destruction loss
- ■ State of abandonment
- □ Recovery with care (Museum)
- □ Recovery
- □ High level of transformation
- □ Place of memory Cemetery
- □ Place of memory Memorials

Current ownership

- ■ Private
- □ Public

Active role in WW1

- ■ Active
- □ Partially active
- □ Inactive/Declassed

WS-Network recognizability

- □ Good recognizible
- □ Recognizible
- ■ Weak recognizible
- □ Not recognizible

Constructive tipology and materials

For its construction, since it was one of the last forts built in Trentino, you can see the abundant use of reinforced concrete beams with a height of about 50cm put in place with a very dense interaxis, almost to form a continuous plate. For this reason, after the war, the fort was imploded, allowing the recovery of large and valuable quantities of iron. The fort Cariola was largely destroyed in 1928 by a company that had won the contract called by the Ministry of Finance to recover the huge amount of iron potrelle used to support the various floors and the concrete roof.

Enhancement project - New use

Currently the fort is private property and therefore is not accessible inside, only the external parts can be visited.

Reachability level

☐ Easily reachable ☒ Hardly reachable

Safe use and access

☐ Totally Safe ☐ Partially Safe ☒ Not Safe

Community Engagement

No data.

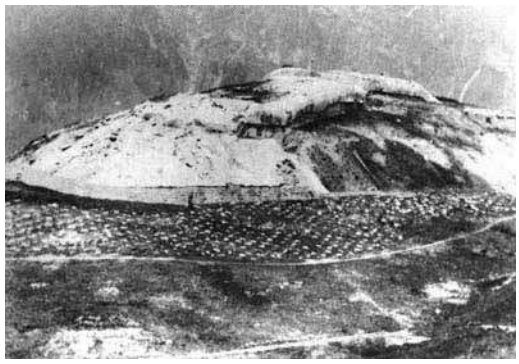
Customer Experience Data

No data.

On-line Presence

Some historical images and some data regarding the fort's involvement in the conflict can be found online, but the information is easy to find.

Historical and current photographic documentation



Trentino, Italia

Alto Fort (Mattarello)

General information

The last of the Mattarello complex, it was built in Zampetta and, unlike the batteries that faced west, was placed to protect two vital roads: the one coming from the south (Rovereto) and the one coming from the east (Valsorda-Passo della Fricca-Valsugana). It had a square plan on three floors, two above ground and one below, surrounded by a moat, in turn delimited by a stone wall with a hut for the riflemen. A central corridor, which starts from the entrance, divides the building into two parts that can be reached through a transversal corridor. On the second floor are the accesses to the domes-observatory and to the howitzers. It was disarmed in 1915; in particular the two 15 cm howitzers in the revolving dome were placed in a battery in a cave located nearby. The original domes were replaced by concrete copies.

State of conservation

☐ Destruction loss
☒ State of abandonment
☐ Recovery with care (Museum)
☐ Recovery
☐ High level of transformation
☐ Place of memory Cemetery
☐ Place of memory Memorials

Current ownership

☐ Private
☒ Public

Active role in WW1

☐ Active
☐ Partially active
☒ Inactive/Declassed

WS-Network recognizability

☐ Good recognizible
☐ Recognizible
☒ Weak recognizible
☐ Not recognizible

Constructive tipology and materials

It is made of non-regular squared ashlars that cover a reinforced concrete structure and form very thick walls. With a square plan, it develops on a basement floor, two above ground and a mezzanine above the second floor. The corridors have ceilings formed by iron beams one next to the other. The entrance portal is original and is on a long central corridor that cuts the work in two. The two parts are not similar to each other. A frontal caponier positioned in the moat is equipped with five small horizontal loopholes on the first level and six on the second level (which is accessed via an internal spiral staircase) where there is also a larger horizontal loophole. Almost all of the small loopholes were equipped with rifle mounts. There is an underground level where there are a few rooms and a corridor leading to the other corner post at the level of the moat. Going up instead to the second floor, the dislocation of the rooms remains almost unchanged on the right side, while it changes on the left side since there are the accesses to the howitzer domes and to the observatory one. The roof was covered later on by a sheet metal covering, which is currently partly torn off. It is also present on the front, an external iron staircase that from the second floor leads to the roof of the work.
The constructive peculiarity of the fort is the coexistence of different types of mixed concrete and steel floors, with double-T girders and corrugated sheets, laid both in the construction phase and in subsequent phases of structural reinforcement.

Enhancement project - New use

It was used until a few years ago by the Italian Army as a powder magazine and this explains the fact that it is still intact. However, it must be remembered that it was not bombed during the war and therefore the original structure did not need to be repaired. And now abandoned but still owned by the Italian military property. It would be desirable an intervention of historical-conservative recovery to avoid that the continuous influx of vandals can get to damage this very interesting work of the belt of Trento.

Reachability level

Easily reachable	Hardly reachable

Safe use and access

Totally Safe	Partially Safe	Not Safe

Community Engagement

Since it has yet to be restored/recovered, it would be desirable to take a new bottom-up approach to future work on this work

Customer Experience Data

No data.

On-line Presence

Historical information regarding the subject property can be found online fairly easily.

Historical and current photographic documentation

Veneto, Italia

Interrotto Fort

General information

Forte Interrotto, erroneously called fort, was a military barracks built in the 19th century and partially fortified into a fortress at the outbreak of the First World War to defend the Italian border against the Austro-Hungarian Empire. The fort is located at an altitude of 1,392 meters and is in the municipal territory of Asiago. Antecedent to the first world conflict (the construction was completed in 1887) came directly involved in the war events and then heavily damaged. It was occupied by the Austro-Hungarian army on May 22, 1916, during the advance towards Asiago. It was then adapted to an observatory on the plateau (with the placement of some lighthouses) and equipped with some small-caliber pieces. Its task during the First World War, assisted by the Tagliata Val d'Assa and the batteries of Monte Rasta, was to constitute a barricade of the upper Val d'Assa in case of an Austrian advance.

State of conservation

- ☐ Destruction loss
- ☐ State of abandonment
- ■ Recovery with care (Museum)
- ☐ Recovery
- ☐ High level of transformation
- ☐ Place of memory Cemetery
- ☐ Place of memory Memorials

Current ownership

- ☐ Private
- ■ Public

Active role in WW1

- ■ Active
- ☐ Partially active
- ☐ Inactive/Declassed

WS-Network recognizability

- ☐ Good recognizible
- ☐ Recognizible
- ■ Weak recognizible
- ☐ Not recognizible

Constructive tipology and materials

Initially conceived as barracks to host the Alpine Battalion "Bassano", the structure was built in the second half of the 19th century entirely in stone. The building with its mighty walls of stone and brick looks more like a medieval castle than a fortification of the nineteenth century. It consisted of a rectangular structure about 1,170 m2 wide, 14 meters high, and with the parade ground in the center; on two opposite corners of the perimeter there were two towers with a diameter of 10 m. The fortress was surrounded by a moat 5 meters wide.

Enhancement project - New use

As part of the "Project for the protection of the historical heritage of the First World War in the Vicentine Prealps", the fort was the subject of an interesting intervention of structural consolidation and safety of the structure through the removal of collapsed material, the consolidation of dangerous elements and the reintegration of the wall texture with the stone recovered. It was also provided to restore the coverage with the cleaning of vegetation and waste material, consolidation and integration of the roofing, and waterproofing of the entire structure.

Reachability level

- Easily reachable
- Hardly reachable

Safe use and access

- Totally Safe
- Partially Safe
- Not Safe

Community Engagement

The project of the Ecomuseum of the Vicentine Prealps is one of the few successful examples of participatory planning concerning the heritage of the Great War. The involvement of volunteers has been implemented especially in the operational phases.

Customer Experience Data

Good degree of appreciation for the fort.

46 % - Excellent
42 % - Very Good
11 % - Good
1 % - Weak

On-line Presence

Having undergone significant restoration, information regarding the fort is widely accessible online.

Historical and current photographic documentation

Veneto, Italia

Punta Corbin Fort

General information

Located in the western area of the Asiago Plateau, near Mount Cengio and the village of Treschè Conca, the Fort of Punta Corbin was one of the Italian forts that formed the defensive line on the Vicenza Prealps. Built starting from 1906 on a rocky spur jutting out over the Astico Valley to defend the valley from possible Austro-Hungarian invasions, Corbin was designed to be one of the most powerful fortifications of the Plateau. Still, in reality, its role in the conflict was marginal. After a few months from the beginning of the war, Fort Corbin and all the other fortresses in the area were deprived of its cannons and found itself extremely weak and ineffective. During the Strafexpedition of 1916, Fort Corbin was occupied by the Austro-Hungarian army, but then the fort returned to be Italian. From that moment, both for the damages it presented and for the displacement of the fight in other areas of the Plateau, it served as a post and observatory towards the Cimone, occupied by the Austrians until 1918. After the war, the Corbin was used for a few years by the army as barracks for training and then be abandoned.

State of conservation

☐ Destruction loss
☐ State of abandonment
■ Recovery with care (Museum)
■ Recovery
☐ High level of transformation
☐ Place of memory Cemetery
☐ Place of memory Memorials

Current ownership

■ Private
☐ Public

Active role in WW1

■ Active
☐ Partially active
☐ Inactive/Declassed

WS-Network recognizability

☐ Good recognizible
■ Recognizible
☐ Weak recognizible
☐ Not recognizible

Constructive tipology and materials

It is a specific fortified typology according to the most 'modern' canons of the war of position of the beginning of the century. Fundamental is the relationship with the surrounding landscape.
The fortress suffered a few large caliber artillery shots, in particular from the 'Barbara' 380 positioned at Millegrobe di Luserna, in May 1916 to level the field for the 'Spring Expedition' later called Strafexpedition. It overlooked the Valdastico with a covered observatory and at the center of the domes there was an armored observation tower, rotating and retractable, for the aiming of the cannons.On the front exposed to the enemy, the structure was articulated in a deep ditch in counterscarp, beaten by a concrete hood caponier, with slots for anti-personnel machine guns.

Enhancement project - New use

The abandoned ruins were bought by the Panozzo family, who patiently cleaned up the structures and carried out restoration works during the last decades. Especially valuable for the aspect of leaving intact and legible wounds and signs of time lived. In the fortress and its surroundings have shot some scenes of the film 'I recuperanti' by Ermanno Olmi in 1969. In the command barracks, there is a small museum and a small and nice bar-restaurant.

Reachability level

Easily reachable

Hardly reachable

Safe use and access

Totally Safe

Partially Safe

Not Safe

Community Engagement

No community engagement because it is a private fort.

Customer Experience Data

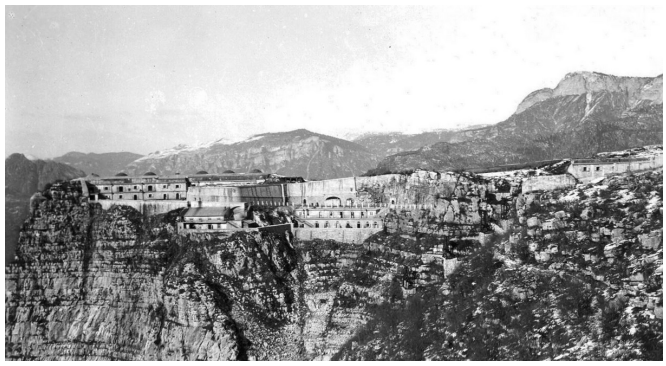
Good degree of appreciation for the fort and the context.

47 % - Excellent
40 % - Very Good
7 % - Good
6 % - Weak

On-line Presence

Historical information regarding the subject property can be found online fairly easily.

Historical and current photographic documentation



Veneto, Italia

Verena Fort

General information

Built between 1912 and 1914 on the summit of Mount Verena, at an altitude of over 2000 meters, the armored fort Verena was part of the Agno-Assa barrage. Like Fort Campolongo, it was one of the most modern and important achievements of Italian military engineering. Moreover, the choice of the position was tactically perfect, keeping both sides of the Val d'Assa under fire. On 12 June 1915, a heavy 305 mm grenade shot from the Austrian positions of the Cost'Alta managed to penetrate the parapet in front of the Verena battery and, after having passed through the back wall of the room below dome no. 3, exploded inside the room. Fort Verena has ascribed the primacy of having fired, at dawn on 24 May 1915, the first cannon shot, thus starting the hostilities on the Altipiani front. However, overwhelmed by the Austro-Hungarian offensive of 1916, Fort Verena was occupied by the Imperial troops on 22 May and remained in their hands until the end of the conflict. Today the ruins are the arrival station of a cableway, and in the rooms inside, there is the engine for the traction of the same.

State of conservation

Destruction loss	State of abandonment	Recovery with care (Museum)	Recovery	High level of transformation	Place of memory Cemetery	Place of memory Memorials
☐	☐	■	☐	☐	☐	☐

Current ownership

Private	Public
☐	■

Active role in WW1

- ■ Active
- ☐ Partially active
- ☐ Inactive/Declassed

WS-Network recognizability

- ☐ Good recognizible
- ☐ Recognizible
- ■ Weak recognizible
- ☐ Not recognizible

Constructive tipology and materials

The access to the fortress was through a gate enclosed between pillars, which were a sign of architectural beauty very unique in a fortified work. Under the flat concrete roof of considerable thickness (about 2.5 meters) are the reserves, the rooms intended to store the ready use ammunition. As in all the strong concrete simple, it was preferred to adopt the vaulted system to stress the material only to compression, as for masonry structures, for those vaulted, it was chosen to use the concrete with increasing consistency from the inside out, trying to obtain lower moduli of elasticity in the inner layers and increasingly higher towards the outside: result obtained by varying the doses of aggregates and maintaining the same amount of cement. Dosages of aggregates and maintaining the same amount of cement.

Enhancement project - New use

Fort Verena is protected by the Unified Text of Cultural Heritage, and the intervention has been financed with contributions under Law 78/2001. The restoration of the fort had a twofold purpose: to recover a historical testimony; to guarantee the safety of the visitors in the excursions to the logistic complex. The interventions carried out concerned the cleaning and securing of the entire structure, also with the consolidation of the most degraded or collapsed structural elements.

Reachability level

■ Easily reachable

□ Hardly reachable

Safe use and access

□ Totally Safe

■ Partially Safe

□ Not Safe

Community Engagement

The restoration project adopted a traditional top-down approach.

Customer Experience Data

Good degree of appreciation for the fort and the context.

52 % - Excellent
43 % - Very Good
5 % - Good

On-line Presence

Historical information regarding the subject property can be found online fairly easily.

Historical and current photographic documentation

Veneto, Italia

Campolongo Fort

General information

Built to defend the Italian border against the Austro-Hungarian Empire, at an altitude of 1,720 meters, on the top of the homonymous mountain that rises on the right side of the middle Val d'Astico, the fort is located in the municipal territory of Rotzo and overlooks the Val d'Assa below with its sheer walls. "Armored bomb-proof fort, under construction since 1910", Fort Campolongo represents one of the most modern constructions made by the Italian military engineering and constituted with Fort Verena and Fort Corbin, the most direct response to the line of Austro-Hungarian forts. In July 1915 it was seriously damaged by the Austro-Hungarian mortar Skoda of 305 mm placed in Cost'Alta, and almost completely destroyed on May 15, 1916 by the blows that started the Spring offensive. On 22 May it is occupied by the Austro-Hungarian army, which holds it firmly until the end of the conflict.

State of conservation

Destruction loss	State of abandonment	Recovery with care (Museum)	Recovery	High level of transformation	Place of memory Cemetery	Place of memory Memorials
☐	☐	■	☐	☐	☐	☐

Current ownership

Private	Public
☐	■

Active role in WW1

- ■ Active
- ☐ Partially active
- ☐ Inactive/Declassed

WS-Network recognizability

- ☐ Good recognizible
- ☐ Recognizible
- ■ Weak recognizible
- ☐ Not recognizible

Constructive tipology and materials

Apart from the gunnery batteries made entirely of unreinforced concrete, everything else in the complex was built of white Asiago stone. Once again the morphological conformation of the territory determined the typological-constructive choices of the fortifications.

Enhancement project - New use

The grandeur of the structures has made necessary an important intervention of consolidation of the most degraded parts with the original logistical organization's philological reconstruction and a radical intervention of cleaning from debris and vegetation. The static consolidation of the structures has involved the restoration of damaged vaults, the reconstruction of collapsed floors and walls, the restoration of the concrete roof, and the integration of missing parts in a "neutral and simplified" form.

Reachability level

Easily reachable

Hardly reachable

Safe use and access

Totally Safe

Partially Safe

Not Safe

Community Engagement

The restoration project adopted a traditional top-down approach.

Customer Experience Data

Medium degree of appreciation for the fort and the context.

23 % - Excellent
40 % - Very Good
20 % - Good
17 % - Weak

On-line Presence

Historical information regarding the subject property can be found online fairly easily.

Historical and current photographic documentation

Friuli Venezia Giulia, Italia

Bernadia Fort

General information

The Bernadia fort, built around 1910, belonged, together with the forts of Col Roncone, Magagna, Santa Margherita, and Tricesimo, to the so-called "Middle Tagliamento Fortress". The Italian army conceived this defensive system to prevent the enemy invasion through the Valli del Torre and protect the bridges on the Tagliamento. The main armament consisted of 4 cannons of the type "A" (Armstrong) 149 mm caliber in a revolving dome, while the secondary armament consisted of 4 cannons 75 mm (A) in an open battery. The work, which was realized according to the model elaborated by General Enrico Rocchi, was distributed on three floors. On the lower floor, there were gun emplacements for protecting the moat, the storage rooms for bullets and explosives. The intermediate floor housed the troop quarters, the bathrooms, the ammunition hoists. The highest part instead contained the armored battery. At the outbreak of the First World War, like most of the other fortifications built in Friuli, the Fort was set back from the front line and was deprived of its artillery pieces.

State of conservation

- ☐ Destruction loss
- ☐ State of abandonment
- ■ Recovery with care (Museum)
- ☐ Recovery
- ☐ High level of transformation
- ☐ Place of memory Cemetery
- ☐ Place of memory Memorials

Current ownership

- ☐ Private
- ■ Public

Active role in WW1

- ☐ Active
- ☐ Partially active
- ■ Inactive/Declassed

WS-Network recognizability

- ☐ Good recognizible
- ☐ Recognizible
- ■ Weak recognizible
- ☐ Not recognizible

Constructive tipology and materials

Fort Bernadia was built with the techniques studied by the engineer Rocchi, following the scheme of the armored fort of the Italian School. This type of construction adopted new solutions compared to the nineteenth-century forts, particularly in the distribution in different buildings. However, from the technological point of view, the Italian forts were built with outdated techniques: although built with large thicknesses of cement, this material was not reinforced with iron elements. This peculiarity made these forts more fragile, but in the cases in which the fortifications were not directly involved and destroyed by the war (such as Fort Bernadia), the absence of iron preserved them from destruction by the recuperators.

Enhancement project - New use

The fort has been transformed into a cultural center and multimedia museum. The intervention has tried to preserve the value of testimony of the building, making recognizable the new interventions compared to the old. The project has managed to keep intact some features that made the fort sustainable: the recovery and purification through sand and charcoal of rainwater, used by the soldiers for daily needs, and which is now used for the operation of the bathrooms; the method of aeration consists of tubes designed specifically for the release of fumes after the firing of the cannon; and the decision not to reinsert part of the iron on the facade of the structure, looted by the same troops, along with the cannons.

Reachability level


Easily reachable


Hardly reachable

Safe use and access


Totally Safe


Partially Safe


Not Safe

Community Engagement

The restoration project adopted a traditional top-down approach.

Customer Experience Data

No data.

On-line Presence

Historical information regarding the subject property can be found online fairly easily.

Historical and current photographic documentation

Veneto, Italia

Tre Sassi Fort

General information

The Tre Sassi fort was built by the Austro-Hungarian Empire between 1897 and 1901 to guard the passage of the carriageway leading to Val Badia and to control the peaks of Lagazuoi and Sass de Stria. Situated at a considerable height (2183 meters above sea level), the fort underwent some changes in 1911 because its structure was already obsolete in view of the war against the Kingdom of Italy. Despite these modernization works, the Austro-Hungarian authorities abandoned it already in the first days of July 1915. At 13:00 on July 5, 1915, the fort was hit by the Italian artillery firing from the batteries of Monte Pore, Prà Pontìn, Valiàte, and Val Costeàna. The 210 mm grenades managed to perforate the unreinforced concrete roof and to damage the structure, which was abandoned. However, the Austrians continued to illuminate it to induce the Italian artillery to consider it still operational. Thanks to this stratagem, they continued to target the fort with an evident waste of bullets, which could have hit other military objectives.

State of conservation

Destruction loss	State of abandonment	Recovery with care (Museum)	Recovery	High level of transformation	Place of memory Cemetery	Place of memory Memorials
☐	☐	■	☐	☐	☐	☐

Current ownership

Private	Public
☐	■

Active role in WW1

- ☐ Active
- ■ Partially active
- ☐ Inactive/Declassed

WS-Network recognizability

- ■ Good recognizible
- ☐ Recognizible
- ☐ Weak recognizible
- ☐ Not recognizible

Constructive tipology and materials

If we compare it with the forts built 15 years later on the Folgaria plateau, we realize that the Tre Sassi was very different. Rectangular in shape on three floors, it was equipped with embrasures along the two sides facing the Falzarego Pass (to the south) and Val Parola (to the east), where the two 60mm cannons were installed. The typical domes of the forts, which usually housed much larger cannons or howitzers, were not built. This structure was of medium size and could accommodate up to a hundred soldiers. Inside there were also warehouses, kitchens, rooms for the infirmary, and even loculi in the event of some death. It was not built instead of a room for electricity supply as oil lamps provided the lighting. The water was pumped from the nearby Lake of Val Parola.

Enhancement project - New use

The fortress, which today belongs to the Regole d'Ampezzo, has been subject to a conservative restoration with a museum destination The outside of the fortress is also the object of some museographic operations, such as the reconstruction of the layout of the defense grids. In the intentions, which underlie the design choices, the fort, as a documentary sign of the events of which it has been witness, should keep visible the traces of its use, thus remaining a museum of itself, even of the work of dilapidation and dismantling carried out by the restorers. In this way, its transformation into a pure container and the pursuit of an compatible use would be avoided.

Reachability level

■ Easily reachable
□ Hardly reachable

Safe use and access

■ Totally Safe
□ Partially Safe
□ Not Safe

Community Engagement

The restauration project has been financed by the European Community. Now the fort is rented to the Municipality of Cortina, which in turn has rented it to the manager of the museum, who owns the rich collection, the result of 65 years of research by the Lancedelli family.

Customer Experience Data

High degree of appreciation for the fort and the museum.

53 % - Excellent
40 % - Very Good
7 % - Good

On-line Presence

Historical information regarding the subject property can be found online fairly easily.

Historical and current photographic documentation

Trentino, Italy

Cherle/San Sebastiano Fort

General information

Fort Cherle was built at an altitude of 1445 meters in the locality of Malga Cherle, on the Altopiano dei Fiorentini, as a barrier on the Folgaria plateau. The fort consisted of two buildings, the body of the casemates and the block of batteries, connected by a corridor. It was surrounded by a moat, controlled by a counter blockhouse, and by three orders of reticulate. For the control of the terrain interval up to the fort Zwischenwerk Sommo | fort Sommo Alto, it was equipped, on the right flank of the casemate body, with a "traitor" battery. The fort was equipped with four domes for 10 cm howitzers, 15 M 07/12 8 mm machine guns in armored casemates and vertical armored shields, 2 M 10 6 cm guns in the counter blockhouse, and 2 M 12 10 cm howitzers in the "traitor" battery. The garrison consisted of 5 officers and 128 soldiers. At the outbreak of the war, the fort suffered heavy bombardment by the Italian 280 mm batteries located on Campomolon.

State of conservation

- ☐ Destruction loss
- ☐ State of abandonment
- ☐ Recovery with care (Museum)
- ☐ Recovery
- ☐ High level of transformation
- ☐ Place of memory Cemetery
- ☐ Place of memory Memorials

Current ownership

- ☐ Private
- ☐ Public

Active role in WW1

- ☐ Active
- ☐ Partially active
- ☐ Inactive/Declassed

WS-Network recognizability

- ☐ Good recognizible
- ☐ Recognizible
- ☐ Weak recognizible
- ☐ Not recognizible

Constructive tipology and materials

The fort consisted of a series of buildings not structurally united but connected by a pothole. The plan drew a sort of triangle; the covers of the thickness of at least 2.5 meters were made of concrete cast on a simple warping of iron girders. On the ground floor, the stone masonry, the skirting board of the building, and the well-kept entrance structure testify to one of the few attempts on the plateaus to follow a rudimentary architectural approach

Enhancement project - New use

In spite of an important work of recovery, the fort is in great part unfit for use. The cleaning works have made practicable the moat and some internal spaces; through the narrow corridors, you can go up to the top, where once the artillery was placed. Some panels are located along with the route offer historical information and information about the construction of the fort.

Reachability level

- [x] Easily reachable
- [ ] Hardly reachable

Safe use and access

- [ ] Totally Safe
- [x] Partially Safe
- [ ] Not Safe

Community Engagement

No data

Customer Experience Data

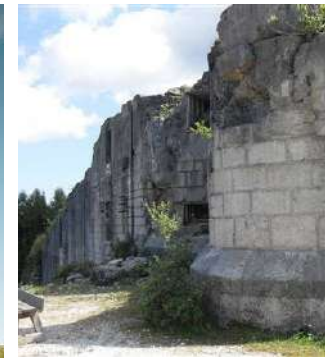
Good degree of appreciation for the fort and the museum.

29 % - Excellent
52 % - Very Good
10 % - Good
9 % - Weak

On-line Presence

Historical information regarding the subject property can be found online fairly easily.

Historical and current photographic documentation



Trentino, Italy

Sommo Alto Fort

General information

The fort Sommo Alto (in German Zwischenwerk Sommo) is a military fortification located 4 km from Folgaria at an altitude of 1,613 m above sea level, near the Coe pass (1,550 m), in the province of Trento. The fort belongs to the Folgaria barrage. The fort was designed by Captain of the General Staff of the Engineer Corps Schönherr and was built between the years 1911-1914, with a cost of 982,000 Austrian crowns (excluding armament), with the main function of serving as a link between Fort Sebastiano (or Fort Cherle) and Fort Dosso del Sommo (or Fort Serrada), but also to keep under control the Coe pass. The fort had its main function during the conflict in May 1916 ("Battle of the Highlands" or "Spring Offensive" or Strafexpedition), when it was used to support the Austrian advance, bombing Mount Maronia and Costa d'Agra. Although the fort was sporadically hit by artillery, it never suffered real attacks by the Italian infantry. In November 1918, the fort opened fire against the enemy lines near the retreat until the ammunition was exhausted.

State of conservation

Destruction loss	State of abandonment	Recovery with care (Museum)	Recovery	High level of transformation	Place of memory Cemetery	Place of memory Memorials
☐	■	☐	☐	☐	☐	☐

Current ownership

Private	Public
☐	■

Active role in WW1

- ■ Active
- ☐ Partially active
- ☐ Inactive/Declassed

WS-Network recognizability

- ☐ Good recognizible
- ☐ Recognizible
- ■ Weak recognizible
- ☐ Not recognizible

Constructive tipology and materials

The fort had an articulated conformation that adapted to the terrain. It consisted of an elongated casemate made entirely of concrete (2/3 m thick), developed on three levels and protected by a galvanized plate. Connected to it, using underground passages, two concrete blocks in armored casemates were made for close-range combat. On the highest point, there was the "U" complex, consisting of the battery block and casemates; on the saddle between Dosso del Sommo and 1,650 meters above sea level, there was the "S" complex for close-range defense; on the north-eastern ridge, there was the "R" complex. The main thickness of the roofs varied between 2.5 and 2.8 meters and consisted of reinforced concrete cast on a simple frame of main girders.

Enhancement project - New use

The fort has been subject to an intervention that has tried to combine the need to protect the large gaps left by the action of the restorers with the possibility of perceiving the original function of the fortification as a connection point between the two forts of the plateau (Forte Cherle and Dosso delle Somme) and observation point towards the enemy valleys. It has only slowed down the action of the degradation that, today, risks to compromise the static stability of the whole structure.

Reachability level

- [x] Easily reachable
- [ ] Hardly reachable

Safe use and access

- [ ] Totally Safe
- [x] Partially Safe
- [ ] Not Safe

Community Engagement

No data

Customer Experience Data

No data.

On-line Presence

Historical information regarding the subject property can be found online fairly easily.

Historical and current photographic documentation

Trentino, Italy

Verle Fort

General information

Fort Busa Verle is located at an altitude of 1506 meters at Passo Vezzena - Malga Verle. This bomb-proof fortified structure was used to prevent an eventual Italian advance from Val d'Assa on Vezzena, Cima le Mandrielle, Monte Erio. It was composed of the main casemate, about 70 meters long, with rooms for the garrison, a position for close combat on the left side, a battery of howitzers, and a flanking position south of the moat. It was equipped with four revolving domes with 10 cm M9 howitzers, two 8 cm M5 rapid-fire cannons, 13 MG machine guns, electric searchlights, and optical telegraph connections with the other forts in the sector. The garrison consisted of 4 officers and 167 men. As a fort Campo was subject to heavy cannonade by the Italian artillery but was never conquered. After the Strafexpedition of 1916, it remained as a point of optical connection with the system of the plateaus.

State of conservation

- ☐ Destruction loss
- ■ State of abandonment
- ☐ Recovery with care (Museum)
- ☐ Recovery
- ☐ High level of transformation
- ☐ Place of memory Cemetery
- ☐ Place of memory Memorials

Current ownership

- ☐ Private
- ■ Public

Active role in WW1

- ■ Active
- ☐ Partially active
- ☐ Inactive/Declassed

WS-Network recognizability

- ☐ Good recognizible
- ☐ Recognizible
- ■ Weak recognizible
- ☐ Not recognizible

Constructive tipology and materials

Like the other fortifications of the plateau, Fort Verle has a structure entirely made of thick concrete, supported by iron girders embedded in the casting itself. In addition to this supporting reinforcement, stretched steel wire mesh was placed within the casting to reinforce the structural strength. Despite this, it is not yet possible to speak of reinforced concrete in the current sense of the term. Inside, some intermediate floors have collapsed, leaving the structure of the intermediate floor visible.

Enhancement project - New use

The fort has not undergone any restoration work. The historiography confirms as on the around of the fort have been bursted more than 5000 bombs, of different caliber: some of the material traces of these bombardments are still visible in the surrounding landscape. This could be a good opportunity to implement a new operational strategy that is interested not only in the fort but also in the surrounding area, and that aims to involve the communities in the different phases of the development of the project.

Reachability level

☒ Easily reachable ☐ Hardly reachable

Safe use and access

☐ Totally Safe ☐ Partially Safe ☒ Not Safe

Community Engagement

No data

Customer Experience Data

No data.

On-line Presence

Historical information regarding the subject property can be found online fairly easily.

Historical and current photographic documentation

Trentino, Italy

Belvedere / Gschwent Fort

General information

The engineer Rudolf Schneider was the designer of the fortress. He built it starting from 1908 under the direction of the military engineers of Trento and following the indications of the Imperial and Royal Ministry of War of Vienna. It is immediately noticeable how the fort is no longer conceived as a construction in which everything is collected in a single architectural complex, but as an articulated work that consists of several forts for close combat, far from each other, in the middle of which was placed the block of the battery for combat at a distance. The main body of the fortress was arranged on three levels and is the largest of the forts built by the Austro-Hungarian military genius in Trentino. During the first year of the war, it suffered heavy bombardments and had numerous losses. However, it was not invested by the fury of iron and fire that in the sector of Passo Vezzena and Luserna put to hard test Fort Cima Vezzena, Fort Busa Verle, and Fort Lusérn and, thanks to its dominant position on the Val d'Astico, never received a direct assault by the Italian infantry..

State of conservation

Destruction loss	State of abandonment	Recovery with care (Museum)	Recovery	High level of transformation	Place of memory Cemetery	Place of memory Memorials
☐	☐	■	☐	☐	☐	☐

Current ownership

Private	Public
☐	■

Active role in WW1

- ■ Active
- ☐ Partially active
- ☐ Inactive/Declassed

WS-Network recognizability

- ☐ Good recognizible
- ■ Recognizible
- ☐ Weak recognizible
- ☐ Not recognizible

Constructive tipology and materials

The fortress comprises several blocks dug into the mountain: the main casemate - which housed lodgings, warehouses, logistical services - the battery block in a forward position, a counter-scarp in the moat, and three armored outposts. In order to withstand the heaviest bombardments, it was equipped with a cover of more than two and a half meters of concrete, in which a triple layer of 400 mm steel girders was inserted. Conceived, like the other fortresses of the Highlands, to resist in absolute autonomy to bombardments that could last for days and days, it had ample deposits, an aqueduct equipped with a drinking water system, an internal power station, a first aid for the wounded, a telephone exchange and an optical telegraphy room to communicate with the outside.

Enhancement project - New use

After the Second World War, the fort passed to the Trentino Alto Adige Region and in 1966 to a private individual who partially restored it and transformed it into a museum. In 1996 it was purchased by the Municipality of Lavarone, which carried out a thorough conservative restoration, the restoration of the original zinc roof, the arrangement of the attics, and complete rehabilitation of the site. A modern and up-to-date historical museum (with texts in Italian, German and English) was also set up for educational and popular purposes, dedicated not only to Fort Belvedere and the fortresses of the Highlands but also to the broader local and international issues of the First World War.

Reachability level

■ Easily reachable

□ Hardly reachable

Safe use and access

■ Totally Safe

□ Partially Safe

□ Not Safe

Community Engagement

Customer Experience Data

High degree of appreciation for the fort and the museum.

60 % - Excellent
34 % - Very Good
6 % - Good

On-line Presence

Historical information regarding the subject property can be found online fairly easily.

Historical and current photographic documentation

Trentino, Italy

Cima Vezzena / Spitz Verle Fort

General information

This fort is located at an altitude of 1,908 m above sea level and is situated on the top of Pizzo di Levico. It had a very important function as an observatory thanks to its strategic position. For this reason, it was called "the eye of the plateaus," and it could control the area southwards towards Asiago and the whole northern side of Valsugana. It was certainly a daring work; in fact, it leaned against the rock that acts as a wall to the north and overlooks a sheer drop of 1300 meters on Valsugana. The difficult position, however, entailed several problems of supply. For this reason, it was equipped with water tanks of 37,000 liters, fed by electrically operated pumps that brought water from the underlying fort Verle. Thus, it was considered impregnable, and it proved to be so; the Italians tried to conquer it several times between 1915 and 1916, but all attempts failed. Since the first days of the war, it was constantly kept under fire by the Italian artillery. After the Austrian offensive of spring 1916, the damages suffered by the fort during the first year of the war were repaired.

State of conservation

☐ Destruction loss

☐ State of abandonment

☐ Recovery with care (Museum)

☐ Recovery

☐ High level of transformation

☐ Place of memory Cemetery

☐ Place of memory Memorials

Current ownership

☐ Private

☐ Public

Active role in WW1

☐ Active

☐ Partially active

☐ Inactive/Declassed

WS-Network recognizability

☐ Good recognizible

☐ Recognizible

☐ Weak recognizible

☐ Not recognizible

Constructive tipology and materials

The fortification, with three floors above ground, was built of concrete and reinforced concrete. The plant is trapezoidal; the fort is located in an artificial gorge of rock and was defended by thick reticulate lines. During the first year of the war, underground quarters were excavated for the garrison after the Italian artillery had made unusable the second and third floor. The peculiarity of this fort is the presence of a system of caves dug into the rock connected with the basement of the fort. These caves today are only partially visible but not accessible.

Enhancement project - New use

Starting in the fall of 2016, the fort was affected by a series of recovery, conservation, enhancement, and safety interventions. With steel plate and reinforced concrete inserts, the fort's original structure was restored; a panoramic walkway was also built in the vicinity of the fortified structure. The recovery works of the historical-architectural patrimony related to the fortifications and artifacts of the First World War were carried out by the municipal administration of Levico, which availed itself of the provincial project "Great War" aimed at the recovery of fortifications on the occasion of the centenary of the end of the war events. The results of the recovery work were presented to the public on July 2, 2017.

Reachability level

☐ Easily reachable ☐ Hardly reachable

Safe use and access

☐ Totally Safe ☐ Partially Safe ☐ Not Safe

Community Engagement

No data

Customer Experience Data

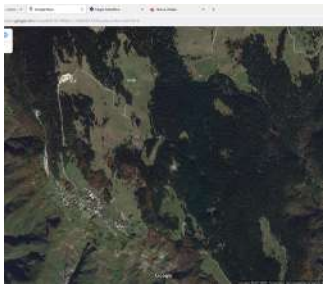
Good degree of appreciation for the fort and the context.

50 % - Excellent
33 % - Very Good
10 % - Good
7 % - Weak

On-line Presence

Historical information regarding the subject property can be found online fairly easily.

Historical and current photographic documentation



Trentino, Italy

Campo Luserna Fort

General information

Fort Cima Campo was one of the most powerful and well-equipped Austrian forts of the entire front and was nicknamed “Padreterno” by the Italian soldiers for its impressiveness.
The designer and director of the works was the engineer Captain of the General Staff of the Engineer Corps Eduard Lakom. The fort had two outposts: Viaz in the east and Oberwiesen in the west. In the summer of 1915, it suffered a heavy bombardment by Italian artillery, after which the Bohemian commander Emanuel Nebesar, convinced of an imminent and decisive Italian attack, raised the white flag. However, the suspension of fire and the white flags caused the intervention of the batteries of the Austrian forts Verle and Belvedere that, with their shots, attempted to knock down the white flags and disperse the possible assault of the Italian infantry. Restored the situation with the help of volunteers, commander Nebesar was dismissed and arrested.

State of conservation

- ☐ Destruction loss
- ☐ State of abandonment
- ■ Recovery with care (Museum)
- ☐ Recovery
- ☐ High level of transformation
- ☐ Place of memory Cemetery
- ☐ Place of memory Memorials

Current ownership

- ☐ Private
- ■ Public

Active role in WW1

- ■ Active
- ☐ Partially active
- ☐ Inactive/Declassed

WS-Network recognizability

- ☐ Good recognizible
- ☐ Recognizible
- ■ Weak recognizible
- ☐ Not recognizible

Constructive tipology and materials

Placed at an altitude of 1549 meters on the ridge that connects the Val D’Astico and the Val Torra, the fort was composed of the main building about 60 meters long (with lodgings, deposits, and workshops) and two concrete outposts with armored structures carved in the rock. The plan of the main body was trapezoidal concrete reinforced by thick girders and a galvanized plate. It was surrounded on three sides by a moat dug into the rock and was articulated on different levels. It was armed with four howitzers of 10 cm M 09, 2 rapid-fire cannons of 8 cm M5, two rapid-fire cannons of 6 cm M 10, and 19 MG of 8 mm M 07/12.

Enhancement project - New use

In recent years, thanks to the intervention of the Municipality of Luserna and the Labor Agency of the Autonomous Province of Trento, a project of valorization and recovery of the former Austro-Hungarian fortress has begun. Since 1990 there have been significant interventions to remove debris from the outposts Viaz and Oberwiesen, which can now be visited also in some of their internal rooms, the cleaning of the deep ditches of the stronghold, with the consolidation of some supporting structures and some floors, the restoration of the war memorial built in 1916, the cleaning of stretches of trenches and the reopening of 210 meters of a tunnel between the outposts.

Reachability level

■ Easily reachable

□ Hardly reachable

Safe use and access

□ Totally Safe

■ Partially Safe

□ Not Safe

Community Engagement

No data

Customer Experience Data

Medium degree of appreciation for the fort and the context.

30 % - Excellent
20 % - Very Good
40 % - Good
10 % - Weak

On-line Presence

Historical information regarding the subject property can be found online fairly easily.

Historical and current photographic documentation

Trentino, Italy

Dosso del Sommo / Serrada Fort

General information

The fort was erected in a dominant position; on one side dominates the Terragnolo valley, being able to see the Pasubio, while on the other side has a view on the plateau of Lavarone and Asiago, as well as being in "optical" connection with the nearby forts: Fort Sommo Alto and Fort Sebastiano. The fort was designed initially by R. Majer and later by Captain Karl von Bedekovic. Its construction took place between 1911 and 1914 and was part of the "Folgaria barrage". The fort consists of three blocks, of which the main one is 100 meters long and 8 meters wide, on three floors. The fort, commanded by Captain Leo Schwarz, had the task of preventing an Italian advance through the Terragnolo valley, which it did. Although the fort was subject to Italian bombing, it did not suffer significant damage, indeed during the war, it had an important function, bombing the nearby Coe pass and Pasubio. The fort was connected to the hamlet of Serrada (Folgaria) by the trench Forra del Lupo.

State of conservation

- ☐ Destruction loss
- ■ State of abandonment
- ☐ Recovery with care (Museum)
- ☐ Recovery
- ☐ High level of transformation
- ☐ Place of memory Cemetery
- ☐ Place of memory Memorials

Current ownership

- ☐ Private
- ■ Public

Active role in WW1

- ■ Active
- ☐ Partially active
- ☐ Inactive/Declassed

WS-Network recognizability

- ☐ Good recognizible
- ☐ Recognizible
- ■ Weak recognizible
- ☐ Not recognizible

Constructive tipology and materials

The Fort Dosso delle Somme was surrounded by a moat 10 meters wide and was formed by three buildings, all connected by tunnels dug into the rock. The largest was the one located north-west, at the top of the small plateau, and measured 100 meters long and 8 meters wide. It consisted of three floors that housed the quarters for the garrison, the kitchen, the power plant, the engine room, warehouses, and stores for ammunition. On the roof were two of the four domes with the 100mm howitzers. The whole was covered with a large concrete casting, later colored in red and green to camouflage it. The second building consisted of two underground floors while the roof ended with three domes: two were destined for the remaining howitzers, while the third was an armored observation post. At the end of this second building, there were two metal casemates equipped with machine guns. Finally, the third building was made up of several casemates that housed the other machine guns and allowed for defense in close combat.

Enhancement project - New use

The fort has not undergone any restoration work. The historiography confirms as on the around of the fort have been bursted a lot of bombs, of different caliber: some of the material traces of these bombardments are still visible in the surrounding landscape. This could be a good opportunity to implement a new operational strategy that is interested not only in the fort but also in the surrounding area, and that aims to involve the communities in the different phases of the development of the project.

Reachability level

- ■ Easily reachable
- □ Hardly reachable

Safe use and access

- □ Totally Safe
- □ Partially Safe
- ■ Not Safe

Community Engagement

No data

Customer Experience Data

No data

On-line Presence

Historical information regarding the subject property can be found online fairly easily.

Historical and current photographic documentation

Stabroek Fort, degradation of concrete in contact with moat water, Pic. J. Aldrighettoni

	Permanent fortification	Field fortification
Mountain areas	*Mountain forts*	*Mountain defensive systems*
Plain areas	***Plain strongholds***	*Open-field entrenched systems*
Coastal areas	*Coastal towers and fortifications*	

WarScape Class - Stronghold	Tab. 4.49	Douaumont Fort
	Tab. 4.50	Tarakaniv Fort
	Tab. 4.51	de Mutzig Fort
	Tab. 4.52	de Loncin Fort
	Tab. 4.53	de Lantin Fort
	Tab. 4.54	de Lier Fort
	Tab. 4.55	de Pontisse Fort
	Tab. 4.56	de Barchon Fort
	Tab. 4.57	d'Evignèe Fort
	Tab. 4.58	de Fleeron Fort
	Tab. 4.59	de Chaudfontainie
	Tab. 4.8	Nizza Stronghold
	Tab. 4.9	Verdun Stronghold
	Tab. 4.11	Thorn Stronghold
	Tab. 4.12	Kaunas Stronghold
	Tab. 4.15	Namur Stronghold
	Tab. 4.16	Krakow Stronghold

Verdun, France

Douaumont Fort

General information

Construction work began in 1885, the concrete casting of the roof was carried out in 1888, and the fort was reinforced until 1913. Situated on one of the highest elevations of the area (388 meters), it occupies a total surface of 30,000 m² and is about 400 meters long, with two underground levels. The armament consisted of a 155 mm R cannon and two 75 mm cannons, as well as several other 75 mm cannons variously stationed, and numerous machine gun turrets.

Fort Douaumont was considered at the time the strongest defense in Europe and virtually impregnable. Unfortunately, in February 1916 the Germans launched their major offensive in the area of Verdun, and the fort immediately became the main target, because of its privileged position as an observatory. The fort fell on 25 February 1916 and was reconquered by the French on October 24, 1916, after the Germans, following the explosion of the previous May and the subsequent damage inflicted by artillery, had almost abandoned it. Millions of shots had meanwhile been fired on the fort, and thousands of men had lost their lives to recapture it.

State of conservation

- ☐ Destruction loss
- ☐ State of abandonment
- ■ Recovery with care (Museum)
- ☐ Recovery
- ☐ High level of transformation
- ☐ Place of memory Cemetery
- ☐ Place of memory Memorials

Current ownership

- ☐ Private
- ■ Public

Active role in WW1

- ■ Active
- ☐ Partially active
- ☐ Inactive/Declassed

WS-Network recognizability

- ☐ Good recognizible
- ■ Recognizible
- ☐ Weak recognizible
- ☐ Not recognizible

Constructive tipology and materials

Originally protected by a 2.5-meter-thick concrete roof and 4 meters of earth, it was defended on the side facing the enemy by a large entrenched area bristling with obstacles, barbed wire, and machine-gun posts, and surrounded by a moat more than seven meters deep. Its barracks could accommodate a garrison of 635 men, it was equipped with two water tanks and an oven to bake bread; it served as an observatory, a shelter, a depot of material and ammunition. Internally, it was organized in two underground levels, protected by meters and meters of reinforced concrete, earth and sand: in this way, the power of bullets would be greatly diminished, as well as their piercing capacity. Moreover, inside there were two main corridors running east-west: placed one above the other, they connected the various rooms, and allowed to reach quickly (and safely) the outer areas of the fortress.

Enhancement project - New use

The restoration project sought to preserve traces of the destruction, transforming the ruins of the fort into a museum that can be visited by the public. Inside some rooms have been restored, for educational purposes, with reproductions of the furnishings of the time (dormitories, kitchens).

Reachability level

- ■ Easily reachable
- □ Hardly reachable

Safe use and access

- □ Totally Safe
- ■ Partially Safe
- □ Not Safe

Community Engagement

The implemented projects followed a traditional top-down approach.

Customer Experience Data

Good degree of appreciation for the museum and the fort.

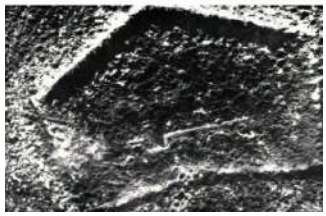
55% - Excellent
38% - Very Good
4 % - Good
3 % - Weak

On-line Presence

Historical information is easily accessible given the importance the fort had during the conflict. Many publications, studies carried out, researches, dissertations, realized projects and installations are available.

Historical and current photographic documentation





Dubno, Ucraina

Tarakaniv Fort

General information

As a result of the third division of Poland, when Galicia was captured by Austria, the border between Austria and the Russian Empire began to pass along the Zbarazh-Brody-Berestechko-Sokal line. To strengthen the border of the Russian Empire, the royal leadership set several fortifications. One of them is Tarakaniv Fort, which was built in 1885-1890 by the forces of the main engineering department under the military ministry of the Russian Empire. Prominent fortifiers were involved in the construction of the fort: K. Velychko, Totleben, Baumgarten, the first commandant of the fort Belikov. Until 1905, Tarakaniv Fort was used as a fortress-warehouse. During the First World War, at the end of September 1915 the Austrian troops occupied the fort. The destruction of the fort took place during the fighting of the First Equestrian Army against the White Poles, as well as in summer of 1916 during the Brusilovoffence on the southwestern front. After the First World War, the fort lost its strategic destiny forever.

State of conservation

Destruction loss	State of abandonment	Recovery with care (Museum)	Recovery	High level of transformation	Place of memory Cemetery	Place of memory Memorials
☐	■	☐	☐	☐	☐	☐

Current ownership

Private	Public
☐	☐

Active role in WW1

- ■ Active
- ☐ Partially active
- ☐ Inactive/Declassed

WS-Network recognizability

- ☐ Good recognizible
- ☐ Recognizible
- ■ Weak recognizible
- ☐ Not recognizible

Constructive tipology and materials

This defensive structure was a concrete and earthy fortification, built with the use of brick, cement, cast-in-foundry parts; it also had form-ceiling and doors, which closed hermetically, stairs, laces. The fort had autonomous water supply with three wells inside, a kerosene engine and a machine for lighting and ventilation; telegraph and telephone; a bathhouse, a medical facility, food storage for a 2-month supply. In 1901, the garrison fortified church was built and equipped in aRussian-Byzantine style. The arrival of the Russian Emperor Alexander III with his family in 1890 during the celebration of the opening of the Tarakaniv Fort was a great event.

Enhancement project - New use

No enhancement project has been developed to date, even though the fort represents an important landmark in the evolutionary history of the First World War.

Reachability level

☐ Easily reachable ☐ Hardly reachable

Safe use and access

☐ Totally Safe ☐ Partially Safe ☐ Not Safe

Community Engagement

No community engagement. It's important to remember how Eastern Europe has experienced a different political history than Western countries, and how this has affected the freedom of historical narrative of the past.

Customer Experience Data

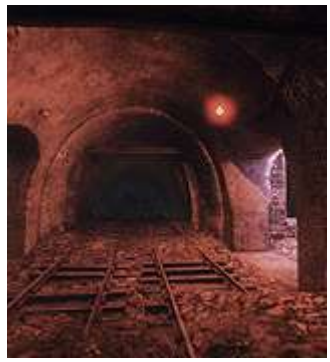
High level of appreciation for the charm of this abandoned ruin:

75% - Excellent
23 % - Very Good
2 % - Good

On-line Presence

Like all the fortifications that belonged to the Russian Empire, online information is not easy to find, also because very often they are in Russian, not always with English translation.

Historical and current photographic documentation


Strasburgo, France

Kaiser Wilhelm II Fort (de Mutzig)

General information

Fort de Mutzig was part of a network of forts surrounding Strasbourg and Metz that had been built by the Germans after the end of the Franco-Prussian War. The first construction work began in April 1893. This German fort was the first built after the development of melinite, an explosive invented in 1885. From then on began a new era in the building of fortifications. In 22 years of construction, the Feste Kaiser Wilhelm II will grow to the point of becoming the largest and most powerful fortification in Europe when war was declared in 1914. In 1914 the Feste covers 254 ha, it is made up of nearly 50 structures: 2 forts, 6 batteries, 12 artillery observatories, around twenty infantry shelters, 3 concrete barracks, 4 power stations with 18 generators, 16 kitchens, 6 bakeries, 4 wells. During the Great War the Feste Kaiser Wilhelm II never endured an attack or a siege. The only feat of the Feste happened on 18 August 1914, when the 105 mm. guns fired 291 salvo's on approaching French troops near Urmatt, some 7,5 km. away to the west, in the Valley of the Bruche.

State of conservation

Destruction loss	State of abandonment	Recovery with care (Museum)	Recovery	High level of transformation	Place of memory Cemetery	Place of memory Memorials
☐	☐	■	☐	☐	☐	☐

Current ownership

Private	Public
☐	■

Active role in WW1

- ■ Active
- ☐ Partially active
- ☐ Inactive/Declassed

WS-Network recognizability

- ☐ Good recognizible
- ■ Recognizible
- ☐ Weak recognizible
- ☐ Not recognizible

Constructive tipology and materials

It was the first German fortification to be made of concrete, entirely armored, ventilated and lit by electrical power. This prototype was an experimentation preliminary to the construction of the dispersed fortifications: ouvrages scattered on the terrain, dug underground and connected by underground galleries.
At the end of the war, French troops discovered a world of avant-garde construction techniques, which they studied in depth to adopt many of the same solutions in the design of the Maginot Line works.

Enhancement project - New use

On the occasion of the Centenary, some of the batteries of the fortress have been recovered and transformed into a museum, for educational and evocative purposes. Period equipment and furnishings have been repositioned to evoke the life of the fort. Guided tours are organized for tourist groups and school groups from all over the world.

Reachability level

☐ Easily reachable ☐ Hardly reachable

Safe use and access

☐ Totally Safe ☐ Partially Safe ☐ Not Safe

Community Engagement

On the occasion of the centenary, an association of volunteers was created to take care of the fort and make sure that it becomes part of the material heritage of humanity.

Customer Experience Data

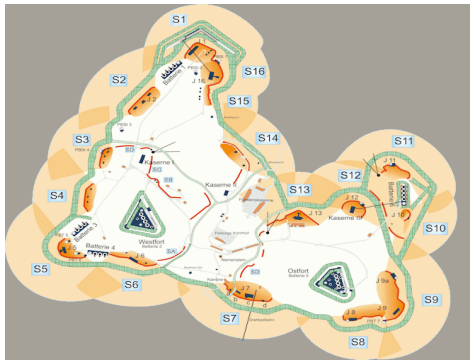
High level of appreciation for the museum and the visits:

84 % - Excellent
15 % - Very Good
1 % - Good

On-line Presence

Historical information is easily accessible given the importance the fort had. Many publications, studies carried out, researches, dissertations, realized projects and installations are available.

Historical and current photographic documentation



Liegi, Belgio

Forte de Loncin

General information

Fort Loncin was built between 1881 and 1884, 7 km from the center of Liège, in the direction of Brussels and Tongeren, and played a crucial role in the initial stages of the Great War, in August 1914. Since the first post-war period, the fort has always been manned by a watchman who prevented the repeated looting that injured the other defenses. It did not rearm it in the 1930s, so today, it looks just as it did in 1914. Nature has taken back what was once hers: the fort is now a paradise of vegetation frequented by exceptional fauna. Since 1980, a museum has been created that brings together several unique pieces, including a 1914 army machine gun cart, various models illustrating the typology of the fort, and the course of the battle of Liège. The aim is to make the visitor reflect on the absurdity of war, the feelings and anguish that a soldier at the front could feel, and the knowledge that our freedom is the result of the sacrifice of those who fought for it.

State of conservation

Destruction loss	State of abandonment	Recovery with care (Museum)	Recovery	High level of transformation	Place of memory Cemetery	Place of memory Memorials
☐	☐	■	☐	☐	☐	☐

Current ownership

Private	Public
☐	■

Active role in WW1

- ■ Active
- ☐ Partially active
- ☐ Inactive/Declassed

WS-Network recognizability

- ☐ Good recognizible
- ☐ Recognizible
- ■ Weak recognizible
- ☐ Not recognizible

Constructive tipology and materials

The fort had an isosceles triangular plan, the base of which was 300 m long, while the two sides measured 235 m each; the moat was 8 m wide and 6 m deep and is now entirely covered with vegetation. Built entirely of unreinforced concrete, i.e., a conglomerate of Portland cement (invented in 1824), sand, stone, and water, the fort was characterized by the presence of an internal ventilation system that allowed the escape of any asphyxiating gases or gas smoke. The heavy German bombardment, inflicted with the use of the Big Berta, was the prelude to the subsequent surrender of the forts de Flèmelle and Fort de Hollogne.

Enhancement project - New use

The fortress was transformed into a museum with a restoration project involving both the interior and exterior parts of the complex. The necessary installations were installed to ensure adequate lighting for the museum rooms. The access connections (stairs and access ramps) were arranged to make it more accessible to visitors in the external elements. Inside, many armaments and objects belonging to the fort itself have been preserved and displayed. Museum theme: memory and commemoration.

Reachability level

- [x] Easily reachable
- [ ] Hardly reachable

Safe use and access

- [x] Totally Safe
- [ ] Partially Safe
- [ ] Not Safe

Community Engagement

The recovery project did not involve the local community directly. The museum is state-run and therefore has paid staff, not volunteers.

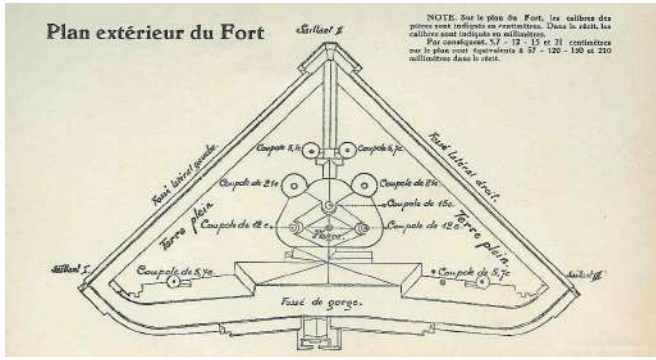
Customer Experience Data

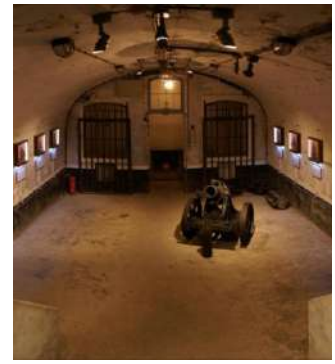
They are appreciated by all for the experience inside the fort, where the story is also experienced with sound effects.
Votes:
79% excellent
19% very good
2% average

On-line Presence

Information on the property in question is readily available online, concerning its evolutionary history and the period of WW1, and the current situation.

Historical and current photographic documentation





Liegi, Belgio

Forte de Lantin

General information

Fort de Lantin was built between 1881 and 1884, about 7 kilometers northwest of the center of Liège and 4/5 km from its neighbors, Loncin and Liers. Like the other forts around the city of Liège, Fort de Lantin played a vital role in August 1914. After the war and during the Second World War, the regiment was not modernized like the other forts in the enclosure. It, therefore, remained abandoned and in a deep state of disrepair until 1975, when a group of volunteers began to take care of it. The central dome of the fort was also used as an observatory from which one could communicate with the surrounding citadels.

State of conservation

Destruction loss	State of abandonment	Recovery with care (Museum)	Recovery	High level of transformation	Place of memory Cemetery	Place of memory Memorials
☐	☐	■	☐	☐	☐	☐

Current ownership

Private	Public
■	☐

Active role in WW1

- ■ Active
- ☐ Partially active
- ☐ Inactive/Declassed

WS-Network recognizability

- ☐ Good recognizible
- ☐ Recognizible
- ■ Weak recognizible
- ☐ Not recognizible

Constructive tipology and materials

It is one of the little forts in Liège and has the shape of an isosceles triangle whose base is 200 meters long and whose sides measure 225 meters. The fort was surrounded by a 6m deep and 8m wide moat, through which one could access the service rooms (laundry, toilets, guardhouse) located in the counterscarp (outside) and in the central massif, where the main armament of the fort was found and from which the domes housing 5.7cm howitzers emerged. Built the fort of unreinforced concrete in which the percentage of sand and pebbles was much higher than the amount of concrete. The troop chambers were located along the moat, which was also overlooked by windows protected by steel beams and sandbags during the fighting.

Enhancement project - New use

The fort has been transformed into a museum, following symbolic and functional rehabilitation logic. Some of the dormitories have been rearranged according to their layout at the time of the war. Ca even rent the dormitory for short periods.

Reachability level

- [x] Easily reachable
- [ ] Hardly reachable

Safe use and access

- [x] Totally Safe
- [ ] Partially Safe
- [ ] Not Safe

Community Engagement

In 1975, a group of volunteers began to take care of the fort by clearing weeds and rubble. In 1980, the group “Friends of Fort Lantin” was set up, who are still the owners and managers today.

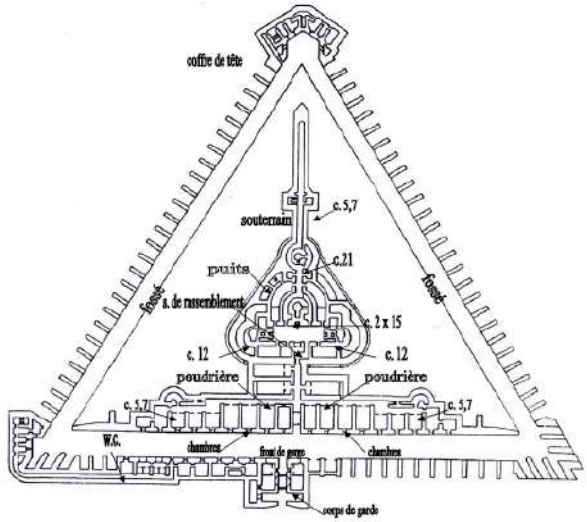
Customer Experience Data

It is highly appreciated as a historical place steeped in re-enactments. The restoration seems to help the visitor experience.
Votes:
20% excellent
80% very good

On-line Presence

Information on the property in question is readily available online, both with regard to its evolutionary history and the period of WW1, as well as the current situation.

Historical and current photographic documentation



Liegi, Belgio

Forte de Liers

General information

The Liers Fort has located approximately 6.5 km (4.0 mi) north of the center of Liège and has similar characteristics to the other forts in the Liège defense system. The fort was heavily bombarded by German artillery in the battle of August 1914. Liers were never structurally upgraded, as was done for other forts in the post-war period. The fort is now used as a test site for aircraft engines and is therefore not accessible to the public.

State of conservation

Destruction loss	State of abandonment	Recovery with care (Museum)	Recovery	High level of transformation	Place of memory Cemetery	Place of memory Memorials
☐	☐	☐	☐	■	☐	☐

Current ownership

Private	Public
■	☐

Active role in WW1

- ■ Active
- ☐ Partially active
- ☐ Inactive/Declassed

WS-Network recognizability

- ☐ Good recognizible
- ☐ Recognizible
- ■ Weak recognizible
- ☐ Not recognizible

Constructive tipology and materials

The plan of Fort de Liers is in the shape of an isosceles triangle and is surrounded by an 8-meter wide and 6-meter deep moat. As in the other "Brialmont style" forts, the main armaments were concentrated in the enormous central concrete space. The most controversial aspect, as in almost all Brialmont forts, was the absence of toilets inside the central body: this design error, inherent in the absence of an underground tunnel between these buildings, was one of the main problems the fort's garrison had to face during the siege. The troops' rooms were located along the moat, which was also overlooked by windows that were protected by steel beams and sandbags during the fighting. Fort built of unreinforced concrete.

Enhancement project - New use

The fort has not been restored or recovered for conservation purposes, but has been transformed into an industrial production site for the testing of aircraft engines.

Reachability level

☒ Easily reachable ☐ Hardly reachable

Safe use and access

☐ Totally Safe ☒ Partially Safe ☐ Not Safe

Community Engagement

No data.

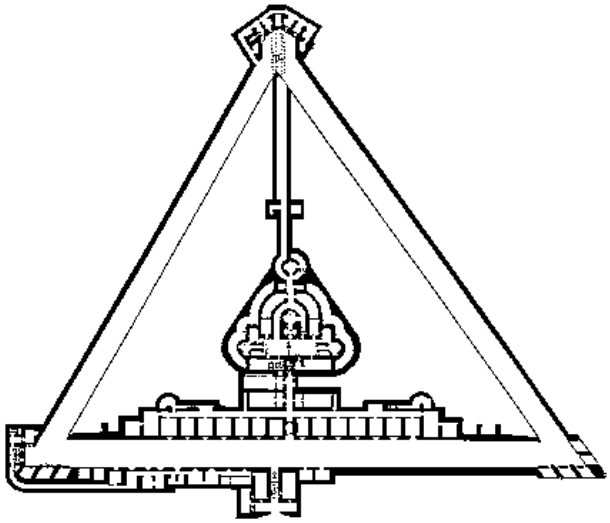
Customer Experience Data

No data.

On-line Presence

Historical information about the property is fairly easy to find online, but the current situation (including photographs) is hardly available, probably due to the new use.

Historical and current photographic documentation



Liegi, Belgio

Forte de Pontisse

General information

Fort Pontisse is located about 7 kilometers northeast of the center of Liège, overlooking the Meuse Valley and the Albert Canal, and is one of the largest fortresses in the Liège enclosure. Fort Pontisse resisted until 13 August 1914 and then fell to the Germans. Also, in this fort, latrines, showers, kitchens, mortuaries were in the counterscarp, a non-functional position during combat. During the occupation, the Germans made numerous structural and technological improvements to the fort, including the ventilation system, toilets, and the use of reinforced concrete. The fort was reoccupied by the Belgian army after the armistice of 1918 and was also used during the Second World War.

State of conservation

- ☐ Destruction loss
- ☒ State of abandonment
- ☐ Recovery with care (Museum)
- ☐ Recovery
- ☐ High level of transformation
- ☐ Place of memory Cemetery
- ☐ Place of memory Memorials

Current ownership

- ☒ Private
- ☐ Public

Active role in WW1

- ☒ Active
- ☐ Partially active
- ☐ Inactive/Declassed

WS-Network recognizability

- ☐ Good recognizible
- ☐ Recognizible
- ☒ Weak recognizible
- ☐ Not recognizible

Constructive tipology and materials

The fort is irregularly trapezoidal in shape, in contrast to most of the forts built by Brialmont. A moat 6 meters deep and 8 meters wide surrounds it, while the main armament is concentrated in the central massif. The troop chambers were located along the moat. The top of the central massif consisted of 4 meters of unreinforced concrete, while the walls, which were considered less exposed, were built with 1.5 meters of concrete. Built entirely of unreinforced concrete during the German occupation in 1916, it was modernized and reinforced with reinforced concrete structures to make it functional again during World War II.

Enhancement project - New use

The fort is now in a state of abandonment and is used, in its external parts, by an association that breeds goats, donkeys, and horses. For years it has been used as an illegal dump, without any control or interest shown by the competent authorities.

Reachability level

☒ Easily reachable ☐ Hardly reachable

Safe use and access

☐ Totally Safe ☒ Partially Safe ☐ Not Safe

Community Engagement

No data.

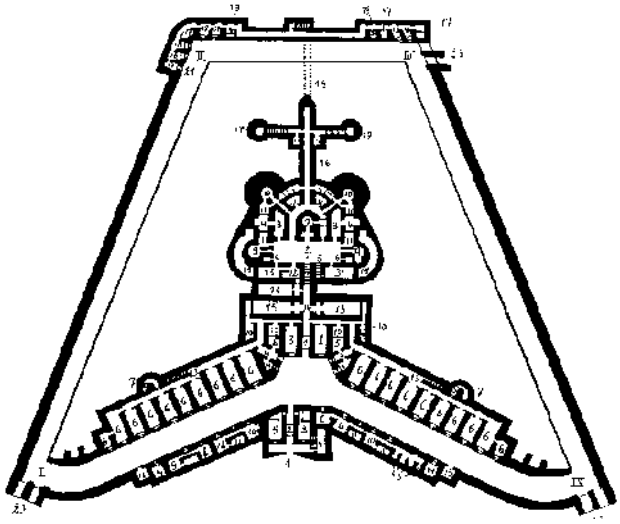
Customer Experience Data

No data.

On-line Presence

Historical and current information about the property can be found online quite easily. As the fort has not been the subject of recovery/restoration projects, it does not have its own website or anything else.

Historical and current photographic documentation



Liegi, Belgio

Forte de Barchon

General information

Fort de Barchon is located about 9 kilometers (5.6 mi) northeast of the center of Liège, just off the E40 motorway, and was heavily bombarded by German artillery in the battle of August 1914. In the 1930s, it was upgraded to become part of the Belgian fortified position with the aim of preventing or slowing down a German attack. It was involved in the Battle of Belgium in 1940 and fell to the Germans. Today the fort houses a museum and is open to the public. The fort is also known as a meeting place for Softair enthusiasts and is sometimes set up as an adventure park.

State of conservation

Destruction loss	State of abandonment	Recovery with care (Museum)	Recovery	High level of transformation	Place of memory Cemetery	Place of memory Memorials
☐	☐	☐	☐	■	☐	☐

Current ownership

Private	Public
☐	■

Active role in WW1

- ■ Active
- ☐ Partially active
- ☐ Inactive/Declassed

WS-Network recognizability

- ☐ Good recognizible
- ☐ Recognizible
- ■ Weak recognizible
- ☐ Not recognizible

Constructive tipology and materials

The plan of the fort is isosceles triangular in shape, with a base 300 meters long and sides 235 meters long. Like the other forts in the enclosure, it is surrounded by an 8m wide and 6m deep moat; the main armament is again located in the central massif, as is the scheme of all “Brialmont” type forts. The troop chambers were located along the moat. The fort was built entirely of unreinforced concrete consisting of a conglomerate of Portland cement (invented in 1824), sand, stone, and water. After the war, it was modernized to make it functional again during the Second World War: improvements were made to ventilation, protection, sanitation, communications, and electricity.

Enhancement project - New use

The fort has not been the subject of any recovery/restoration/museum projects but is usually used for the organization of recreational activities, as a meeting place for Soft-Air lovers, and sometimes as an adventure park. The preservation of the historical and identity component is totally lacking.

Reachability level

- [x] Easily reachable
- [ ] Hardly reachable

Safe use and access

- [ ] Totally Safe
- [x] Partially Safe
- [ ] Not Safe

Community Engagement

No data.

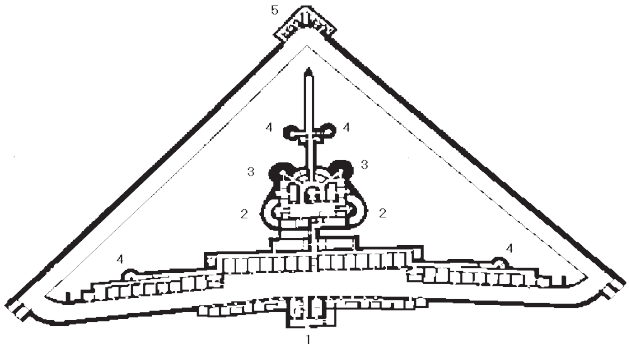
Customer Experience Data

The recreational activities carried out inside the fort are highly appreciated, but the degree of appreciation of visitors relates only to these activities, not to the fort itself.

On-line Presence

Historical and current information about the property can be found online quite easily. As the fort has not been the subject of recovery/restoration projects, it does not have its own website or anything else.

Historical and current photographic documentation



Liegi, Belgio

Forte d' Evignée

General information

The Évegnée Fort is one of the 12 forts that make up the fortified position of Liège, from which it is about 9 km away. It was built between 1888 and 1892 according to the plans of General Brialmont and was heavily bombed during World War I and at the beginning of World War II. In 1915 and 1916 and after the war, the Germans modernized the fort and reinforced it to include it as an indispensable part of the Liège fortified position, whose function was to deter a possible German incursion from the Belgian border. In 1971 the fort was bought by Thales Belgium, formerly Forges de Zeebrugge, a defense and security company working for several nations. Today the fort serves as a warehouse for the storage and technological testing of explosive pyrotechnic components (capacity of about 49 tonnes), assembling the elements in two production halls that were mainly located in what used to be the moat, and developing product validation tests.

State of conservation

- ☐ Destruction loss
- ☐ State of abandonment
- ☐ Recovery with care (Museum)
- ☐ Recovery
- ■ High level of transformation
- ☐ Place of memory Cemetery
- ☐ Place of memory Memorials

Current ownership

- ■ Private
- ☐ Public

Active role in WW1

- ■ Active
- ☐ Partially active
- ☐ Inactive/Declassed

WS-Network recognizability

- ☐ Good recognizible
- ☐ Recognizible
- ■ Weak recognizible
- ☐ Not recognizible

Constructive tipology and materials

The fort is in the shape of an isosceles triangle with a base of 200 m and sides of 225 m. It is surrounded by a ditch 6 m deep and 8 m wide. As in all other forts, the main armament is concentrated in the central massif. Like all forts designed by Brialmont, Fort d'Evegnée was designed to withstand bombardment by 21cm howitzers. However, during the bombardment, the Germans hit the fort with 42cm howitzers, causing much greater stress than the expected resistance, which caused the fort to fall. It was built entirely of unreinforced concrete, and the top of the central massif consisted of 4m of concrete, while the less exposed walls were 1.5m thick.

Enhancement project - New use

The fort has not been the subject of any recovery/restoration/museum projects but is currently used as a warehouse for the storage of materials and technological experimentation of explosive and pyrotechnic components.

Reachability level

■ Easily reachable

□ Hardly reachable

Safe use and access

□ Totally Safe

■ Partially Safe

□ Not Safe

Community Engagement

No data.

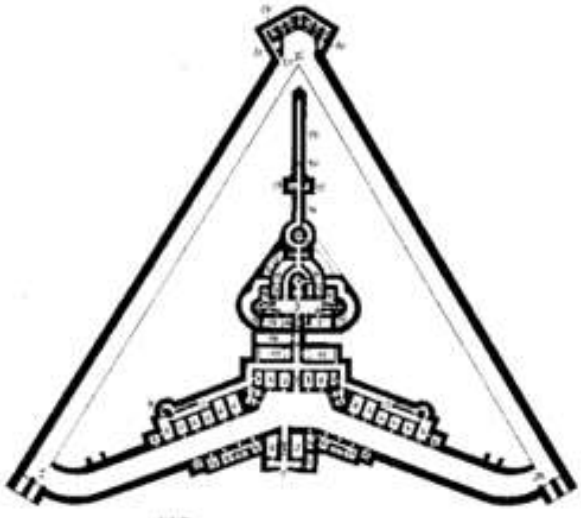
Customer Experience Data

No data.

On-line Presence

Historical information about the property can be found online quite easily. As the fort has not been the subject of recovery/restoration projects, it does not have its own website or anything else.

Historical and current photographic documentation



Liegi, Belgio

Forte de Fléeron

General information

Fort de Flèron was built between 1881 and 1891, about 7 kilometers south-east of Liège's city center in Fléeron. The building was heavily bombed during the siege of the city, but attacks by German heavy infantry met with unexpectedly strong resistance, resulting in the loss of many German soldiers. At the same time, the Germans penetrated into the city of Liège by infiltrating through the forts and thus managed to install heavy artillery in Liège itself, attacking Fort Fleron, as well as the others, from behind. This knocked out the entire ring of forts, which surrendered one after the other. In the 1930s, like other forts, it was reinforced to become part of the Liège fortified position, whose function was to deter a possible German incursion from the Belgian border. After World War II, the fort was destroyed and almost completely buried to allow for the construction of the new city: today, only part of the wall is still visible from the street, and the whole area is surrounded by flats.

State of conservation

- ■ Destruction loss
- ☐ State of abandonment
- ☐ Recovery with care (Museum)
- ☐ Recovery
- ☐ High level of transformation
- ☐ Place of memory Cemetery
- ☐ Place of memory Memorials

Current ownership

- ☐ Private
- ☐ Public

Active role in WW1

- ■ Active
- ☐ Partially active
- ☐ Inactive/Declassed

WS-Network recognizability

- ☐ Good recognizible
- ☐ Recognizible
- ☐ Weak recognizible
- ■ Not recognizible

Constructive tipology and materials

The fort formed an isosceles triangle whose base was 300 meters long and whose walls measured 235 meters (771 feet). A 6 meter (20 ft) by 8 meters (26 ft) moat surrounded the fort. The moats were defended enfilade by 57 mm cannons in casemates resembling saber batteries, while the heavy artillery was in rotating turrets concentrated in the central massif. As with the other forts in the Liège enclosure, all the main problems of the "Brialmont-type" forts occurred at Fléeron. Like the other forts in the Liège fortress, Fort de Fléeron was built entirely of unreinforced concrete, with the less exposed walls 1.5m thick and the central massif roof up to 4m thick.

Enhancement project - New use

The fort was actually destroyed to make way for the construction of new buildings and flats.

Reachability level

☐ Easily reachable ☐ Hardly reachable

Safe use and access

☐ Totally Safe ☐ Partially Safe ☐ Not Safe

Community Engagement

No data.

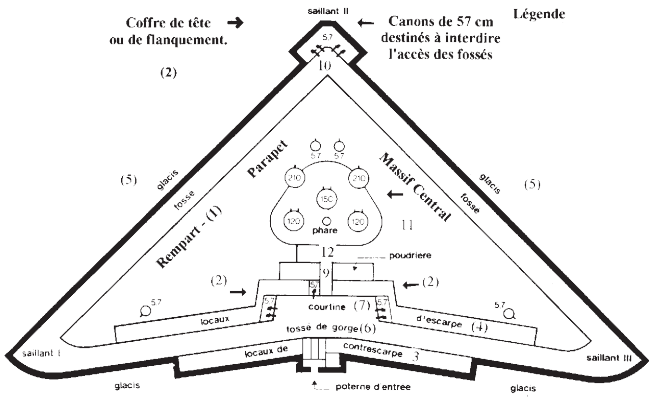
Customer Experience Data

No data.

On-line Presence

Historical information about the property in question can be found quite easily online. Currently, the fort itself no longer exists.

Historical and current photographic documentation



Liegi, Belgio

Forte de Chaudfontaine

General information

The Fort de Chaudfontaine, also called Fort de La Rochette, is located about 7 kilometers south of the center of Liège, on the heights above the community of Chaudfontaine, overlooking the Vesdre valley. Built 1888-1892 as a modern concrete infrastructure, it surrendered during World War I after two days of resistance on 13 August 1914 following the explosion of a German shell in the roof of the ammunition depot. The road leading to the fort was renamed "Rue du XVIII de August," and a military cemetery and memorial to 50 of the 71 victims who died in the explosion were also built. In 1933, the fort was renovated, rearmed, and consolidated, yet it only lasted a few days in World War II. After a long period of neglect, since 1990, Fort Chaudfontaine has been renamed "Fort Adventure," and a company that still organizes adventure courses for the enjoyment of both adults and children has found a home there.

State of conservation

Destruction loss	State of abandonment	Recovery with care (Museum)	Recovery	High level of transformation	Place of memory Cemetery	Place of memory Memorials
☐	☐	☐	☐	■	☐	☐

Current ownership

Private	Public
■	☐

Active role in WW1

- ■ Active
- ☐ Partially active
- ☐ Inactive/Declassed

WS-Network recognizability

- ☐ Good recognizible
- ☐ Recognizible
- ■ Weak recognizible
- ☐ Not recognizible

Constructive tipology and materials

The fort was built as an irregular rectangle, in contrast to the 'triangular Brialmont type.' A moat about 6 meters (20 feet) deep by 8 meters (26 feet) wide surrounded the fort, whose main armament was concentrated in the huge central one. Fort de Chaudfontaine was one of the largest forts in Liège's fortification belt. Fort de Chaudfontaine was built entirely of unreinforced concrete (an innovation of the mid-1890s), i.e., a conglomerate consisting of Portland cement (invented in 1824), sand, stone, and water. In 1933, the fort was renovated, rearmed, and consolidated with a thick layer of reinforced concrete, designed to withstand the heaviest weapons, and the vaults were reinforced.

Enhancement project - New use

The fort has not been the subject of any recovery/restoration/museum projects but is currently used as an Amusement/Adventure Park, so much so that it has been renamed Fort Adventure. Recreational and entertainment activities take place inside.

Reachability level

☒ Easily reachable ☐ Hardly reachable

Safe use and access

☐ Totally Safe ☒ Partially Safe ☐ Not Safe

Community Engagement

No data.

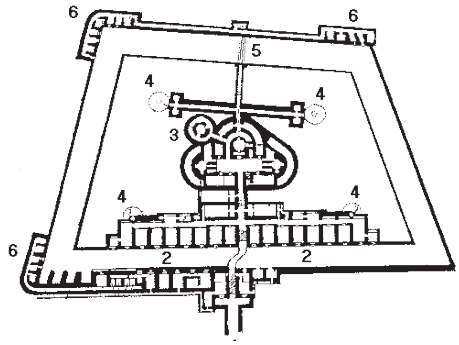
Customer Experience Data

The appreciations relate to Fort Adventure, i.e., the recreational activities carried out within it, without any reference to the testimony value of the fort itself.
Votes:
67% excellent
33% very good.

On-line Presence

Historical information about the property in question can be found online quite easily. There is a specific website for museum activities where it is also possible to book visits.

Historical and current photographic documentation



	Permanent fortification	Field fortification
Mountain areas	*Mountain forts*	***Mountain defensive systems***
Plain areas	*Plain strongholds*	***Open-field entrenched systems***
Coastal areas	*Coastal towers and fortifications*	

WarScape Class - Mountain Defensive Systems	Tab. 4.61	Monte Ortigara
	Tab. 4.62	Melette di Foza
	Tab. 4.63	Monte Zebio
	Tab. 4.69	Talpina/Piazzina Trenches
	Tab. 4.70	Monte Giovo Trenches
	Tab. 4.71	Nagià Grom Trenches
	Tab. 4.72	Trincerone Monte Zugna
	Tab. 4.73	Monte Kolovrat
	Tab. 4.3	Piazzaforte di Trento
	Tab. 4.6	Campo trincerato Monte Bondone
	Tab. 4.10	Monti Vosgi
	Tab. 4.20	Linea Cadorna
	Tab. 4.21	Ecomuseo Prealpi Vicentine

WarScape Class - Open fields entrenched systems	Tab. 4.64	De Palingbeek
	Tab. 4.65	The Mastenbos System
	Tab. 4.66	Sanctuary Wood Museum
	Tab. 4.67	Bayernwald Trenches
	Tab. 4.68	Pool of peace
	Tab. 4.74	Monfalcone entrenched system
	Tab. 4.18	Campi trincerati Isonzo

WS-Network recognizability

- [x] Good recognizible
- [ ] Recognizible
- [ ] Weak recognizible
- [ ] Not recognizible

Remembrance Trees Project

Safe use and access

- [x] Totally Safe
- [ ] Partially Safe
- [ ] Not Safe

Public/private initiative

- [ ] Only public
- [x] Volunteer involvement

Project description

Dopo la distruzione del Westhoek, città, villaggi, campi, prati e foreste furono ricostruiti e restaurati. I fronti del passato sono scomparsi, nel punto dove correvano le due linee del fronte sono stati piantumati 305 alberi commemorativi. La nuova vegetazione ricorda quindi la posizione dei fronti contrapposti più immobili del periodo 1915-1917, e delimita allo stesso tempo la "terra di nessuno": un grande vuoto densamente popolati da valori intangibili ma assolutamente percepibili ancora oggi.
La ricostruzione esatta delle posizione del fronte è stata ottenuta grazie allo studio ed elaborazione di moltissime fotografie aeree d'epoca, che sono anche riprodotte in un semplice cornice posta attorno all'albero stesso. Queste cornici sono indicate in colore rosso per gli alberi piantati sull'antico fronte tedesco, e blu per quello inglese. Il progetto incarna pienamente il principio del minimo intervento: un intervento "debole", nell'accezione più positiva del termine, in grado di evocare l'assenza.
Ciò che ermerge distintamente è l'assoluta vicinanza tra le linee nemiche, e camminando nello "spazio-soglia" si viene colpiti da un'intensa carica emozionale, difficile da spiegare a parole, ma chiaramente percepibile sostando anche solo qualche minuto in questo luogo.

German front- No man land
Recovery with care

Monte Ortigara, Cima Caldiera, Monte Lozze, Monte Chiesa, Monte Forno

WS-Network recognizability

- ☐ Good recognizible
- ☐ Recognizible
- ☐ Weak recognizible
- ☐ Not recognizible

Public/private initiative

- ☐ Only public
- ☐ Volunteer involvement

Safe use and access

- ☐ Totally Safe
- ☐ Partially Safe
- ☐ Not Safe

Project description

The identified area includes the monumental area of Ortigara and Cima Caldiera, the Italian stronghold of Mount Lozze, and the fortified complex of Mount Chiesa and Mount Forno. These places are full of memory as they were the theater of one of the bloodiest battles of the First World War: the Action K, or Battle of Ortigara (June 1917). Mount Ortigara. Systematization and securing of the Austrian trench and the cave post "galleria Biancardi", cleaning the Austrian resistance trench parallel to the crest line up to the Dolina del Circo. Cima Caldiera. Restoration of the castling road and the mule track; recovery of some sections of the Italian resistance trench between Lozze and Campanaro and the main connecting trenches between the different lines. Cleaning and consolidation of the most significant remains of barracks, tunnel shelters, and Italian positions. Mount Lozze. Almost complete recovery of the Italian defensive works and the cave emplacement. Mount Chiesa. Recovery of the main mule track, cleaning, and consolidation of the main barracks along the route. Restoration of the complex of works that characterized the Dolina degli Sloveni. Monte Forno. Restoration of the access mule tracks to the Austro-Hungarian stronghold and the barracks along the routes recovery of the cave posts.

Monte Chiesa e Dolina degli Sloveni
Recovery with care (Open-air Museum)

Cima Caldiera - Ortigara
Recovery with care

Monte Forno - Ortigara
Recovery with care

Trinceramenti - Ortigara
Recovery with care

Monte Lozze
Recovery with care

WS-Network recognizability

- ☐ Good recognizible
- ☐ Recognizible
- ■ Weak recognizible
- ☐ Not recognizible

Complesso di Campo Gallina, Monte Castelgomberto, Melette di Foza

Safe use and access

☐ Totally Safe ■ Partially Safe ☐ Not Safe

Public/private initiative

☐ Only public ■ Volunteer involvement

Project description

The Austrian logistic complex of Campo Gallina was organized as a real citadel equipped with a hospital, store, church, barracks, shelters, and warehouses. The particular conformation of the area and the relevance of the material remains of the works realized during the conflict make it a sort of "little Pompei" of the Great War. The interventions concerned the cleaning and securing of the ruins of the buildings inside the basin. Moreover, other huts and shelter caves have been recovered, with their relative access paths.

The complex natural amphitheater constituted by the tops of the mountains Tondarecar, Castelgomberto, Fior, Spiel, and Miela were the scene of some of the bloodiest battles fought on the Asiago Plateau. Famous are the entrenchments and the cave posts realized by the Italians inside the rocky "crowns" that delimit the massif. The interventions have been concentrated in a specific way on the Castelgomberto mountain where has been recovered the trench of Italian resistance with the relative cave positions.

Complesso di Campo Gallina
Recovery with care

Monte Castelgomberto
Recovery with care

Monte Zebio
Open air museal path

WS-Network recognizability

- ☐ Good recognizible
- ☐ Recognizible
- ☐ Weak recognizible
- ☐ Not recognizible

Public/private initiative

- ☐ Only public
- ☐ Volunteer involvement

Safe use and access

- ☐ Totally Safe
- ☐ Partially Safe
- ☐ Not Safe

Project description

Zebio, thanks to its central position, became a very important stronghold of the Austrian resistance line that (between the summer of 1916 and the autumn of 1918) stretched from Val d'Assa to Ortigara. For this reason, it was equipped for the defense with a complex system of trenches, tunnels, and cave posts still visible today. During the summer of 1916 and above all during the Battle of Ortigara (10 - 25 June 1917) the Italian units repeatedly attacked the Austrian positions without success. The name of Monte Zebio will always be linked to the epic deeds of the heroic "Sassari" Brigade, whose memory has been immortalized in the pages of the famous book "Un anno sull'Altipiano", written by one of its most courageous officers, Captain Emilio Lussu of the 151st Infantry Regiment. Since 1997, recovery and enhancement of the Austrian positions of Crocetta dello Zebio and the so-called Mina di Scalambron have been carried out through the cleaning and consolidation of part of the resistance trench and the mine crater, the recovery of the emplacements, tombstones, and barracks located in the immediate rear and the installation of explanatory tables and panels. Moreover, near the Stalder Refuge, on the route of an old Italian walkway, a section of trench was created for didactic purposes consisting of some "typical" sections deduced from the examination of documentary material of the time and in particular from the provisions of the Military Engineers.

Trincea didattica Rigugio Stalder - Monte Zebio
Recovery with care (Open-air Museum)

Monte Zebio
Recovery with care

Monte Zebio
Recovery with care

WS-Network recognizability

- ☐ Good recognizible
- ☒ Recognizible
- ☐ Weak recognizible
- ☐ Not recognizible

De Palingbeek
Open air museal path

Safe use and access

- ☒ Totally Safe
- ☐ Partially Safe
- ☐ Not Safe

Public/private initiative

- ☐ Only public
- ☒ Volunteer involvement

Project description

Today, the park stands as 254 acres of woods and meadows, fragrant with wildflowers, crisscrossed by bike and walking paths, but traces of the past are not far behind. The quiet ponds in the woods are shell craters created by the pounding of the land that peaked at the Battle of Messines Ridge. The project included reference signage, wooden walkways around the craters, and an information pavilion in the trail center. The additions are designed to preserve the traces etched into the landscape and take visitors on an experiential journey of discovering these places. The additions are integrated with respect and "on tiptoe" in the environmental context of the park, which remains the subject to be perceived, experienced, and heard. In 2018 within this area, a commemorative exhibition was set up on the Centennial occasion, entitled "Coming World, Remember Me". Over 600,000 clay sculptures were laid out on what was "no man's land" in memory of the lives sacrificed on the fields of Flanders. Significantly, each statue was built by volunteers and students, following a mold but finishing it by hand, so no two are alike. For each statue, 5€ were donated, half of which were given to a charity for African children's facilities. Among the sculptures, grass has begun to grow, a symbol of nature that, after a hundred years, has begun to reappropriate the battlefields.






Tab. 4.64 | WS - CLASS: OPEN FILEDS ENTRENCHED SYSTEMS __ YPRES SALIENT (Belgium)

Tab. 4.65 | WS - CLASS: OPEN FILEDS ENTRENCHED SYSTEMS __HOLLANDSTELLUNG (Germany)

The Mastenbos System

Open air museal path

WS-Network recognizability

- ☐ Good recognizible
- ☐ Recognizible
- ☐ Weak recognizible
- ☐ Not recognizible

Public/private initiative

- ☐ Only public
- ☐ Volunteer involvement

Safe use and access

- ☐ Totally Safe
- ☐ Partially Safe
- ☐ Not Safe

Project description

After the first German offensives during the first months of the war, which led to the fall of the strongholds of Liege and Namur, German troops began to fear a possible real English attack through the Netherlands, with an action similar to the one they implemented at the beginning of the conflict to invade France through Belgium. In order to avoid this, the German command elaborated an articulated plan of fortification of the entire Belgian-Dutch border up to the North Sea coasts based on the construction of a dense network of concrete bunkers on the northern border near Antwerp. The so-called Hollandstellung resulted in the construction of 411 bunkers in the territory from the Belgian coast to the Scheldt river (80 km), 830 bunkers around the Antwerp stronghold (the Stellung Antwerpen - 48 km), and another 132 bunkers on the Turnhoutkanalstellung (from Antwerp to Turnhout-34 km). At the end of the war, the bunkers were emptied by the Germans and abandoned. In the surroundings of the Stabroek fort, around Kapelle, developed a part of this backward defensive line, the Mastenbos System. In the last years, an interesting study elaborated by Ghent University has produced an intervention of conservation of this important historic place, with the arrangement of the entrenched systems without foreseeing the reconstruction, but inserting only some useful garrisons for the fruition.






WS-Network recognizability

- ☐ Good recognizible
- ☐ Recognizible
- ☐ Weak recognizible
- ☐ Not recognizible

Sanctuary Wood Museum

Open air museal path

Safe use and access

☐ Totally Safe ☐ Partially Safe ☐ Not Safe

Public/private initiative

☐ Only public ☐ Volunteer involvement

Project description

This museum was started in 1919 by the current owner's grandfather, who preserved part of the remaining trench system in what the British Army called Sanctuary Wood. The wood got its name at the First Battle of Ypres in 1914 when men separated from their regiments came to this wooded area - a safe area away from the main fighting, a place of 'sanctuary' - to wait to rejoin their unit. Today, in the woods, the trenches are still clearly visible, as well as the "signs" inflicted by the bombardments, which have transformed the landscape into an uneven alternation of holes, excavations, remains of corrugated metal sheets, and wooden pickets. The landscape is subject to periodic maintenance, but in principle, the musealization project has provided for preserving the remains with almost no additions/transformations. In some places where the rubble did not allow a clear reading of the remains, some elements were replaced and/or integrated, but these interventions were limited and did not refer to the totality of the operations carried out.






Bayernwald Trenches

WS-Network recognizability

- ☐ Good recognizible
- ☐ Recognizible
- ☐ Weak recognizible
- ☐ Not recognizible

Public/private initiative

- ☐ Only public
- ☐ Volunteer involvement

Safe use and access

- ☐ Totally Safe
- ☐ Partially Safe
- ☐ Not Safe

Project description

The entrenched system was part of the German defense lines near the town of Kemmel; it consisted of the entrenchments, four concrete bunkers, and two mine shafts, as evidenced by numerous period aerial photographs. One of the mine shafts was discovered in 1971, but the entire area was overgrown until 1998 when restoration work began, subsidized by the city council of Heuvelland and the Association for Battlefield Archaeology in Flanders. The work was completed in 2004 when the "museum in the landscape" was opened to visitors. The state of preservation in which the trenches were before the restoration was really compromised, the principle that guided the intervention was, unlike other projects completed in "places of memory" in Flanders, more oriented to restoration as philological restoration, based on the "sure traces" testified by period photographs. The first trenches built were made of sandbags and wooden parapets; in 1916, these types of construction were replaced with more organized wooden structures, covered and connected by wicker mesh. Today in the complex, there are four bunkers made of precast concrete blocks, but originally, inside the Bayernwald, there were 10 of these bunkers.

Bayernwald - Trenches
Recovery

WS-Network recognizability

- ☐ Good recognizible
- ☐ Recognizible
- ☐ Weak recognizible
- ☐ Not recognizible

Pool of peace

Safe use and access

☐ Totally Safe ☐ Partially Safe ☐ Not Safe

Public/private initiative

☐ Only public ☐ Volunteer involvement

Project description

The Pool of Peace (or Lone Tree Crater) in Wijtschate is now a peaceful reminder of the great Mine Battle of June 1917. The opening of the offensive was marked by the detonation of 19 deep mines under the German lines between Ploegsteert and Hill 60. The explosions formed enormous craters in the landscape. The Spanbroekmolen Mine Crater, also known as Lone Tree Crater, is the site of the largest of 19 mines blown by the British Army in the early hours of the morning of 7 June 1917. It is 12 meters deep and has a diameter of 129 meters. This signalled the launch of the Battle of Messines. In 1914 Spanbroekmolen was the site of a windmill ("molen" is the Dutch word for "mill"). At the end of the First Battle of Ypres in November 1914 the German Front Line was established in this location on the high ground of the Messines Ridge. Between then and 7 June 1917 the Germans spent a year and a half developing well-established positions here with concrete bunkers and strong defensive positions. Most importantly, the position had very good views across the lower lying British positions. The photograph looks across the area of the British lines in a south-westerly direction from Spanbroekmolen. The British Front Line ran from left to right in the field a few metres beyond the road. The church in the middle distance on the far left of the picture is in Wulverghem village. The German position is immediately behind the camera on the high ground of the ridge. Being high on the ridge the Germans were also preventing the British Army from seeing into the German rear areas.

Tab. 4.68 | WS - CLASS: OPEN FILEDS ENTRENCHED SYSTEMS __ YPRES SALIENT (Belgium)

Talpina/Piazzina Trenches

WS-Network recognizability

- ☐ Good recognizible
- ☐ Recognizible
- ☐ Weak recognizible
- ☐ Not recognizible

Public/private initiative

- ☐ Only public
- ☐ Volunteer involvement

Safe use and access

- ☐ Totally Safe
- ☐ Partially Safe
- ☐ Not Safe

Project description

In the Salient Trentino, the first line passed from Lake Garda and the Loppio Valley to the lavini di Marco and up to the Pasubio plateau, famous for the bloody battles that caused about ten thousand deaths. The Gresta valley up to Rovereto was in the hands of the Austro-Hungarian Empire, while the entire Brentonico plateau was occupied by the Italian troops, which received supplies in the city of Ala by rail. From the warehouses in the valley, munitions and foodstuffs were transported by cableway to Piazzina and stored in a long tunnel dug into the rock. At night, long columns of mules transported the materials up to the crest of Monte Baldo, to the gun emplacements on Monte altissimo, and also to the fortifications on Monte Cornale' up to the first line below the village of Castione. The generals of the Austro-Hungarian Empire decided to cut off this line of supplies by aerial bombardment of the city of Ala. All the mountain slopes were scattered with trenches and firing posts, now completely abandoned and reabsorbed by the dynamics of the natural transformation of the landscape. As you can see from the pictures, the trenches were built in masonry using local stone and respecting the construction methods indicated by military manuals. These relics of the Great War are still present, but currently, there are no projects of recovery or enhancement, but there is not even a project of cataloging and recognition. Over time, such signs, if not "taken care of", are destined to disappear..





Monte Giovo

WS-Network recognizability

- ☐ Good recognizible
- ☐ Recognizible
- ▒ Weak recognizible
- ☐ Not recognizible

Safe use and access

☐ Totally Safe ▒ Partially Safe ☐ Not Safe

Public/private initiative

☐ Only public ▒ Volunteer involvement

Project description

Conquered in November 1915, the Italian army started the fortification works of the "Giovo Dosso" in the first months of 1916 with entrenchment works and positioning of small artillery on the hillock. Its particular characteristics allowed to control the movements on the Austrian front, on the bottom of both the Lagarino and Cameras valleys, and could serve as a base point for small/medium artillery and infantry raids. Moreover, it was strategic for the defense against possible Austrian incursions. Therefore, the Italian army began to dig some tunnels, one of which was very long inside the hump that at a certain point forked into two other tunnels with exits towards the northern base.
The whole area was connected with walkways and trenches before being abandoned at the end of the conflict. The place has been the subject of a recovery and enhancement project shared between public and private entities. The first step was the involvement of groups of volunteers and enthusiasts to recover and enhance some war artifacts in the area. The volunteers of various local "Alpine Groups" and the provincial section of SAT and the Environmental Restoration Service of the Province started the work in 2013. They carried out deforestation, cleaning, and recovery of the site. Also important was the collaboration of surveyor students and teachers of the Fontana Institute, engaged in a valuable topographic survey of the stronghold for operational and educational purposes.

Nagià Grom entrenched system

WS-Network recognizability

- ☐ Good recognizible
- ☐ Recognizible
- ☐ Weak recognizible
- ☐ Not recognizible

Public/private initiative

- ☐ Only public
- ☐ Volunteer involvement

Safe use and access

- ☐ Totally Safe
- ☐ Partially Safe
- ☐ Not Safe

Project description

In wartime, the Gresta Valley constituted the point of union between the Riva sector and the Lagarina Valley and was affected by several entrenchments. Mount Nagià is a pronounced protrusion that overlooks the Cameras Valley below and can control the Brentonico plain, Mount Altissimo, Dosso Alto di Nago, and a small portion of the Adige Valley: this gave it the advantages of a natural fortress to which the Austrian military commands added the organization of a rather articulated entrenched camp. Work on the Nagià Grom stronghold began in the spring of 1915, when the war with Italy had not yet begun, and continued, with extensions and modifications, for the entire duration of the conflict. Today Monte Nagià Grom is an exceptional "document" that testifies and recounts, that shows works and artifacts in an excellent state of preservation, proof of the wounds suffered by our territory a century ago and of the "genius" (misdirected) of strategists and "tacticians" who "invented" a decidedly modern and revolutionary war.
uppose today the Nagià is a historical "document", evident and easily visitable by everyone. In that case, it is due to the immense work of the Alpine Group of Mori that, since 2001, has dedicated itself to the recovery of paths, mule tracks, trenches, walkways, posts, and artifacts. In these activities, the Alpini have found the collaboration of different people and associations: the friends of Manzano, Valle San Felice, and Bressanone, the Sat of Mori, the boys of the Day Center of Mori, and the middle schools of Mori.

WS-Network recognizability

- ☐ Good recognizible
- ☐ Recognizible
- ☐ Weak recognizible
- ☐ Not recognizible

Trincerone Monte Zugna

Safe use and access

☐ Totally Safe ☐ Partially Safe ☐ Not Safe

Public/private initiative

☐ Only public ☐ Volunteer involvement

Project description

Mount Zugna, with its ridge, divides the territory of lower Trentino longitudinally, straddling two fundamental routes connecting north and south: Vallagarina and Vallarsa. General Conrad had already identified Vallarsa as one of the best points to enter Italy. The Austro-Hungarians in 1915 abandoned Mount Zugna, which in the first months of the war was occupied by the Italian army. During the spring expedition of 1916, the Austro-Hungarian army was blocked at an altitude of 1419 to the Italian "Trincerone". The imperial army decided to get around the obstacle by attacking the Italian troops from behind to cut off supplies and neutralize the artillery that from the Zugna blocked Vallarsa. For this reason, they attacked Passo Buole with seven days of bombing from May 22 to 29, 1916. The Italian "Trincerone", extreme defense against the Austro-Hungarian offensive of May 1916, had been almost obliterated by bombing: now it has been partially rebuilt to show its form and function through a restoration that has triggered many controversial observations. The theme of visual relationships has been re-established by operating a decisive cut of the wood, while on the military artifacts have been performed cleaning operations from vegetation and debris. The integration of the missing part of the Trincerone was carried out with a new concrete insertion distinguishable from the ancient masonry.





Tab. 4.72 | WarScape CLASS: MOUNTAIN DEFENSIVE SYSTEMS — Monte Zugna (Trentino) - Italy

Monte Kolovrat

WS-Network recognizability

- ☐ Good recognizible
- ☐ Recognizible
- ▒ Weak recognizible
- ☐ Not recognizible

Public/private initiative

- ☐ Only public
- ▒ Volunteer involvement

Safe use and access

- ☐ Totally Safe
- ▒ Partially Safe
- ☐ Not Safe

Project description

In the extreme eastern part of Friuli Venezia Giulia, on the border with Slovenia, Mount Kolovrat is a mountain range that during the Great War played a fundamental role because on it was placed the third defensive line of the Italian front, and these were the main theaters of the defeat of Caporetto. After it, the Austro-Hungarian troops broke through the front, overcoming both the first and the second line. Even today, the ground is marked by the remains of trenches and emplacements for machine guns, howitzers, and cannons.
To not forget this immense tragedy, on the crest of Kolovrat, the Na Gradu Open Air Museum was created. The project foresees an open-air museum to preserve the historical memory of the Great War, characterized exclusively by the principle of minimum intervention and cleaning operations.
From here, there is a view that sweeps from the Krn massif (Black Mountain) to Sveta Gora (Holy Mountain) and the Friulian plain, practically over the entire front line of the Second Italian Army. The Museum winds its way through walkways, trenches, tunnels dug into the rock, machine guns, and cannon emplacements. The recovery was carried out using the original material of the First World War.

Monfalcone entrenched system

WS-Network recognizability

- ☐ Good recognizible
- ☐ Recognizible
- ☐ Weak recognizible
- ☐ Not recognizible

Safe use and access

- ☐ Totally Safe
- ☐ Partially Safe
- ☐ Not Safe

Public/private initiative

- ☐ Only public
- ☐ Volunteer involvement

Project description

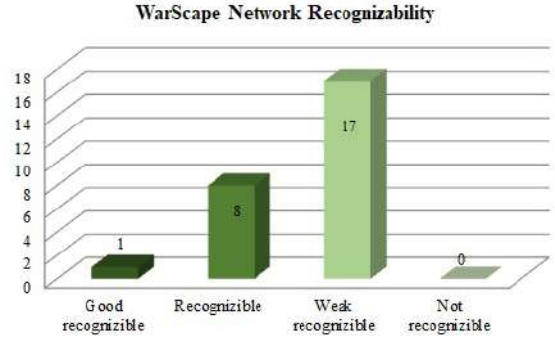
The first world war bursted on the front between Austria and Italy on May 24th 1915. The town of Monfalcone has been involved in the fighting since June the 9th, when the first Italian troops entered the town in order to occupy the positions on the highlands that had been abandoned by Austro-Hungarian soldiers looking for better defenses. Monfalcone was then turned into a backline, welcoming shelters, field hospitals, headquarters and cemeteries, while a network of front line trenches started to carve deeply in the highland. The beginning operations allowed the Italian troops to settle on the heights of the Gradiscata, of the Rock and of Quote 98 in order to place their outposts before the "Tamburo" (drum) area and quote 93. The last enemy outpost of q, 77 by Sablici could be overcome only in May 1917, during the tenth Isonzo battle. In late autumn 1917 the Austro-Hungarian breakthrough in Plezzo and Tolmino forced the Italians to withdraw from the Carso. On October 27th 1917 all military operations near Monfalcone were ended.
Currently, most of these trenches have been subject to an interesting intervention of conservative recovery, and restoration for educational purposes. Many local and non-local associations have contributed to the co-design and maintenance of the park, including the National Alpine Association - Group of Monfalcone, the Friends of Karst, the Italian Alpine Club - Section of Monfalcone, the Gruppo Speleologico del Fante, the Protezione Civile Monfalcone, the Dolomitenfreunde / Friends of the Dolomites, the Great War Research and Study Group.

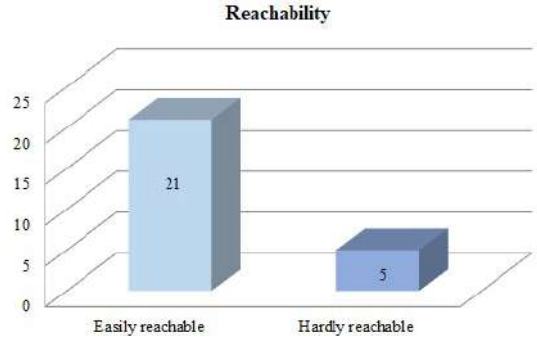


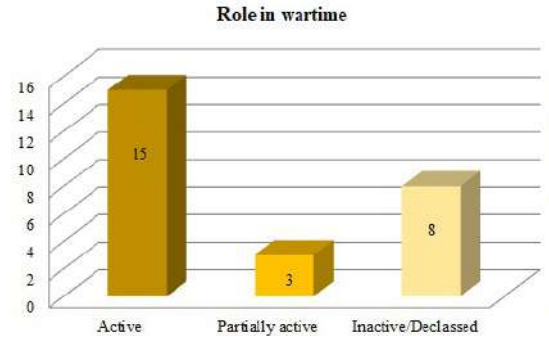


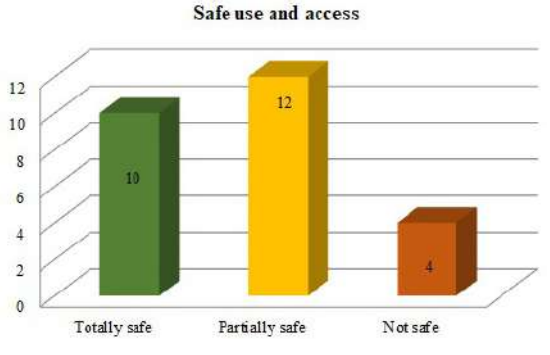
Hooge Crater Trenches, Zillebeke (Ypres), Belgium.
Pic. J. Aldrighettoni

WarScape Class - Mountain Forts			Ownership		Current state							Role in wartime			WS-Network recognizability				Safe use and access			Reachability	
			Private	Public	Destruction - Loss	State of abandonment	Recovery with care (Museum)	Recovery	High level of transformation	Cemeteries	Memorials	Active	Partially active	Inactive/Declassed	Good recognizible	Recognizible	Weak recognizible	Not recognizible	Totally safe	Partially safe	Not safe	Easily reachable	Hardly reachable
	Tab. 4.22	Cadine Fort		1			1							1			1		1			1	
	Tab. 4.23	Civezzano Tagliata		1			1						1			1				1		1	
	Tab. 4.24	Zaccarana Fort		1			1					1				1				1			1
	Tab. 4.25	Mero Fort		1			1					1				1				1			1
	Tab. 4.26	Pozzi Alti Fort		1			1					1				1				1			1
	Tab. 4.27	Danzolino Fort		1	1	1								1			1			1		1	
	Tab. 4.28	Nago Fort	1					1						1			1		1			1	
	Tab. 4.29	Larino Fort		1			1							1			1		1			1	
	Tab. 4.30	Strino Fort		1			1							1			1		1			1	
	Tab. 4.31	Corno Fort		1			1							1		1			1			1	
	Tab. 4.32	Tenna Fort		1			1						1				1		1			1	
	Tab. 4.33	Carriola Fort	1		1	1						1					1				1		1
	Tab. 4.35	Mattarello Fort		1		1								1			1			1		1	
	Tab. 4.36	Interrotto Fort		1			1					1					1		1			1	
	Tab. 4.37	Punta Corbin Fort	1					1				1				1				1		1	
	Tab. 4.38	Verena Fort		1			1					1					1			1		1	
	Tab. 4.39	Campolongo Fort		1			1					1					1			1		1	
	Tab. 4.40	Bernadia Fort		1			1							1			1		1			1	
	Tab. 4.41	Tre Sassi Fort		1			1						1		1				1			1	
	Tab. 4.42	Cherle Fort		1		1						1				1				1		1	
	Tab. 4.43	Sommo Alto Fort		1		1						1					1			1		1	
	Tab. 4.44	Verle Fort		1		1						1					1				1	1	
	Tab. 4.45	Belvedere Fort		1			1					1				1			1			1	
	Tab. 4.46	Cima Vezzena Fort		1		1	1					1					1				1		1
	Tab. 4.47	Luserna Fort		1			1					1					1			1		1	
	Tab. 4.48	Dosso del Sommo		1		1						1					1				1	1	
			3	23	2	8	17	2	0	0	0	15	3	8	1	8	17	0	10	12	4	21	5





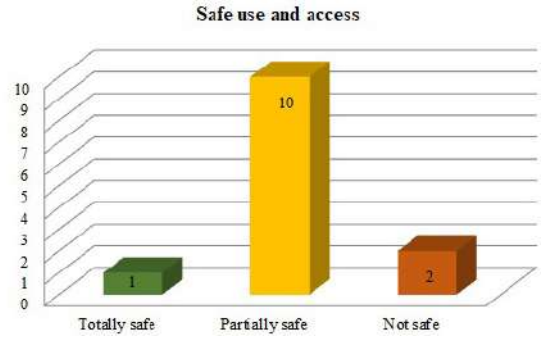


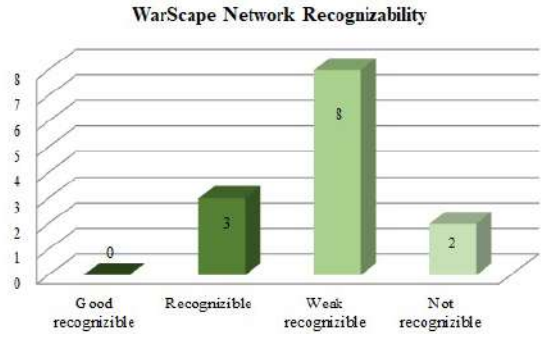


Tab. 4.75 | WarScape CLASS: MOUNTAIN FORTS - Analysis and summary graphs

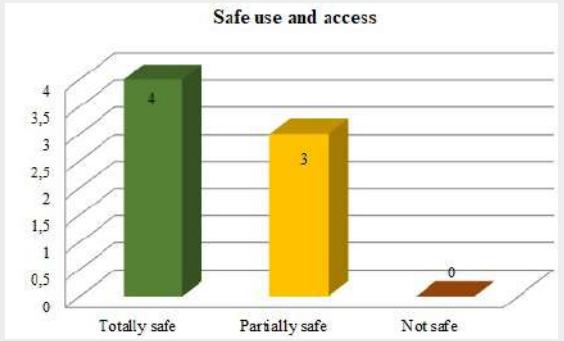
Tab. 4.76 | WarScape CLASS: FIELD FORTIFICATIONS - Analysis and summary graphs

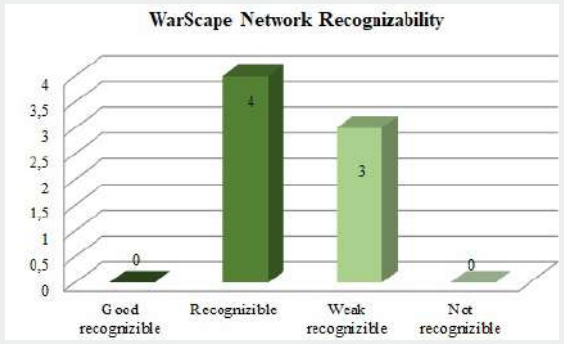
			Initiative		*WS-Network recognizability*				*Safe use and access*		
			Only public	Voulunteer envolvement	Good recognizible	Recognizible	Weak recognizible	Not recognizible	Totally safe	Partially safe	Not safe
WarScape Class - Mountain Defensive Systems	Tab. 4.61	Monte Ortigara		1			1			1	
	Tab. 4.62	Melette di Foza		1			1			1	
	Tab. 4.63	Monte Zebio		1			1			1	
	Tab. 4.69	Talpina/Piazzina Trenches						1			1
	Tab. 4.70	Monte Giovo Trenches		1			1			1	
	Tab. 4.71	Nagià Grom Trenches		1		1				1	
	Tab. 4.72	Trincerone Monte Zugna		1		1				1	
	Tab. 4.73	Monte Kolovrat		1			1			1	
	Tab. 4.3	Piazzaforte di Trento		1			1			1	
	Tab. 4.6	Campo trincerato Monte Bondone		1				1			1
	Tab. 4.10	Monti Vosgi		1			1			1	
	Tab. 4.20	Linea Cadorna		1			1			1	
	Tab. 4.21	Ecomuseo Prealpi Vicentine		1		1			1		
			0	**12**	**0**	**3**	**8**	**2**	**1**	**10**	**2**



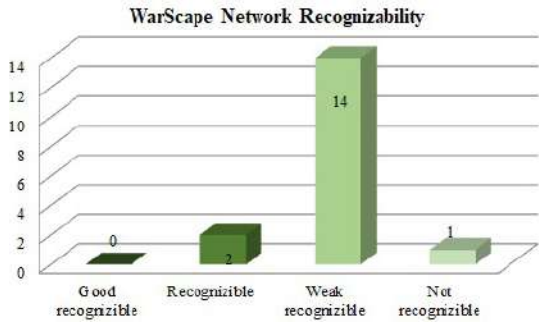


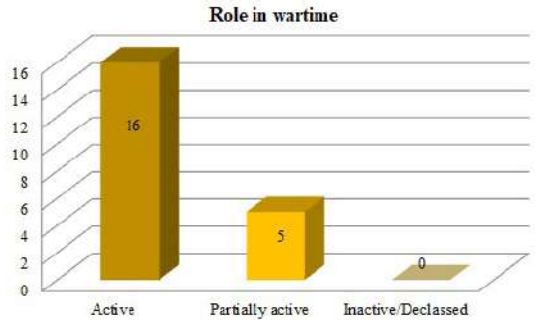
			Initiative		*WS-Network recognizability*				*Safe use and access*		
			Only public	Voulunteer envolvement	Good recognizible	Recognizible	Weak recognizible	Not recognizible	Totally safe	Partially safe	Not safe
WarScape Class - Open fields entrenched systems	Tab. 4.64	De Palingbeek		1			1		1		
	Tab. 4.65	The Mastenbos System		1			1			1	
	Tab. 4.66	Sanctuary Wood Museum	1			1				1	
	Tab. 4.67	Bayernwald Trenches	1			1			1		
	Tab. 4.68	Pool of peace	1			1			1		
	Tab. 4.74	Monfalcone entrenched system		1		1			1		
	Tab. 4.18	Campi trincerati Isonzo	1				1			1	
			4	**3**	**0**	**4**	**3**	**0**	**4**	**3**	**0**

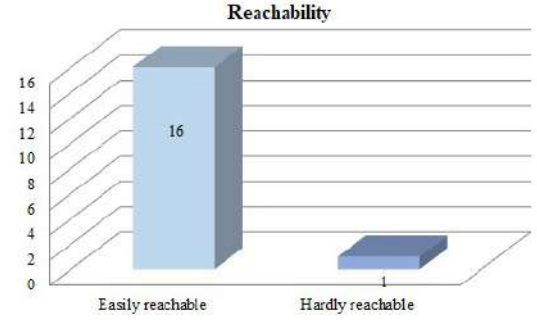


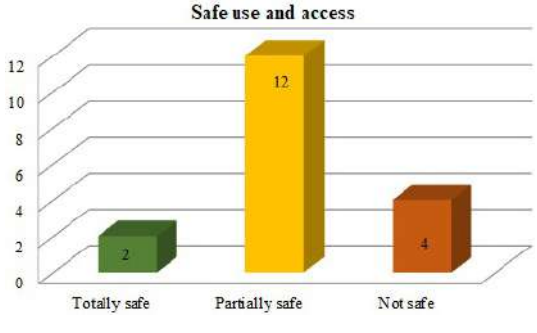


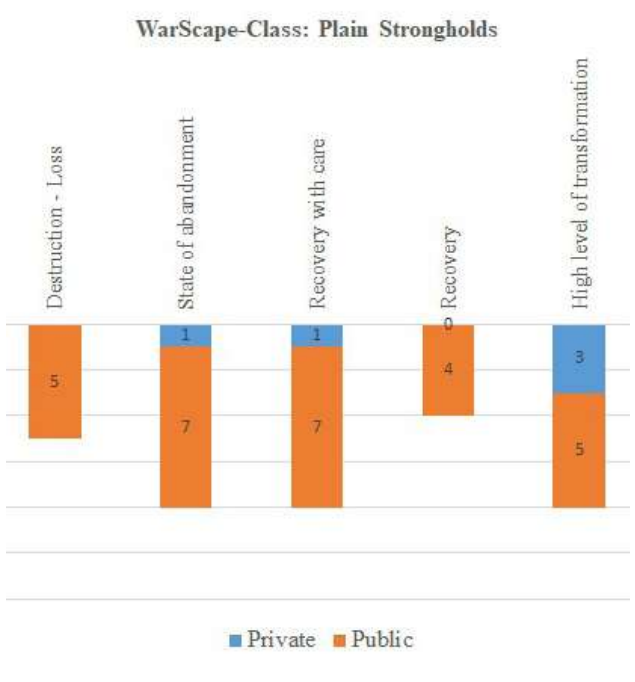
WarScape Class - Stronghold			Ownership		Current state							Role in wartime			WS-Network recognizability				Safe use and access			Reachability	
			Private	Public	Destruction - Loss	State of abandonment	Recovery with care (Muscum)	Recovery	High level of transformation	Commemoration place - Cemetery	Commemoration place - Memorial	Active	Partially active	Inactive/Declassed	Good recognizible	Recognizible	Weak recognizible	Not recognizible	Totally safe	Partially safe	Not safe	Easily reachable	Hardly reachable
	Tab. 4.49	Douaumont Fort		1			1					1				1				1		1	
	Tab. 4.50	Tarakaniv Fort		1		1						1					1				1		1
	Tab. 4.51	de Mutzig Fort		1			1					1				1				1		1	
	Tab. 4.52	de Loncin Fort		1			1					1					1		1			1	
	Tab. 4.53	de Lantin Fort	1				1					1					1		1			1	
	Tab. 4.54	de Lier Fort	1						1			1					1			1		1	
	Tab. 4.55	de Pontisse Fort	1			1						1					1			1		1	
	Tab. 4.56	de Barchon Fort		1					1			1					1			1		1	
	Tab. 4.57	d'Evignée Fort	1						1			1					1			1		1	
	Tab. 4.58	de Fleeron Fort		1	1							1						1				1	
	Tab. 4.59	de Chaudfontainie	1						1			1					1			1		1	
	Tab. 4.8	Nizza Stronghold				1	1	1	1				1				1			1		1	
	Tab. 4.9	Verdun Stronghold			1	1	1	1	1	1		1	1				1			1		1	
	Tab. 4.11	Thorn Stronghold			1	1		1				1	1				1				1	1	
	Tab. 4.12	Kaunas Stronghold			1	1	1					1	1				1			1	1	1	
	Tab. 4.15	Namur Stronghold				1		1	1			1					1			1	1	1	
	Tab. 4.16	Krakow Stronghold			1	1	1		1			1	1				1			1		1	
			5	6	5	8	8	4	8	1	0	16	5	0	0	2	14	1	2	12	4	16	1











Hill60, Ypres, Belgium, Pic. J. Aldrighettoni

Chapter 4

War-scapes classes: proposal of an order matrix to “re-read” complexity in a systemic key

4.1 The search for a multiscalar approach to recognizing vestiges as a “system”

In the light of the above considerations, the need to identify new keys to understand better the complexity that characterizes the different "war-scapes" emerges strongly in response to the widespread inability to recognize them as a "system." In this sense, returning to investigate the different warscapes from a holistic perspective provides a crucial contribution to help solve this "problem of scale" by proposing an approach that, moving away from the individual observation of the single fragments (without losing any information), can focus on the networks of relations between them, and thus understand the works as a whole as a "system".[247]

This is a multi-scalar approach that integrates the specific knowledge of the particular with a new outlook that can accommodate a broader, overall vision, apparently blurred but which allows us to see relationships that are difficult to recognize “up close.” In other words, this means going back to studying the constituent elements of the various “war landscapes” through an understanding of their reciprocal interactions and the tangible but also visual connections underlying one part and another. To a certain extent, this means recovering the original “systemic view” according to which these “fortified landscapes” were conceived and designed better to understand the functioning of the entire “war machine.” This “way of looking” at the different warscapes makes it possible, for example, to recognize the various permanent fortifications not as isolated works but as elements of a “multi-component device”

247 The need to regain a systemic outlook is explored in relation to the reflections in Chapter 3.

designed to function as such, in which the degree of efficiency of the individual parts was measured precisely in their practical operation about the system.[248]

In the same way, it means being able to recognize the intrinsic connections, "of function" but also "of meaning," between the forts themselves and the entrenched systems confined to them and insisting on their surroundings. As is evident, this is an approach that is both inductive and deductive, which seeks to identify the correspondences between the reflections carried out on the biographical analysis of the "war landscapes" (further study in Chapter 3) and the information directly observable from the study of the single fragments (general reconnaissance dealt with in Chapter 2), to reconstruct the connective plots of these "fragile palimpsests of high complexity" and weave their meanings. The ability to observe the fragments of the vestiges no longer in their individuality but to metaphorically group them into sub-systems of works that are spatially close and, above all, connected by deep ties of functionality and mutual coherence thus makes it possible to overcome the fragmentation that characterizes today's "war landscapes" and reduce their complexity. In other words, it is a question of expanding to this observatory of reference particular reflections already widely discussed and diffused in the more specifically architectural sphere, which concerns the need not to extrapolate the permanences, even if isolated, of the remains "from their context, aligning them one next to the other like relics of a civilization closed in the cases of an increasingly gigantic museum. A practice [...] that extinguishes the profound sense that all things inherited from the past bear in their appearance and their matter".[249]

248 The fortified systems were in fact designed essentially according to the logic of functionality, and it is precisely in this sense that one can understand the reasons why, even before the outbreak of war, structurally obsolete constructions that were no longer able to fulfil the roles for which they had been designed were abandoned. For example, all the structures built in masonry that were unable to resist the destructive power of the new artillery: many permanent fortifications along all the front lines were in fact downgraded and the armaments were generally moved to open positions. Similarly, many forts built to defend lines behind the front, or built on the border between countries that later became allies, were downgraded and used essentially as support points for the 'front lines'. With regard to the latter, we would mention, for example, the fortifications built on the Italian-French border (barrage on the Colle di Tenda, di Nava, di S. Bernardo, del Melogno, on the Italian side; the Authion, Barbonnet and Tournoux forts on the French side).

249 DI BIASE, 1990, p.108. These considerations refer to the theoretical debate within the discipline of monument restoration regarding the need to look beyond the traditional dichotomy between materia signata and haecceitas, in order to recognise how the testimonial value of a given asset is formed as much in its material essence as in that "second essence" mentioned in Chapter 3. See MASIERO, CODELLO, 1990; QUENDOLO, 2001.

This "way of looking," which constantly moves between the different scales of observation, also makes it possible to identify, precisely among these new sub-systems recognized thanks to this particular gaze, the presence of certain repetitions, of common and recurring typological-constructive or functional characteristics. On the one hand, the recognition of these repetitions underlines the fact that the remains do not in themselves constitute unique and irreproducible works of art but are no less authentic for that[250], on the other hand, it makes it possible to reduce the number of this "highly complex heritage" by grouping the sub-systems of works that present similarities and affinities into specific "classes of warscapes." In other words, the analysis of these similarities and affinities makes it possible to classify the various "warscapes" concerning the typological nature of the works (permanent or field/temporary fortifications) and the context in which they were built (mountain, plain and coastal contexts). As is evident, this perspective expands to a network-level what was previously understood concerning the very close symbiotic relationship between the typological nature of the individual structures and the physical nature of the terrain on which they were built.[251]

Therefore, at an analytical level, adopting a holistic outlook means defining a new "matrix of order" capable of reinterpreting the articulated and fragile palimpsest of relics by recovering a general systemic perspective and arranging the typological-constructive peculiarities with the different orographical characteristics of the territories. This matrix, therefore, proposes a new way of looking at the heritage of the relics of the Great War to reinterpret and reorganize the heterogeneity and vastness of its constituent elements through a reduction in complexity, in the awareness that this reduction is not a simplification of the contents, but a necessary contribution to facilitate comprehension. Specifically, five different "classes of warscape" were identified: mountain fortifications and "strongholds" or "fortified walls" built-in lowland contexts, as regards permanent works; mountain defensive structures and open-field entrenched systems, as considers a field and temporary fortifications; towers and coastal fortifications, to defend territories from possible attacks "from the sea." Thanks to this classification, it was possible to return to analyzing the various works not in their individuality, as already tackled in the analysis of the status quo, but by organizing more organic and orderly research which, by moving to different scales, aims to bring out the level of recognizability of the remains as a "system." This is necessary to focus on the potential of this heritage, which is amplified

250 See Chapter 6.

251 See Chapter 3 for more details.

	Permanent fortification	Field fortification
Mountain areas	***Mountain forts***	***Mountain defensive systems***
Plain areas	***Plain strongholds***	***Open-field entrenched systems***
Coastal areas	***Coastal towers and fortifications***	

precisely if it is recognized as a system of works in a reciprocal relationship, and to understand better the fragilities and possible risks that may compromise its value as a testimony in the future. In other words, this "way of looking" represents a proactive approach helpful in defining an indispensable knowledge base against which future conservation and enhancement interventions can be directed. Applied knowledge, therefore, brings into tension the ability to "see things poetically" with the different ways of "taking care of them."[252]

4.1.1 Setting analysis parameters

From an operational point of view, the new reading of the palimpsest of vestiges through the synthesis matrix was conducted by elaborating specific files, reported below.

For each WarScape-Class, a representative sample of works was selected, at an international level, against which in-depth studies were developed at different scales of observation, both concerning the individual artifacts and to the current degree of recognizability of the close interconnections that substantiated the vestiges as a whole as a "fortified system." Specifically, some significant "fortified systems" were first analyzed at a general level to understand the reasons that determined their construction, both from a historical-political point of view and specifically in terms of structure. Such a look made it possible to reduce the number of individual fortified works, both permanent and field, and to understand the mutual support relationships that existed between them and that substantiated their meaning and existence. The ability to better recognize these networks of physical and visual connections that constituted the "war machine" arterial system is already an essential result in terms of proactive awareness towards future "care" practices. Going beyond the political boundaries and adopting the view instead

252 With regard to the possibility of "seeing things poetically", please refer to what has already been discussed in Chapter 3.2.

through the "Warscape classes," some significant "case studies" were selected, against which furthermore specific analytical sheets were developed, investigating the single vestiges on a detailed scale, without however losing the systemic view, i.e., the relationship with the network. As can be seen in the annexes below, in these analysis sheets, equal importance has been given to the in-depth study of the typological-constructive characteristics of the individual fortified systems (Constructive typology and materials) and of any restoration/recovery/enhancement projects that have been carried out in recent years (Enhancement project-New use), as well as to the examination of the degree of recognizability of the connections between the individual works and the network in which they are inserted. The main aspects analyzed are described below.

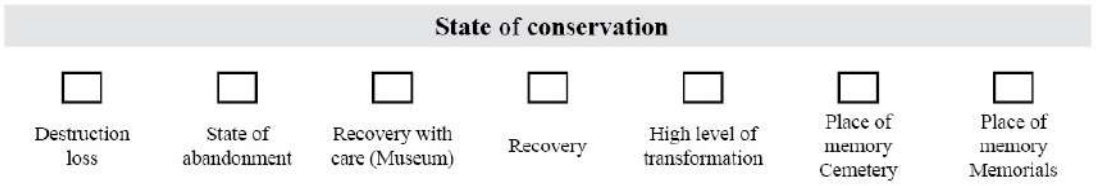
General Information

In this section, the historical-evolutionary contextualization of the object under analysis has been included, summarising the motivations that determined its construction, the transformative dynamics over time, and the main functional and defensive/offensive characteristics for which it was designed.

State of conservation

To understand the current state of conservation of the artifact, the following schematic diagram was proposed, from which the option that best suited the context under study was selected each time[253]. Although aware of the semantic simplifications that such a classification entails, it has made it possible to draw up a homogeneous comparison of all the areas analyzed while also highlighting the general differences in orientation and formal approaches according to the different countries. If for the categories "destruction/loss and state of abandonment," the classification methods were univocal and applicable to each context, as regards, in particular, the categories concerning the processes of recovery, restoration, and transformation of the artifacts, the issue was more delicate. While in Italy, for example, the traditional tendency to deal with the remains of the Great War has been noted, following a cautious and conscientious attitude, even if leading to very different formal results (in terms of both restoration and recovery), in other supranational contexts a greater frankness has emerged in working on the heritage of the Great War with interventions of different transformative impact. Precisely for this reason, in this type of filing, it was decided to classify the interventions on the existing structures in general terms of recovery,

253 Regarding the classification of the current state of conservation/fruition of places and artefacts, refer also to what has already been introduced in Ch.2.2.4.



distinguishing than the specific cases in which a particular attitude of caution was recognized (Recovery with care) for the conservation of the informative/evocative potential guarded by the materiality of the places/manufactures, which often resulted in the conversion of the works into museum spaces (indoors or outdoors), and the areas in which, on the contrary, the remains have undergone significant transformations that have led to the inclusion of new uses and functions with related changes in the original morphological-distributive structures, altering to a large extent (High level of transformation) the memorial value of the asset itself. Finally, the places of commemoration have been identified, such as war cemeteries and landmarks built after the conflict for memorial purposes[254].

Constructive typology and materials

In this section, developed mainly concerning the permanent works, the principal information regarding the typology and construction technology adopted in constructing the results has been summarised. In particular, the close relationship with the morphology of the territory has been highlighted, which very often determined the planning choices and construction techniques. In addition, where possible, information has also been added regarding the materials used and their state of conservation.

Current property

The indication of the current public or private ownership of the "asset" in question is an essential piece of information, projecting the reasoning in terms of future intervention.

Active role in WW1

The direct or partial involvement in the events directly related to the war conflict is essential to understand the complexity of the "signs of destruction," their semantic significance, and their importance for the future. Their direct or partial involvement in the events directly connected to the war constitutes essential data for understanding the complexity of the "signs of destruction," their semantic significance, and, therefore, the overall value of the testimony of the work itself.

254 See note nr.140 p.109.

WS-Network Recognizability

While analyzing the individual works in detail (both permanent and field), as indicated above, I paid particular attention to the ability to recognize the networks of relations that connected the various fragments into a single system. These relations are physical but also visual, such as connecting infrastructures, roads, labyrinthine entrenched lines, railways, cableways, optical networks, to name but a few. The possibility of recognizing these connective networks allows us to understand the current fragments of the remains not as isolated remnants of a broken system lost forever, but as "broken parts" waiting to be recognized and put in tension with each other again, to express their voice, their own story.

Enhancement project-new use

A specific section has been dedicated to the projects involving the works under analysis, developed in particular for the centenary celebrations. The objectives of the projects implemented and the necessary transformations to make them effective have been briefly summarised. Where known, information regarding the different stakeholders involved in the whole valorization process has also been included.

Reachability level

The location of the work in question in places and landscapes with different levels of accessibility has indirectly influenced its current state of preservation: for example, in areas with little accessibility, the vestiges were less subject to the dynamics of post-war anthropic transformation, unlike areas where the needs of reconstruction have sometimes led to their cancellation. However, the ease of access to these sites is also an essential aspect for the future in terms of sustainability and economic viability (more use and therefore more economic induced).

Safe use and access

Aspects of structural safety are closely linked to information on construction techniques and the state of preservation of materials. These data are essential in determining the future "care" of the asset in question to make it usable and visitable.

Community engagement

As has been highlighted in various disciplinary fields, the traditional top-down approach of intervention and management policies, even for historical heritage, is outdated. What is needed is an increase in community awareness of the value of cultural heritage (in this case, the heritage of

remains) which can achieve through the direct involvement of citizens by stimulating active participation in the different phases of projects for the enhancement and improvement of the existing cultural heritage, as well as for its future management and maintenance. In some cases, these new participatory methods supported by the Faro Convention (see chapter 6) have been implemented and have led to very satisfactory results.

Customer Experience Data

Through an analysis of the reviews left by tourists and visitors on the primary online review sites for sites, accommodation, hotels but also places to visit (such as Tripadvisor, for example), a sort of "index of appreciation" of the asset in question was drawn up, recording the impressions and perceptions of the users. This data is obviously to be considered relative and not absolute terms, but it allows us to understand the current trend of appreciation.

Online presence

This section indicates the "online presence" of the asset under analysis, measured in terms of the ability to find historical information about its evolutionary history as well as the ease of finding specific historical documentation.

4.1.2 Critical reinterpretation of the status quo through a renewed "systemic look"

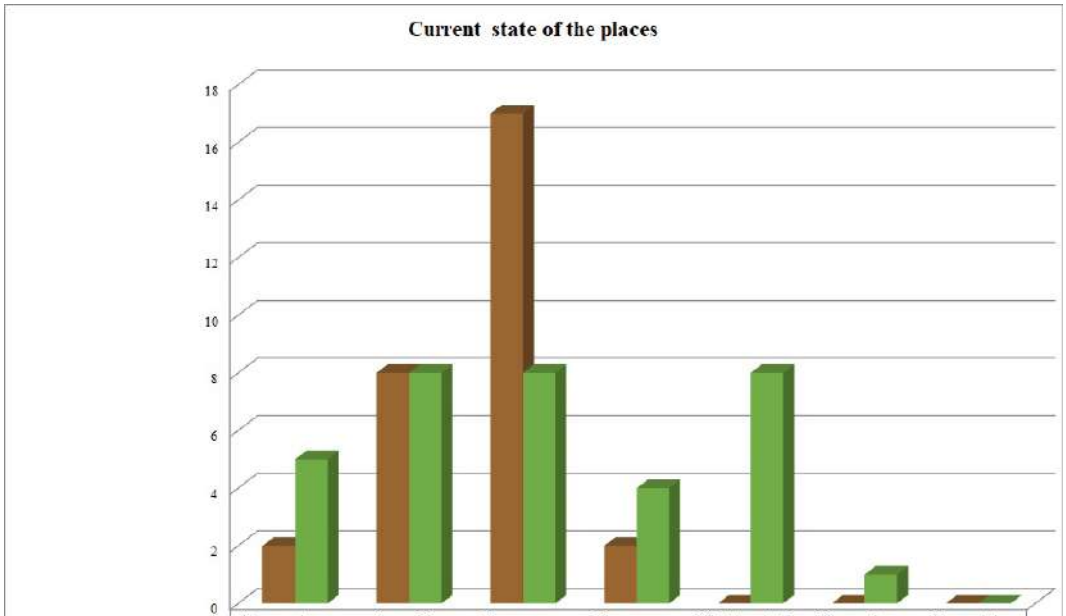
Below are the in-depth files prepared according to the scheme presented.

4.1.3 General considerations and reflections

After the in-depth studies carried out using the previously reported files, the Tab.4.75-4.77 (summary tables produced based on the data from the various WarScape-Classes analyzed) contain several summarising graphs that provide a broader and more complete overview of the different aspects concerning the heritage of the remains and some considerations that have emerged thanks to this overview.

Concerning the current state of places and artifacts, concerning the permanent fortifications in mountainous contexts, for example, can see that only 30% of the works analyzed (8 out of 26) are currently in a state of total abandonment. In comparison, 73% of them (19 out of 26) have been the subject of recovery and enhancement works, which in the majority of cases (18 out of 26) have developed projects that have transformed the fortifications into museums with particular "care" for the ancient. In this regard, it is worth considering that most of the case studies studied belong to the Italian context. As previously stated, an approach usually oriented towards the protection of the historical heritage is traditionally adopted. This is evident if one compares these results with fortifications belonging to the main plains strongholds located in European contexts.

As seen from the tables in Tab.4.75-4.76-4.77, there is a general tendency in Europe to adopt a more casual approach to the recovery of

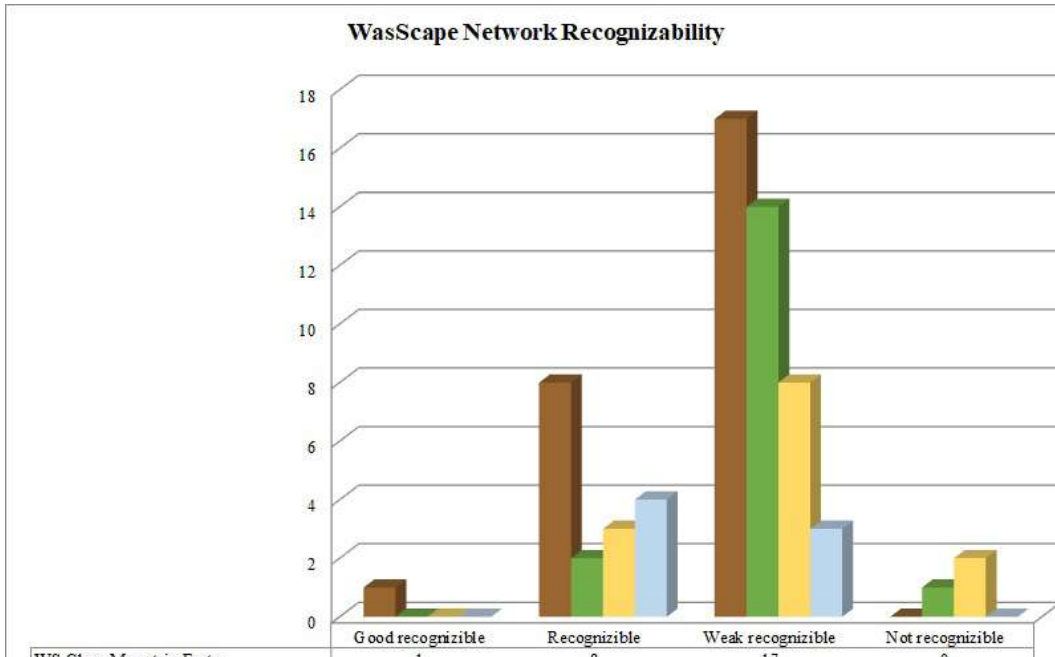


	Destruction - Loss	State of abandonment	Recovery with care (Museum)	Recovery	High level of transformation	Cemeteries	Memorials
WS-Class: Mountain Forts	2	8	17	2	0	0	0
WS-Class: Plain Strongholds	5	8	8	4	8	1	0

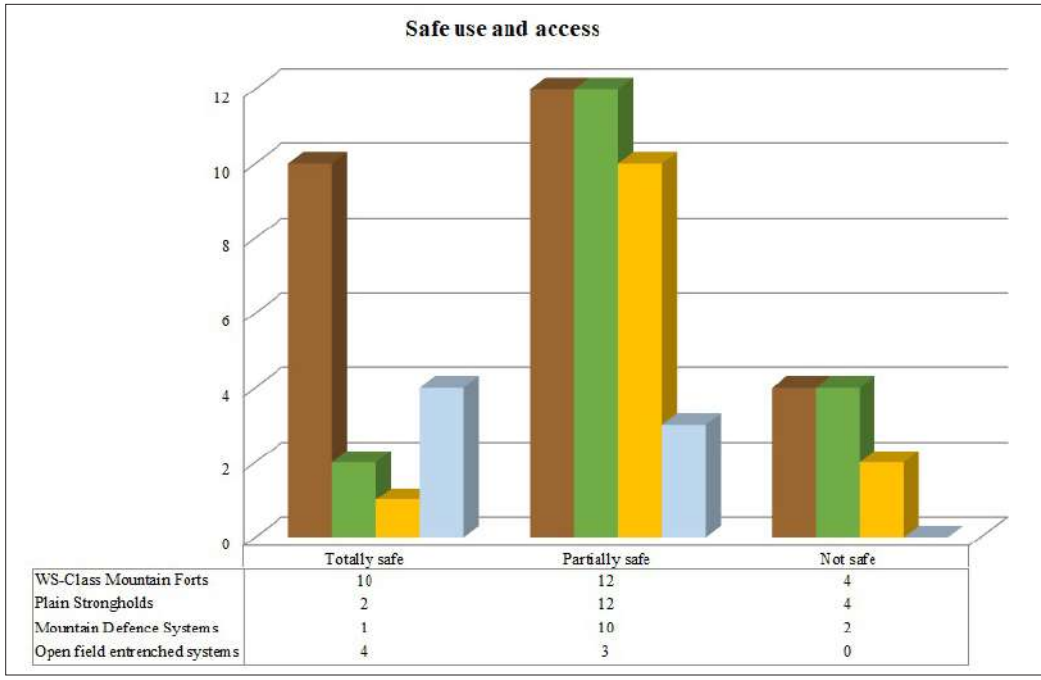
the existing structures (the vestiges) to make them functional for future use. Concerning the fortified walls analyzed in detail, for example, it can be seen that the recovery interventions more oriented towards the recognition of the value of the testimony of material culture represent about ¼ of all the interventions (8 out of 33). At the same time, the projects more "pushed" in a transformative sense constitute almost 40% of the total.

Another interesting consideration concerns the higher percentage of destroyed fortifications in the plain areas (15%) than mountain contexts (6%). Can find the reasons for this differencein the different dynamics of post-war transformation. As previously explained in chapter 3, in fact, in the inaccessible mountain contexts where had built the mountain forts, the works were gradually abandoned and therefore reabsorbed into the natural transformations of the landscape; in the lowland areas, on the other hand, the anthropic needs for reconstruction and restoration of traditional land use often led to a real cancellation of the "signs" of the conflict to leave space for the urban and landscape rebirth of the places.

From the above tables, a problematic issue common to all the WarScape Classes examined emerges, specifically concerning the degree of recognizability of the individual structures analyzed as part of an original fortified "system."



	Good recognizible	Recognizible	Weak recognizible	Not recognizible
WS-Class Mountain Forts	1	8	17	0
WS-Class Plain Strongholds	0	2	14	1
WS-Class Mountain Defence Systems	0	3	8	2
WS-Class Open field entrenched systems	0	4	3	0



	Totally safe	Partially safe	Not safe
WS-Class Mountain Forts	10	12	4
Plain Strongholds	2	12	4
Mountain Defence Systems	1	10	2
Open field entrenched systems	4	3	0

It is clear from the summary graphs that, in all the contexts studied (including those subject to restoration and valorization work), the ability to recognize the relationship between the permanent work and its fortified surroundings is particularly weak, as is the network between the permanent works which, precisely because they are reciprocally connected, constituted the "fortified system." This observation, which is confirmed by both the analysis of the Warscape Classes concerning the permanent structures and those concentrated on the analysis of the field structures, highlights how the majority of the projects implemented to date have given priority to the forts, leaving in second place the improvement and strengthening of the links with the whole set of weaker and more "fragile" signs by nature, such as trenches, temporary shelters, infrastructures, and underground shelters, which constituted the arterial system.

Concerning the structural aspects that determine the safe use of these sites, the summary graphs show that the permanent structures are more usable, essentially due to the restoration and visualization work carried out, which implies safe access to the facilities. Concerning the permanent structures that have not undergone any interventions and to all the camp fortifications, on the other hand, the degree of structural safety is only partially secure, very often due to the abandonment of these sites or to the lack of information regarding the construction techniques with which they were built, which therefore makes it challenging to work on them in terms of recovery and structural improvement.

Colle Santo Stefano, Bezzecca, Val di Ledro (TN), Italy. Ph. J.Aldrighettoni

4.2 SWOT Analysis: the recognition of potentialities and criticalities of the remains of the Great War

The reflections that have emerged from the study of the peculiar characteristics of the five "warscape classes" and from the analysis of the various defensive systems studied in more detail have made it possible to form a broader and more conscious knowledge base, indispensable for better defining the "potentialities and fragilities" of this important heritage. By bringing together the various variables at play and the considerations concerning the future driving forces specific to each WS-Class, a summary SWOT matrix was drawn up to focus on the principal issues on which future conservation, transformation, and enhancement interventions must be oriented. Specifically, the parameters directly related to the precise nature of the "war landscapes," therefore considered "internal factors," have been put in system with the external opportunities or risks, variations about political, social, and economic changes in the context of insertion, which can influence, positively or negatively, the "possibilities of the future." Also, about the various recovery and/or restoration operations already completed or underway, the knowledge regarding the typological-constructive characteristics of the remains and their relative state of conservation (extended to the landscape scale to the degree of recognizability of the sets of works as a "system") has been integrated with information on management policies, the degree of involvement of the various stakeholders, and community participation. The following pages contain several specific fact sheets that, in brief, aim to examine the various strengths and weaknesses that have emerged.

	Positive	Negative
Internal factors	- High testimonial values - Techanical/constructive quality - Value of memory - Identity and sense of belonging	- Fragility - fragmentation - Recognizability - Fruition in safety - Vastity (selection need)
External factors	- Active resources and local development - Social cohesion - civic sense - Reactivation through interdisciplinarity - Contribution to the knowledge of the development of construction techniques and	- Projects top-down - Few participation in the process phases - Few awareness / knowledge - Non-integrated management among stakeholders

SWOT ANALYSIS - Strengths

	Positive	Negative
Internal factors	- High testimonial values - Techanical/constructive quality - Value of memory - Identity and sense of belonging	- Fragility - fragmentation - Recognizability - Fruition in safety - Vastity (selection need)
External factors	- Active resources and local development - Social cohesion - civic sense - Reactivation through interdisciplinarity - Contribution to the knowledge of the development of construction techniques and	- Projects top-down - Few participation in the process phases - Few awareness / knowledge - Non-integrated management among stakeholders

MEMORY

The fragments of the remains of the Great War that today remain in the multi-layered landscape are semiophors able to activate the memory of those who observe, cross them, listen to them: they are ancient and ever new narratives that through experience can evoke the memory of what has been. Suppose it is true that the task of the present time is to inherit the historical heritage of the past, preserve, protect, and enhance it to bequeath it to future generations. In that case, the possibility of memory becomes the necessary prerequisite to ensure that this heritage can continue to narrate its "being in time".

WITNESSES

The heritage of the vestiges of the Great War represents the material testimony of a significant historical moment that radically transformed the landscape of entire Europe into a dense network of field and permanent fortifications, a web of trenches and shelters, barracks and underground shelters, connected by a labyrinthine system of military infrastructures designed in close relation to the morphology of the different territories. However, the fortified systems of the First World War are also the places where millions of young human lives were sacrificed. Therefore the material works preserve their constituent material not only the tangible "signs" of destruction but also the intangible value charge associated with it. For this reason, the built material has become "materia signata", a faithful custodian of values and meanings. On these works already densely pregnant, from the post-war period until today, each geographical context has superimposed other significant layers that have determined the complexity that today characterizes the contemporary multi-layered landscape.

TECHNICAL-CONSTRUCTIVE QUALITY

From an exquisitely architectural point of view, the permanent and field fortifications that have come down to us present precise construction techniques and technologies with attention to the smallest details. The result of continuous research and improvements in the structural field, in response to the increase in the production of armaments, the military structural typologies of the beginning of the century allow us to investigate the evolution of experiments on new materials used for the first time during the First World War, such as concrete reinforced with steel beams and elements, whose evolution led to reinforced concrete as it is currently understood.

IDENTITY - SENSE OF BELONGING

The places designed by the war have not only involved the border spaces but have determined the historical forms of the landscape affecting wider contexts: not only the projects of militarization developed by the various military geniuses before the war but also the destruction during the conflict and the construction of "replacement landscapes" as the first form of commemoration in the first post-war period, have stratified in these places other meanings and values, thus contributing to the definition of much of the modern and contemporary territory and especially the identity of Europe as a whole.






SWOT ANALYSIS - Weaknesses

	Positive	Negative
Internal factors	- High testimonial values - Techanical/constructive quality - Value of memory - Identity and sense of belonging	- Fragility - fragmentation - Recognizability - Fruition in safety - Vastity (selection need)
External factors	- Active resources and local development - Social cohesion - civic sense - Reactivation through interdisciplinarity - Contribution to the knowledge of the development of construction techniques and	- Projects top-down - Few participation in the process phases - Few awareness / knowledge - Non-integrated management among stakeholders

FRAGILITY

The present condition of the fragility of the remains can be interpreted at two different scales of observation: at the scale of the single artifacts, referring to the present compromised state of preservation, and at the scale of the landscape, understanding fragility as the loss of the original relationships between the different elements that formed the articulated assemblage of the war machine. In the first case, the very distinction between permanent works and temporary and field constructions testifies to a different "lifetime" planned for the different works, which recognizes how the whole palimpsest of signs weaker than the forts, such as trenches, shelters, defensive posts, shelters, is "fragile by nature".

This awareness is also important in terms of future interventions of protection and "care", to prevent the risk of acting in terms of formal restoration of works designed "more to resist than to last". As for fragility as the loss of original relationships, it indicates a current weakness of the system-vestiges, which in the loosening of physical ties also implies a weakening of intangible meanings.

FRAGMENTATION OF INTERVENTIONS

The vestiges today often appear as isolated fragments inserted into the contemporary landscape, the result of long processes of slow abandonment that, over time, have compromised the state of preservation and recognizability. In this regard, the analyses carried out have highlighted how the action of the "iron reclaimers" has had, in many cases, an even more destructive impact than the war itself.

In addition to this, the analysis of the interventions carried out has revealed how this condition of fragmentation is also reflected concerning the vestiges that have been the subject of intervention: in other words, in recent years, many projects of restoration/recovery/evaluation have been carried out focusing mainly on single fragments of "vestiges", permanent or field, without recovering the original military look, that is the network. The fragmentary nature of the interventions is certainly also due to the difficult management of the practices of protection and enhancement, which currently does not integrate the competencies of the different actors involved, but tends to divide within narrow bureaucratic and regulatory tracks projects that would instead need an integrated and participated vision.

RECOGNIZABILITY

Directly related to the conditions of fragility and fragmentation, the issue of recognizability of the set of vestiges as a "fortified system" is an important issue that future enhancement practices should try to answer. In addition to the difficult legibility of the permanence of the single vestiges within the contemporary multi-layered landscape, what is almost unrecognizable is the connective network that connected the different elements of the war machine, allowing it to function. In particular, it is difficult to recognize the permanence of all those weaker "signs" that connected the different fortifications through entrenched systems, multiple defensive lines, obstacle fields, observation posts, cableways, and infrastructural networks.

SAFE USE AND ACCESSIBILITY

The accessibility represents a not secondary problem to the sites and the safe use of the artifacts, particularly of the permanent fortifications not yet restored. The question of the safety of forts is particularly significant because the destruction caused by the action of the restorers in the first post-war period has often modified the structural structure of the artifacts: this must be taken into account when thinking about new uses or functions to be included in these places. Investigating how to make safe and/or consolidate walls and floors in reinforced concrete is certainly a topic that needs a specific in-depth study.

VASTNESS OF HERITAGE - NEED FOR SELECTION

The vastness of the material heritage of the Great War imposes a necessary selection: it is, in fact, impossible to preserve everything, and it doesn't even make sense. Therefore, tools and guiding principles are needed to help us act consciously in this direction.

SWOT ANALYSIS - Opportunities

	Positive	Negative
Internal factors	- High testimonial values - Techanical/constructive quality - Value of memory - Identity and sense of belonging	- Fragility - fragmentation - Recognizability - Fruition in safety - Vastity (selection need)
External factors	- Active resources and local development - Social cohesion - civic sense - Reactivation through interdisciplinarity - Contribution to the knowledge of the development of construction techniques and	- Projects top-down - Few participation in the process phases - Few awareness / knowledge - Non-integrated management among stakeholders

DRIVERS FOR LOCAL DEVELOPMENT

The heritage of the Great War embodies a multiplicity of values, not only historical-testimonial but also interesting economic potentialities that, if properly managed and combined, could provide benefits for the development of local territories, for example, by stimulating new forms of "conscious memory tourism".

OPPORTUNITIES TO CREATE EMPLOYMENT

The enhancement of the remains of the Great War must also consider aspects related to the management and aggregate offer to provide tourists and visitors with a range of complementary services to support the use of the property and the activities that take place there. In addition to the management of the artifacts themselves, these aspects can be an opportunity to create new jobs for local communities, new opportunities for development and growth for local micro-economies.

OPPORTUNITIES FOR MEETING AND SOCIAL COHESION

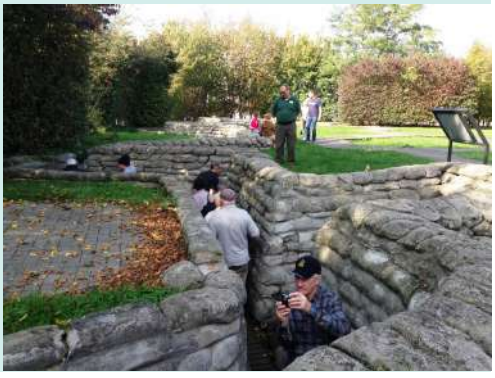
The new forms of participation in the "care" of the material heritage represent meeting occasions for local communities, which are called to invest time and energy for a common good, developing and sharing ideas and proposals that have as their objective the preservation of historical and material evidence, but also local development. In the forms of sharing, therefore, can strengthen ties, contacts, forms of collaboration that increase social cohesion: the "care" of this heritage could also become an opportunity to meet and integrate some of the weaker segments of the community, putting in a system the skills and abilities of each.

COMMUNITY INVOLVEMENT AND AWARENESS

The potential of values and meanings concerning the material and immaterial heritage of the Great War, although universally recognized, often did not materialize in a conscious action by the communities but in simple "passive" collaborations in support of restoration/recovery/valorization projects "dropped" by institutions or professionals on the communities, but not designed with and for them. The future perspective is, therefore, to start from the bottom to make communities aware of the values embodied in this cultural heritage recognized as identity, investing in a new "economy of knowledge", promoting the cultural industry on the entrepreneurial front and with new strategies of social involvement, to transform these vestiges from "public good" to "common good".

TECNIC-CONSTRUCTIVE HEREDITY of EXPERIMENTATIONS on NEW MATERIALS

The study of the "state of the art" has highlighted a considerable study of construction technology, particularly concerning experimentation on "reinforced concrete". The transformations during and after the conflict have often modified the structural arrangements of the artifacts, and therefore today, the question arises of how to consolidate and/or secure such objects. This theme could also be an opportunity to investigate the technical-constructive legacy of the experiments on reinforced concrete concerning its use in subsequent years.



SWOT ANALYSIS - Threats

	Positive	Negative
Internal factors	- High testimonial values - Techanical/constructive quality - Value of memory - Identity and sense of belonging	- Fragility - fragmentation - Recognizability - Fruition in safety - Vastity (selection need)
External factors	- Active resources and local development - Social cohesion - civic sense - Reactivation through interdisciplinarity - Contribution to the knowledge of the development of construction techniques and	- Projects top-down - Few participation in the process phases - Few awareness / knowledge - Non-integrated management among stakeholders

TOP-DOWN POLICIES

The current projects that have affected the places of the Great War, especially in Italy, have been essentially elaborated by professionals and Superintendencies with the aim of "giving back" the heritage to the communities. This top-down management/action policy entrusts the "care" of the war heritage exclusively to a group of technicians, excluding the communities' interests, ideas, and needs. The "state of the art" highlights how this approach can threaten war heritage as this heritage embodies community identity values. Therefore the priority is perhaps not to "give back" war landscapes to communities but to increase people's awareness of these heritages, and by being aware of their potential, then they can be stimulated to "take care" of them, with the necessary help and expertise of specialized technicians.

PASSIVE INVOLVEMENT OF COMMUNITIES

Often communities are involved in the recovery and management of "vestiges," but passively, that is only as a workforce, without proper knowledge, training, and awareness. Instead, the community should be stimulated and involved in all phases of enhancing this heritage: people are citizens, not customers.

RISK OF LOSS OF TESTIMONIAL POTENTIAL

The initiatives implemented since the 1970s have focused on the problem of the "tangible risk" of the loss of vestiges due to degradation, obsolescence, and lack of knowledge of both the historical-testimonial values and the economic and developmental potential. Today, however, in the light of all the interventions made, there is the "intangible risk" of lack of community awareness of this heritage.

NON-INTEGRATED MANAGEMENT BETWEEN DIFFERENT STAKEHOLDERS

The current separate and uncoordinated management, which seems to delegate to the Superintendencies the sole authority in the field of protection and the museums the responsibility of its promotion, has repeatedly shown limits and inadequacies and has led to the fragmentation of the interventions, thus losing the systemic view necessary to recover the original network-system that underlies the construction of the war landscape, even in its multiple transformations. Therefore, the analysis highlights the need to renew the "culture of the project" towards a more integrated action and especially investing in the active involvement of communities: the Faro Convention could offer interesting ideas in this regard.








SWOT ANALYSIS - Threats

4.3 Identification of the main issues that emerged: a renewed "search of sense" for future conservation and enhancement practices

The results obtained through this type of analysis immediately highlighted how these "war landscapes" constitute a heritage of high identity value, as the vestiges are material evidence of a historical moment that physically and culturally transformed the whole of Europe. Their ability to reactivate the memory of those who observe and pass through them is undoubtedly one of their main strengths. At the same time, the virtuous processes that their enhancement can trigger represent abundant opportunities for relaunch and development, including economic development, for the territories in which they are located. Moreover, from a purely architectural point of view, they result from exciting experiments in construction technology, particularly concerning the gradual introduction of concrete, first reinforced with iron elements and then "reinforced" in the current sense of the term. From this point of view, the tangible heritage of the Great War can also provide interesting information for the history of building technology.

On the other hand, as far as the acknowledged criticalities are concerned, from the analysis of the different Warscape Classes, three main macro-questions seem to emerge regarding which future care and enhancement practices should try to elaborate specific solutions.

The first significant "weak core" concerns fragility declined at the scale of single artifacts. Therefore, it is connected to the problems concerning the state of preservation of the vestiges and the level of degradation, also structural, in which they are. Resolving these problems is essential not only to meet the need to protect and conserve a historical heritage with a 'value of civilization,' but also because these problems are directly linked to the possibility of using these assets in safety, and therefore represent an indispensable requirement for any possible future action of enhancement. However, the issue is particularly complicated because, unlike other types of historical, cultural heritage for which knowledge of ancient building techniques can provide reference tables and good practices to follow, in the case of vestiges technological experiments often pose a series of unresolved questions, such as the structural behavior of reinforced concrete structures, to which it would be essential to find at least partial answers to understand how to intervene and improve the state of conservation of the artifacts while respecting the authenticity of the ancient.

A second critical issue concerns the condition of fragility declined to the scale of the "fortified landscape," which is manifested essentially

in a problematic recognition of the set of vestiges as a "system" of individual functional elements mutually linked through physical and visual connections. This translates into the current difficulty in bringing out the deep relationships that the permanent works had with their surroundings and recognizing the palimpsest of material traces by which it was signed. In this sense, what is particularly "at risk of loss" are all those signs that are more fragile in terms of permanence, such as entrenched systems, barracks, obstacle courses, field defense posts, temporary constructions. Thanks to the systemic view adopted through the order matrix, it has emerged how many of the interventions that, in recent years, have concerned the recovery, restoration, and enhancement of the heritage of the Great War, have concentrated more intensely on the forts, leaving in the background the interventions of "care" of these "more minute signs." Moreover, comparing the different WC-classes, it was possible to understand how this weakness is common to both mountain and plain contexts, and consequently represents one of the main issues to be addressed in order to ensure that these vestiges, more fragile in nature but substantial in importance, can continue to narrate their "being in time" also in the future. It is essentially a question of better investigating the permanence of the whole heterogeneous set of vestiges in order to try to bring out what remains of the imprint according to which the Great War shaped, engraved, and modeled the landscape of a hundred years ago, whose traces are often still present today but latent, "submerged" below the visible surface layer.

Finally, adopting a point of view external to the heritage, one of the most consistent problems concerns the management and valorization of this heritage, in particular, to understand how to increase and improve the cultural potential of the remains of the Great War, considering them a concrete resource for the relaunch of the territory, on a local but also territorial scale. In the aftermath of the centenary celebrations, the need to systemize past experiences emerges strongly to produce new action strategies that can recognize the "places of memory" as a strategic symbolic, social, and economic capital. A first consideration that emerges strongly and opens up the discussion to subsequent reflections and proposals is that perhaps at present, some reuse chains essentially linked to forms of musealization have been exhausted, especially for forts, both on a national scale and observing the various European experiences. The idea of the historical museum in the typical imagination of "a place for celebrating the splendor of a nation" has long since disappeared. Still, even the initial intuition of converting some permanent fortifications into "cultural attractions" from which to enhance and promote all the so-called "widespread heritage" surrounding them is posing some questions, such as the risk of dispersing the interventions and implementing a succession of repeated actions

that produce similar or very similar results, but each with the ambition of saying something particular. On the other hand, in the face of proposing a renewed multidisciplinary approach capable of combining the socio-economic interests of the various actors involved with the need to protect a fragile and highly complex heritage, even the recent widespread diffusion of the ecomuseum experience highlights some critical elements which, however, in perspective, testify to the possible room for improvement of this type of institution, also concerning the authoritativeness and contractual power that it can increase in future territorial development policies. In addition to the lack of recognition of legal status, the ecomuseum institution currently still shows a divergence between theoretical principles and realized projects, probably due to a limited strategic vision, in favor of regulatory and methodological rigidities that often lead to the re-proposition of typical faults of the traditional museum sector, with a look "at the past" that is too static and not very open to the prospects of cooperation for the construction of the heritage of the future.

Therefore, in this sense, a renewed "search for meaning" is essential to understand what specific meanings the concept of enhancement can take on concerning the future of this particular heritage.[255]

In this respect, increasing the degree of community involvement in the decision-making and operational processes of future protection and valorization practices is certainly an important starting point for renewing the approach to heritage in favor of greater cooperation and collaboration between the different stakeholders involved, given that currently, as emerged from the records, bottom-up approaches have been minimal compared to the total. This can also help amplify a widespread awareness of the vestiges, which becomes the basis for developing a sort of civic responsibility of the communities towards this heritage.

255 See chapter 6.2 for the development of the enhancement concept.

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Chapter 5

Warscapes as “stores of memories”: from “memory’s construction” to high-capacity “value capacitor”

As already mentioned in chapter 3, returning to investigate war landscapes through a holistic approach implies the need to overcome the barriers of the traditional analytical study in order to identify new looks able to transcend the fragmented reality of the visible in order to be able to capture that "intangible substance" that arises when the single parts are put in mutual tension.[256] In this direction of meaning, the identification of the different "Warscape Classes" through the construction of the "order matrix" presented in the previous chapter has made it possible to recover, at least in part, the original systemic-military outlook, which is today strongly weakened, making it possible to identify the priority "potentialities and fragilities" of this articulated heritage, on which reflections can be consciously based regarding the future "possibilities of care" in terms of protection, conservation and valorisation.[257]

In this regard, however, a further important consideration is indispensable.

Parallel to the above-mentioned direction of analysis, which declines the operational dimension of the holistic approach, it is in fact necessary to investigate more deeply the auratic dimension of the different warscapes, as already introduced in chapter 3. In other words, it is necessary to better understand the strong intangible relations that substantiate the relationship between the "warscapes" as "materia signata" and the profound meanings associated with them. Only through

256 The need for a holistic approach is discussed in Chapter 3.

257 With regard to the way in which future practices for the protection and valorisation of this heritage should be approached, as well as the methodologies for identifying priorities for intervention, please refer to Chapter 6.

the specification and understanding of these intangible values, in fact, is it possible to better define that unique and unrepeatable "quid valore" that characterises the complex set of the remains of the Great War and distinguishes it from any other type of heritage to such an extent that it has stimulated, at least in Italy, the promulgation of a specific law to protect it.[258]

Also in relation to what emerged from the SWOT matrix presented in the previous chapter, in order to be able to consciously decline the future "valorisation practices" of the different warscapes it is therefore fundamental to study these themes in depth, in particular contextualising the meaning of the concept of heritage to this specific observatory, and analysing the processes that, over time, have led to the consecration of the "war landscapes" as "places of memory".

The aim is therefore to analyse the different warscapes from a complementary point of view to the one adopted in the previous chapter, framing them in the more general relationship between history and memory through the examination of an entire century of "narrative practices", in the awareness that, since the immediate post-war period, precisely these different forms of re-elaboration of the war trauma have been decisive in the construction of the national identities of the various European countries.

5.1 The process of “memory’s construction”: a century of “narrative practices”

From the cult of the fallen soldier to the symbolic reinterpretation of the sites of the conflict, from the construction of new overwritings to commemorate the mourning of the millions of young men who fell on the battlefields to the recognition of the warscapes themselves as material testimonies with a value of civilisation,[259] the process of "construction of memory" of the Great War has been articulated over the long term, declining in very different practices, orientations and meanings.

In the immediate post-war period, for example, the "memory" of the conflict took on a totally different meaning from the current one, and was essentially translated into countless commemorative practices based on the celebration of the martyrdom of soldiers, venerated as "national heroes", with almost sacred forms of worship. At that moment in history, in fact, the 'wounds' inflicted by the conflict were still open and the pain they caused was excruciating: the 'landscapes of war' were identified exclusively as 'places of sacrifice', vast 'open-air cemeteries' whose soil was soaked with the blood of millions of young innocent

258 Law 78/2001, as already explained in Chapter 2.

259 See footnote 127 Chapter 2.

lives. Compared to what today is universally "felt" as a "duty of memory" towards a set of physical remains recognised as heritage (the vestiges), communities claimed a sort of "right to forget", a conscious will to forget those landscapes, and with them the atrocities of war, replacing the horrors of mass death with palliative forms of "sacralisation of the fallen". Gradually, such actions of 'martyrdom rhetoric' became more and more widespread and governments themselves systematically employed such shared practices to elaborate mourning as a strong element of social cohesion, to strengthen the sense of belonging of communities and thus reinforce the social fabric.[260] In addition to the organisation of 'victory parades' and other commemorative events, from an operational point of view this attitude essentially took the form of the layering of new layers of what came to be known as the 'architecture of remembrance', i.e. the construction of large memorials and various war cemeteries.[261]

Only with the passing of time, and after several actions of spoliation, sometimes legitimated also at a legislative level (actions of the recuperators), did the approach towards the different warscapes change, developing an increasing interest in the vestiges of the Great War, identified no longer only as material remains of the tragic event of the war, but as physical evidence on which the "signs" of history were deposited. Consequently, the concept of "memory of the Great War" has also evolved, increasingly declining the need to preserve the tangible "effects" of the conflict as material traces progressively recognised as fragments endowed with the value of pure monumentality, understood in the most classic and absolute meaning of warning, memento, teaching for future generations, and therefore to be known and preserved to prevent the "risk of loss ".

5.1.1 Socio-cultural 'wounds' after the conflict

Five years after the assassination attempt on Archduke Franz Ferdinand in Sarajevo (28 June 1914), the peace treaty officially ending the First World War was signed on 23 June 1919. The event, held at the Paris Peace Conference in the former Palace of Versailles, was signed by 44 states and definitively marked the end of the Great War, a bloody conflict that cost all participating nations dearly in terms of human lives (Pic. 5.1.).

At three o'clock in the afternoon, Foreign Minister Hermann Müller and Transport Minister Johannes Bell (two members chosen by the German government to represent the nation) entered the Hall of Mirrors

260 For more on these issues, MOSSE, 1990; WINTER, 1995; DI MICHELE, 2018.

261 MINIERO, 2008.

Il Trattato di Pace con la Germania

PARTE PRIMA

Patto della Società delle Nazioni.

Le alte Potenze contraenti, considerato che per dar sviluppo al sistema cooperativo delle Nazioni e per garantir loro pace e sicurezza occorre:

Accettare certi obblighi di non far ricorso alla guerra;

Mantenere alla luce del sole relazioni internazionali fondate sulla giustizia e sull'onore;

Osservare rigorosamente le sanzioni del diritto internazionale ormai riconosciute siccome regole di condotta effettiva dei Governi;

Far che regni la giustizia e scrupolosamente si rispettino tutti gli obblighi dei trattati, nei mutui rapporti dei popoli organizzati;

Adottano il presente patto, istitutivo della Società delle Nazioni.

Art. 1. — Sono membri fondatori della Società delle Nazioni, quelli dei firmatari, i cui nomi figurano nell'allegato al presente Patto e gli Stati, pure nominati nell'allegato, che avranno aderito al presente patto, senza alcuna riserva, per mezzo di una dichiarazione depositata al Segretariato, entro due mesi dall'entrata in vigore del Patto, e di cui sia data notizia agli altri membri della Società.

Qualsiasi Stato, Dominio o Colonia che si governi liberamente e non designato nell'allegato, può divenire membro della Società, se la sua ammissione è pronunciata dai due terzi dell'Assemblea, purchè egli dia effettive garanzie del suo sincero intendimento di osservare gli impegni internazionali e accetti il regolamento stabilito dalla Società riguardante le sue forze, e i suoi armamenti militari e navali.

Ogni membro della Società può, dopo un preavviso di due anni, ritirarsi dalla Società alla condizione ch'egli abbia adempiuto in quel momento, a tutti i suoi obblighi internazionali compresi quelli del presente Patto.

Art. 2. — L'azione della Società, quale è definita dal presente Patto, è esercitata da un'Assemblea e da un Consiglio, assistiti da un Segretariato permanente.

Art. 3. — L'Assemblea è composta di Rappresentanti dei Membri della Società; essa si riunisce in tempi determinati ed in qualsiasi altro momento, ove le circostanze lo esigano, alla sede della Società od in qualsiasi altro luogo da designarsi.

L'Assemblea è competente a giudicare su qualunque questione che rientri nella sfera di attività della Società o che leda la pace del mondo.

Ogni Membro della Società non può contare più di tre Rappresentanti nell'Assemblea e non dispone che di un voto.

Art. 4. — Il Consiglio si compone di Rappresentanti degli Stati Uniti d'America, dell'Impero Britannico, della Francia, dell'Italia e del Giappone e dei Rappresentanti di quattro altri Membri della Società. Questi quattro Membri vengono liberamente designati dall'Assemblea in tempi che a questa piacerà di scegliere.

Fino a che la loro nomina non sarà fatta, i Rappresentanti del Belgio, del Brasile, della Spagna e della Grecia sono membri del Consiglio.

Il Consiglio può, con l'approvazione della maggioranza dell'Assemblea, designare altri Membri di cui vi sarà permanente Rappresentanza del Consiglio, esso può con la stessa approvazione aumentare il numero dei Membri

Il Trattato di Pace con la Germania 1

Pic. 5.1 - Versailles Peace Treaty, 23 June 1919, first page

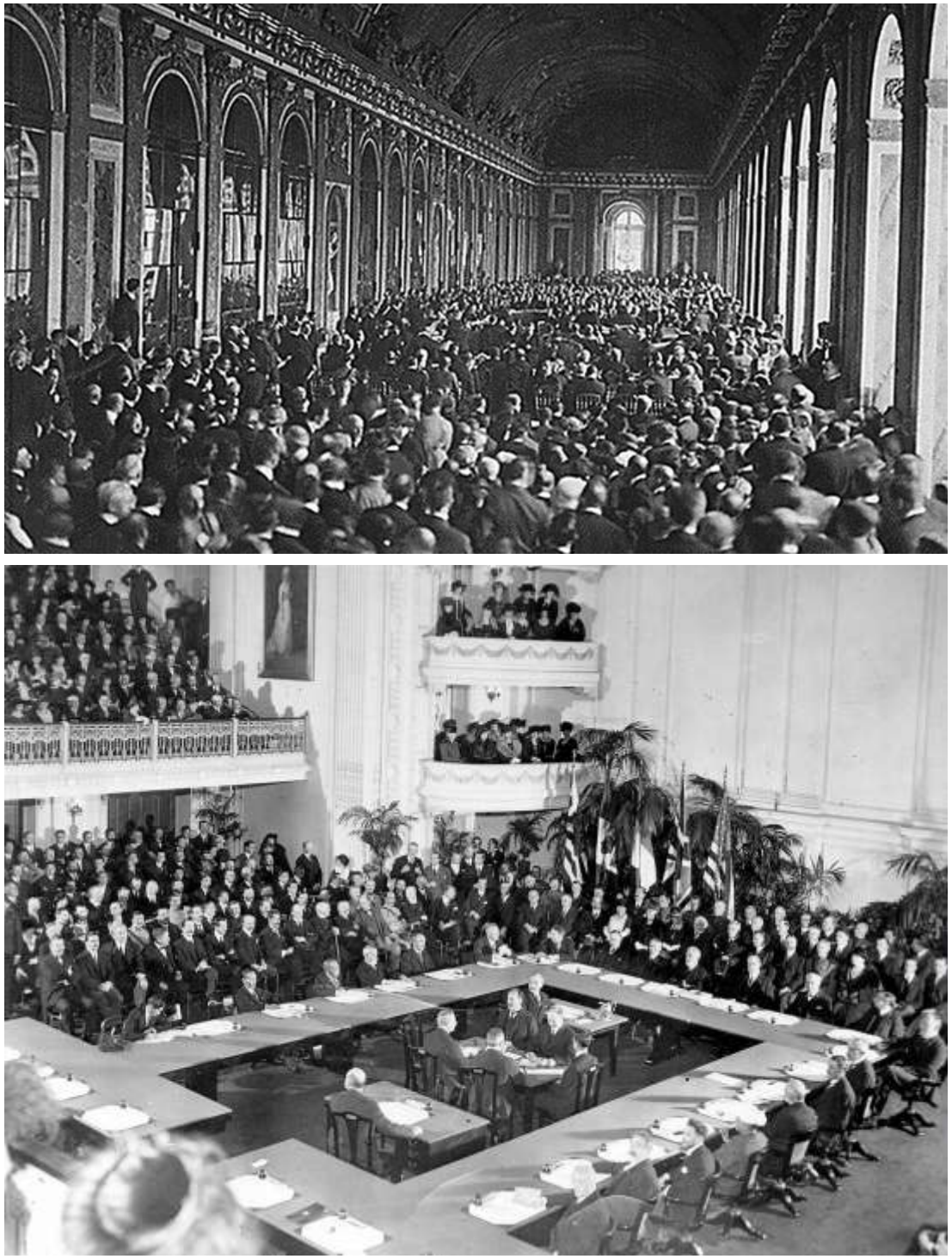
in Versailles to sign Germany's surrender to the victorious powers, following real threats of a resumption of the war if they did not do so[262](Pic. 5.2). Austria and Hungary did not attend the 'conference', but were obliged to sign the final treaty on 28 June. In Germany, the surrender conditions of the treaty were received with great disbelief and anger: the allied powers of France and England[263] had foreseen heavy penalties (132 billion marks would have been an impossible sum to pay for any nation) and territorial surrenders that would, in fact, have greatly penalised the German country[264] (Pic. 5.3). In addition, Germany was indicated in the treaty as being solely and completely responsible for the involvement of all international forces in the war:

"*[...] causing all the loss and damage to which the Allied and Associated*

262 The United States of America never ratified the treaty because they complained about the excessive amount of reparations, but mainly because, for President Wilson and the United States, the focus was on defining the new European borders to succeed in amplifying American control over Europe. According to an innovative interpretation of popular sovereignty, the establishment of a ‘just peace’ was among the American president’s objectives through the redefinition of the system of international relations. The critical issues advocated by Wilson were the implementation of the principle of national ‘self-determination’ (governments based on national sovereignty) and the establishment of a League of Nations to guarantee collective security and peace. In the states that were to be formed, religious and ethnic differences were secured and protected; the American president’s goal was to consolidate his country’s global domination, both economically and politically. See MINIERO, 2008.

263 More than thirty states of the coalition that had won the war took part in the peace negotiations, but participation did not mean active participation in the decisions. Assigned decisions exclusively to the ‘Council of Ten,’ which at the end of March 1919 became the ‘Council of Four,’ formed by the French Prime Minister Georges Clemenceau, the American President Woodrow Wilson, and the British Prime Minister Lloyd George. The Italian Prime Minister Vittorio Emanuele Orlando had less influence, as Italy withdrew from the conference towards the end of April in protest at the failure to take into account the claims of the Adriatic port of Fiume.

264 The basis for German indignation was Articles 231 and 232 of the Treaty of Versailles: the former placed the sole responsibility for the outbreak of war on Germany and its allies, while the latter stipulated that, because of this guilt, Germany would have to pay reparations for the damage caused. Germany, therefore, had to cede Alsace-Lorraine and, temporarily, the Saar to France; to Belgium went the districts of Eupen and Malmédy; to Denmark, North Schleswig. To Poland, Upper Silesia, Posnania and the “Polish corridor”; Danzig was made a free city-state under the protection of the League of Nations; Lithuania was given the territory of Memel; all German rivers were internationalized; the left bank of the Rhine, with the three bridgeheads of Cologne, Koblenz, Mainz, would be subject to occupation for 15 years; in addition, Germany lost all colonial possessions, which went to France, Great Britain and Japan. Germany undertook to pay reparations, the amount of which was not fixed; its army was reduced to 100,000 men, with a fleet of 108,000 tons, without heavy weapons or aviation. The controversy against the Treaty of Versailles was carried on by extremist right-wing groups. It was then taken up by the propaganda of the “revisionist” powers, who wanted to modify its clauses and effects more or less significantly, such as Germany, Hungary, and Italy. Source: Treaty, Encyclopaedia Treccani Online.



Pic. 5.2 - Signing of the Treaty of Peace, Hall of Mirrors, Versailles

Governments and their nationals have been subjected as a consequence of the war imposed upon them by the aggression of Germany and her allies"[265].

The aim of France and England was clearly to inflict a heavy blow on the German country, thus preventing any rapid possibility of recovery, which would have entailed political and economic disadvantages for both victorious nations.

All in all, the economic problems that the conditions of the Versailles peace brought about for Germany were the main cause of the end of the Weimar Republic, leading to new instability and internal conflicts, which benefited the development and increasing affirmation of nationalist sentiments and parties (including that of Adolf Hitler), a clear prelude to the outbreak of the Second World War.

After the first five parts7in which the new borders of Germany and the political clauses at the European level were described, the sixth part of the treaty dealt with the important issue of 'prisoners of war and graves', an apparently less significant, but absolutely contingent issue at that time, and strategic for the whole of Europe.

Specifically, in Part VI Section II, Articles 225 and 226:

«*Art.225.The Allied and Associated Governments and the German Government will cause to be respected and maintained the graves of the soldiers and sailors buried in their respective territories. They agree to recognize any Commission appointed by an Allied or Associated Government for the purpose of identifying, registering, caring for or erecting suitable memorials over the said graves and to facilitate the discharge of its duties. Furthermore, they agree to afford, so far as the provisions of their laws and the requirements of public health allow, every facility for giving effect to requests that the bodies of their soldiers and sailors may be transferred to their own country.*

Art.226. The graves of prisoners of war and interned civilians who are nationals of the different belligerent States and have died in captivity shall be properly maintained in accordance with Article 225 of the present Treaty. The Allied and Associated Governments on the one part and the German Government on the other part reciprocally undertake also to furnish to each other:

(1) A complete list of those who have died, together with all information useful for identification;

(2) All information as to the number and position of the graves of all those who have been buried without identification.»

As can be seen from the body of the text, attention was focused on some significant cross-cutting issues, in fact, for all the nations involved,

265 Treaty of Versailles, Part. VIII, Reparation.

given the number and heterogeneity of the victims: the maintenance and care of the graves of non-German soldiers and sailors who fell and were buried in German territories; the recognition, identification and registration of the fallen through the work of commissions chosen by the Allies; the erection of suitable memorials to remember the soldiers killed in the trenches and on the battlefields; the transfer of the bodies to their respective countries of origin, in accordance with the laws and requirements of public health. Similarly to the previous article, also in Article 226 the Treaty urged both parties to cooperate in order to draw up lists of the dead complete with all the information necessary to proceed to the respective identifications, and also to organise the information available with respect to all those fallen soldiers who, during the course of the war, had been buried without being recognised.

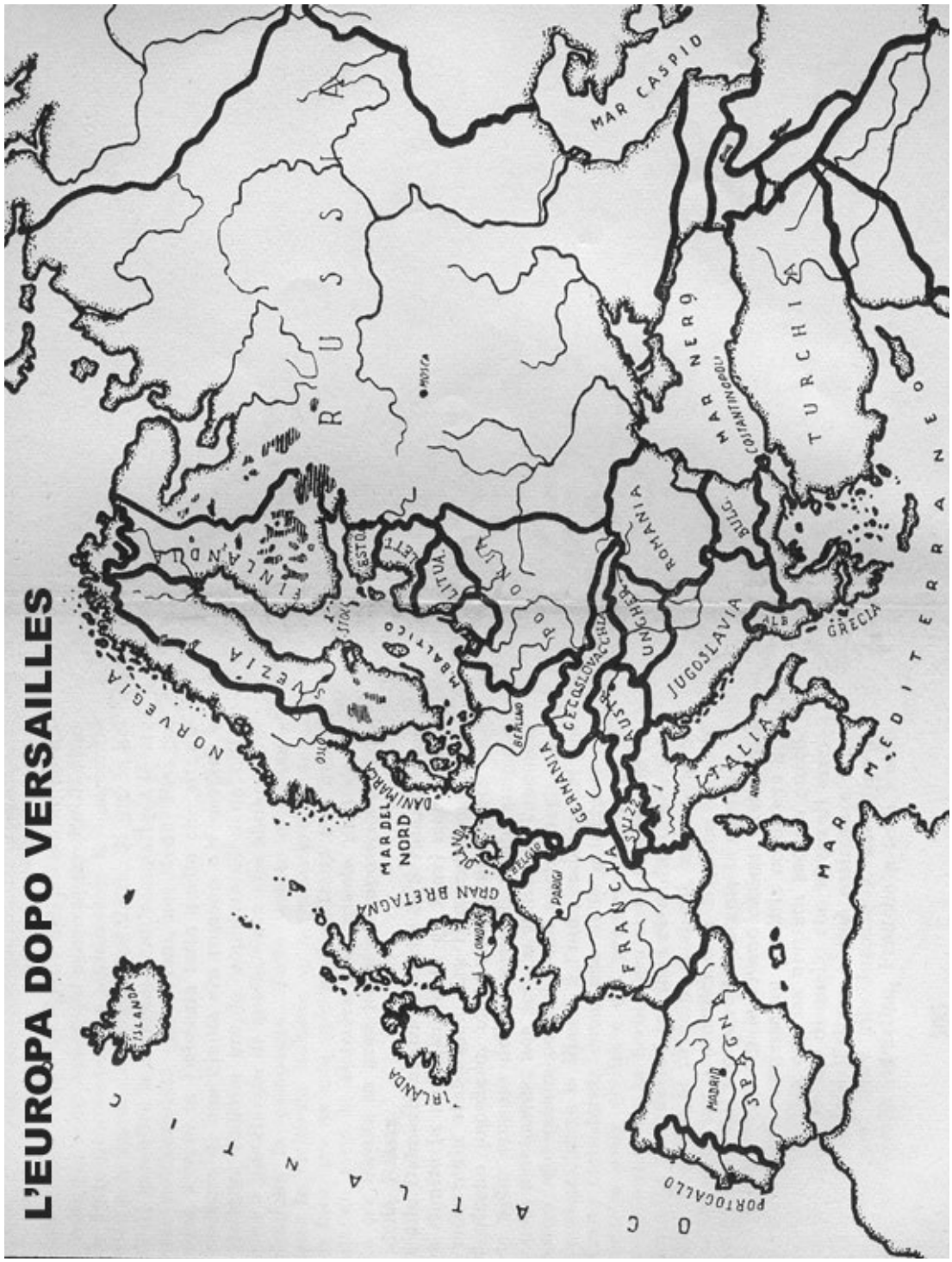
The difficult task of identifying the dead was not only a moral obligation towards the bereaved families, but also symbolically an important form of commemoration of the sacrifice that these soldiers had made in the name of their nation. Motivated by this sense of national pride, the various countries then activated forms of collaboration, even with those who had been the enemy forces, precisely in order to try to restore identity to all those 'nameless dead' scattered across the various battlefields.

The question of the fallen in the aftermath of the Great War did not only represent the mourning for the loss of millions of lives, but the commemoration strategies implemented by the various countries, such as the "cult of the fallen soldier "[266] , became instruments to create new symbols of national identification and aggregation.

The 'construction of remembrance' thus assumed an important political significance, in perfect harmony with the intrinsic nature of the Versailles peace: not a simple treaty between victors and vanquished, but a complex reorganisation of the international political and economic order.[267]

266 MOSSE, 1990; WINTER, 1995; DI MICHELE, 2018.

267 The main victorious forces framed the entire treaty in such a way as to pursue their specific objectives. For France, it was essential to find a solution to the ‘German problem,’ which was, on the one hand, a matter of national security (if there had been no such heavy sanctions, Germany could have recovered quickly and thus represented a political and economic threat), and on the other a form of justice in response to the direct consequences that the war had brought, namely the loss of more than a quarter of the male population in the eighteen to twenty-six age group. For Britain, on the other hand, the idea of French hegemony was as much a threat as German hegemony had been before the war, and British interests clashed with those of France in the Middle East, where vital economic and strategic issues were at stake. The American president, on the other hand, advocated an ideal of ‘just peace’ in the definition of international relations with the principle of national ‘self-determination’ (governments based on popular sovereignty) and the establishment of the League of Nations, which,



Pic. 5.3 - Map of the new borders of the European states, after the Peace Treaty of 1919

The cult of the fallen soldier

The large number of casualties in the First World War makes explicit what was perhaps the most fundamental experience of all wars, the encounter with mass death. The analysis of the attitudes and of the related consequences that, in the first post-war period, were adopted towards the 13 million dead, constitutes a crucial moment both for the understanding of the complex process of elaboration of mourning and 'construction of the memory' of the fallen, and for the interpretation of their symbolic meaning, absolutely decisive and strategic for the subsequent evolution of the European socio-political conditions.

As already discussed in chapter 3, the first observation concerns the fact that no other conflict had been as connected to the physicality of the terrain as the Great War which, as trench and positional warfare, had carved, excavated and modelled the terrain to the advantage of the various actions linked to offence and defence, in some way bringing the daily reality of conflict back to 'human scale'. In this sense, one can understand how soldiers were constantly in contact with death, not only on the battlefields, but also in no-man's land and in the trenches

as the guarantor of peace, was to discourage and make impossible the emergence of new conflicts. Wilson's apparent idealism concealed the precise objective of the United States to reserve for itself economical and political dominance in post-war Europe. See also MINIERO, 2008.

Pic. 5.4 - French soldiers who fell in the Second Battle of Artois, June 18, 1915, France.

themselves: as can be seen from the numerous war diaries of soldiers or veterans, very often the corpses themselves were not buried but became part of the 'war landscape' and could serve as a support for rifles, as reference points for orientation in the trenches or even as 'human shields' to limit exposure to enemy fire[268] (Pic. 5.4).

This direct contact with the end of human life stimulated in the soldiers an ever more radical change in the very idea of death in its religious meaning: at the front and in the trenches the idea of a new Christianity of popular devotion, born outside the official doctrine and which interpreted the experience of death as an occasion of sacrifice for the homeland, similar to Christ's sacrifice for the redemption of the community, and from this point of view 'gain outweighed personal loss'.[269] Death was therefore not only justified by adherence to the aims of war, but became a fundamental moment through which soldiers could become national martyrs and, in imitation of Christ, rise and return to life to fulfil and complete the 'mission of redemption' of the homeland itself.[270]

If the wars of liberation had been compared by the poet Max von Schenkendorf to a new "marvellous Easter", in 1914 Walter Flex[271] compared the war to the Last Supper: Christ revealing himself in war in the sacrificial death of soldiers, a symbol of the nation's best men who acquire an aura of sacredness through their death. In this regard, the sacrifice of soldiers at the front as a metaphor for Christ's Passion leading to the Resurrection found expression in the phrase: "On Christmas Eve the dead speak with human voices"[272], in which the stations of the Cross were symbolically associated with the experience of war. The reference to 'Christmas in the war' was particularly important during the war, as it was not only an opportunity to remember one's loved ones but also the first form of commemoration of the fallen, who were always present in the speeches, thoughts and hearts of fellow soldiers.

An example of this was the Weihnachtsmärchen (Christmas story) that Walter Flex read to the soldiers of his front-line regiment on Christmas

268 See also Chapter 3. See also SAUNDERS, 2007; STEVENSON, 2012.

269 MOSSE, 1990.

270 This concept reflects the propaganda of the German state, which identifies the soldier with the figure of Christ, an analogy found in the iconography of the war such as, for example, postcards showing Christ (or an angel) touching a dead soldier (Pic.5.5). See MOSSE, 1990; WINTER, 1995.

271 Author of The Wanderer between two worlds: an experience of war (Der Wanderer Zwischen beiden Welten) of 1916, a war novel that deals with themes of humanity, friendship, and suffering during the First World War. The Nazis exemplified his romantic and evocative writings as they reflected and fit well with Nazi propaganda about the Aryan race.

272 FLEX, 1991.

Pic. 5.5 - Christ on the grave of a fallen soldier. Official postcard of the Bavarian Committee of Volunteer Nurses.

Eve 1914: the story told of a war widow who, out of despair, drowned herself and her son, but both were brought back to life thanks to an encounter with the spirits of fallen soldiers. The parallelism between the dead soldiers and the angels who brought glad tidings to the shepherds further clarified the mission solemnly entrusted to the soldiers, namely to sacrifice themselves for the redemption of the nation.

Of course, the daily reality of war was very different, less poetic and marked by continuous horrors and tragedies, but it was precisely the combination of these contrasting feelings together with the idea of a symbolic mission supported by this new form of popular devotion that had undermined the traditional "theology of war "[273] that had the great merit of helping the millions of soldiers at the front to overcome their fear of dying: the prediction of a future eternal life as a continuation of the patriotic mission seemed not only to transcend death, but also to inspire life before death itself.

The strategic importance of this ideology became even clearer at the end of the war, when it became the anchor to which to cling in order to overcome the enormous sense of loss felt by many veterans for their fallen comrades, and determined the choices of the different nations regarding the post-war commemoration of their respective fallen. In

273 "The idea that anyone loyal to his family and country by serving his earthly monarch was a servant of God and Christ," in MOSSE, 1990.

other words, the memorials, cemeteries and monuments to the fallen built in the early post-war period were not the signs of a commemoration of mourning with a view to eternal peace, but represented the celebratory rhetoric of joyful sacrifice for the nation, whose task was to keep alive a glorious memory in order to exhort post-war youth to seek the same glory.

The social dimension of grief

"Nobody knows who you are anymore
Infantry soldier
Covered with grass and earth
dressed in the habit of war,
the helmet on your 23
no one remembers why
put down his spade and shovel
carrying your rifle over your shoulder
you climbed the Alpe, you climbed
you sang and died of lead [...]".[274]

The First World War concretely and morally destroyed entire families and, as a consequence, the whole of society, causing an uninterrupted flow of separation and pain.

Analyzing the extent of the trauma through the so-called "circles of mourning"[275] rather than through the reading of numerical data only, it is clear that the social dimension of grief has affected the entire European community in its different levels, including within it a much larger number of people than only direct relatives.[276] If the first group was

274 Poem by Renzo Pezzani , Fallen Soldier: No one, perhaps, knows anymore /why you are buried up there/ in the lost cemetery on the alp, fallen soldier /No one knows anymore who you are /infantry soldier /covered with grass and earth, dressed in a war coat, helmet on your twenty-three /No one remembers why /depositing the spade, the shovel, carrying the rifle on your shoulder/you climbed the alp; you climbed, you sang and died of lead/ and others died with you/ and now you are all of God/ the sun, the rain, the oblivion /You’re nothing but a cross on the mountain /That endures in the whirlwinds and is silent, guardian of glory and peace.

275 SIMONELLI, 2014.

276 For example, let’s look only at the official, albeit incomplete and partial, data. We find that only about 30 percent of those who died in the war made their wives widows, ‘producing’ about six million orphans throughout Europe (with an average of two children per woman);. In contrast, if we look at the bereaved direct ascendants, i.e., the parents of the fallen, we find that in France alone, 1.3 million fathers and mothers

the most directly affected by grief, including the closest relatives such as wives, children, parents, brothers/sisters, the second group extended the wave of grief to what could be defined as the "immediate family", made up of uncles, cousins, nephews, nieces and brothers-in-law, with whom very often the soldiers at the front were able to talk more coldly about the atrocities of war, their feelings and their fears. Finally, the last circle represents the sphere of friends and acquaintances, who were also affected by the loss of a loved one with whom they often had a closer bond than with a family member. From this analysis it is clear that the whole of European society was in mourning, pervaded by grief and the need for news and comfort for the loss of their 'martyrs'.

According to the sociologist Maurice Halbwachs[277], in the post-war period a sort of dualism in the methods of commemoration of fallen soldiers took shape: in parallel with the celebratory strategies organised by the various nations with an approach that today could be defined as 'top-down', various associations developed 'from below', born within the various communities to help and support them. In support of these bottom-up movements, the vast number of people who had fallen in the war left behind a profound and immeasurable legacy of pain that deeply affected entire communities and was the stimulus for the development and diffusion of countless actions to help and support veterans and families of soldiers at the front, for whom the search for information and news about their loved ones was the only way to keep hope alive.

The main objective was to give relief and comfort to the families back home, trying to find any information they could, often with enormous effort, given the unspeakable scale of the losses and the difficulty in finding information about burials. Often these delays and failures were due to the general chaos in the trenches and the poor level of information about the wounded or dead soldiers on the battlefield and in the so-called 'no man's land', whose bodies very often could not be recovered and were therefore left to their fate.[278] In addition to this, the constant bombing and fierce fighting made the identification of the dead increasingly difficult, so much so that, at the end of the war, almost one

lost a child in the war.

277 Halbwachs identifies two types of memory, the internal and personal one and the external or social one: the former retains its unique characteristics. It represents itself in different forms for each person, often mixing with shared memories. Still, at the same time, it crystallizes into a collective memory and can be shared with others. See also HALBWACHS, 1925.

278 Already in Chapter 3, observed that very often, the corpses of fallen soldiers became an integral part of the warscapes themselves, evolving elements behind which to hide and protect themselves from launching new attacks or taking reconnaissance photographs. Once again, this underlines the profound connection between man and territory that characterized the entire unfolding of the First World War.

third of the soldiers who died at the front were not even identified. Even fallen soldiers with dog tags were often not guaranteed to be recognised or recovered, as was the case during the Battle of Gallipoli in 1915, when the heat of the day made the stench of rotting corpses so strong that the gravediggers, who worked at night, could not approach the bodies to carry out identification operations.[279]

All of this caused further doubts and raised the hopes of the families of these soldiers who did not know whether their loved one was alive, dead or missing and wounded. In particular, one of the recurring needs of the bereaved relatives was to have as much information as possible about the last moments of their loved one's life, to try to find some form of relief by identifying with him and, at least for a moment, feeling what he had felt. In this regard, the official army letters, written almost 'serially' with cold and recurring arguments ('the man in question was a good soldier loved by his fellow soldiers and had died without suffering'), were unable to meet the needs of the relatives, which were often instead compensated for by the letters written voluntarily by the fallen man's trench comrades, in a sort of moral obligation and solidarity that had developed in the daily experience of the same difficulties. In fact, the comradeship of war that arose in the trenches among soldiers, even if abstract and limited to particular moments, and the sharing of the pain of surviving in such dangerous conditions, often led to the building of strong and deep bonds, repeatedly recalled in every memoir. The following poem, written by Gunner Manning in memory of his friend Alan Llyod, and sent to his widow, is significant in this regard:

"*In memoriam*
From that sad day a year has passed
That God brought my dear friend to himself
God called him back to himself,
It was his will.
I cannot forget him.
How I miss you, dear friend!
I often wish you were here,
when friends are few and tribulations many.
Oh, dear friend, how I miss you!"[280]

In addition, many voluntary associations and large-scale solidarity

279 For more on the Battle of the Dardanelles, see also CAMINITI, 2008.

280 WINTER, 2014, p. 73

groups were set up to try to help and support civilians and to alleviate the suffering of the bereaved more or less directly. In some countries, the state also took an interest in the needs of the population, especially widows and orphans (especially in France and England), trying to contribute in some way to their survival, albeit with minimal and insufficient aid. In other cases, however, totally or partially private organisations were set up, as in England and Belgium, countries that chose the system of subsidized freedom, i.e. entrusting solidarity and aid solely to private organisations. In addition to these associations, there were also many other organisations whose only aim was to inform and maintain contact between the soldiers at the front and their families: first and foremost the 'International Red Cross Movement', which was recognised by all the belligerent states on the basis of seven principles (Humanity, Impartiality, Neutrality, Independence, Voluntariness, Unity. Universality)[281], which have characterised the association since its inception but were only officially adopted during the 20th International Conference held in Vienna in October 1965.[282]

The Red Cross volunteers tried to accompany the families of the soldiers with closeness and competence, both in the search for missing persons and prisoners, supporting the hopes of relatives and friends,

281 HUMANITY. The Red Cross & Red Crescent Movement was founded to bring aid without discrimination to the wounded on the battlefields. It works in the international and national fields to prevent and alleviate human suffering in all circumstances, ensure respect for the human person, and protect human life and health; it promotes mutual understanding, friendship, cooperation, and lasting peace.
IMPARTIALITY. The Movement makes no distinction of nationality, race, religion, class, or political opinion. It strives to alleviate people's suffering solely based on their needs, giving priority to the most urgent cases.
NEUTRALITY. To continue to enjoy the confidence of all, the Movement refrains from participating in hostilities of any kind and political, racial, and religious disputes.
INDEPENDENCE. The Movement is independent. As auxiliaries to the humanitarian services of their governments and subject to the laws of their respective countries, the National Societies must always maintain their autonomy so that they may be able at all times to act by the principles of the Movement.
VOLUNTARINESS The Movement is an institution of voluntary relief not driven by the desire for profit.
UNITY There can only be one Red Cross association in the country, open to all and extending its humanitarian work to the country's whole.
UNIVERSALITY The International Red Cross & Red Crescent Movement, within which all National Societies have equal rights and the duty to help each other, is universal.
Source: www.cri.it/storiaeprincipi

282 After the war, in 1919, an American Red Cross leader, Henry P. Davidson, proposed that these resources should also be used in peacetime and laid the foundations for the foundation of the League of Red Cross Societies on 5 May 1919 in Paris, which was later renamed the International Federation of Red Cross and Red Crescent Societies in 1991. The motivation was linked to the resources and availability provided by this association during the first conflict and afterward.

and in the difficult moments of accepting losses. In spite of its atrocity, the certainty of the death of a loved one was often the best way to definitively break the heartbreaking illusion that tormented those less fortunate relatives who saw the search stop without a definitive result: security forced them to irreversibly accept mourning, while doubt kept hope alive, amplifying pain and suffering even more.

The social dimension of mourning particularly affected widows who, though devastated by the pain of loss, had to find a way to survive by coping with all the hardships of war, sometimes going to work in war factories to replace husbands, boyfriends and children. Millions of women were faced with an uncertain economic future for themselves and their children, and in this respect, once again, it was some voluntary associations that filled these problems, such as in Paris, where in 1917 an assembly of 14 French organisations was set up to help war orphans and their mothers through a kind of 'adoptive parenthood'. On the opposite front, alongside the concrete actions of the volunteers, states tried to support widows and mothers through a "rhetoric of mourning", through the identification of mothers with the "Mater Dolorosa", as in Italy where Clelia Pizzigoni Calvi, mother of four sons who died in the war, was decorated by the king and Mussolini with 25 gold and silver medals, becoming a reference figure for other mothers who had lost their sons for the Fatherland.

"There is in the women of the Great War a sentimental loyalty that is not limited to memory. Maria Boni, from Rome, did not want to be far from her husband Costantino Brighenti, a major posted to Libya [...] Maria obtained the title of "troop assistant" from the government of the colony: she was one of the first Red Cross nurses to live among the soldiers".[283]

The dimension of mourning also affected all the veterans, the invalids and the mutilated of war, who had to face not only the spiritual wounds of the war, but also the tangible signs that the experience of war had irreparably impressed on their bodies. During the war Italy had millions of wounded, including 500,000 amputees who filled military hospitals in the first months of the war: wounds to the face[284] and abdomen were

283 Maria is the only woman of the Great War to receive the gold medal for military bravery. The motivation for once does not need to add rhetoric to the facts: “During the long blockade of Tarhuna, she was an inciter and example of military virtue; with a very high and strong spirit, she lavished her care on the wounded and dying, comforting them with the infinite resources of her sweet femininity. On 18 June 1915, following the garrison retreating to Tripoli, she resolutely refused to save herself, wanting to follow the troops’ fate in CAZZULO 2015.

284 Facial amputees and their plight, often kept silent because it gave the dimension of what the war meant, was brought to light by the documentary filmed in 2004 by Yervant Gianikian and Angela Ricci Lucchi, entitled, Oh! Uomo. Based on the verses

Pic. 5.6 -
Otto Dix, Die Skatspieler/
Kartespielende/
KriegsKrüppel,
olio su tela, 1920.

the most atrocious and surgery, still in the experimental stage, carried out operations that often had the flavour of a 'Dr Frankstein'. In this field, for the first time, Italy was one of the most avant-garde countries, where military health implemented a series of initiatives that led to the establishment of special hospitals for men who, after the first treatment in the rear, needed more complex operations. One example was the Rizzoli hospital in Bologna, where Dr Arturo Beretta asked to be sent to the Karst front so that he could intervene immediately in case of emergency. In other European countries, the memory of this part of humanity was passed on through the work of artists such as Otto Dix, who in his most famous work, 'The Skat Players' (Pic. 5.6) shows the bodies of three characters filled with tubes, probes and prostheses. In France, on the other hand, it was the Gueueles Cassès association that took care of the 'war-disfigured'.

In the light of all these considerations, one can understand how the enormous suffering caused by the still open 'wounds' caused by the war and the extent of the losses led to the extension of mourning not only to all levels of the European population, but also over a very long period of time, in which the continuous re-emergence of memory due to constant private or public commemorations did nothing but transform the pain of loss into a constant and always vivid feeling.

of George Trakl, a German expressionist poet who died during the war.

5.1.2 The “rhetoric of commemoration”

As already mentioned in the chapter's introduction, in the immediate post-war period the need to find appropriate forms of commemoration to celebrate the 'heroes of the fatherland' soon became not only a fundamental need for family members, but above all a political necessity and a collective factor for the various states. In the years immediately following the conflict, the enthusiasm of the return to peace had to live side by side with the drama of the millions of dead so that, in addition to the construction of the various war cemeteries, solemn celebrations were organised, such as the "victory parades", and touching commemorations, an expression of gratitude for the sacrifice of the soldiers who died in battle.[285] In this sense, in parallel with the organisation of collective events, an increasing interest in battlefields began to develop from the first months of peace, as "places of commemoration" where the fallen could be remembered and which as such became the destination of real pilgrimages of veterans and relatives.

With a view to reconstructing a sort of general "geography of war memory", it is evident that, after the Treaty of Versailles, the different warscapes experienced a first phase of commemorative reinterpretation in which various processes of "sacralisation of the landscape" were developed, leading to the construction of numerous military shrines[286], commemorative monuments and war cemeteries. In that historical moment, in fact, the recognition of the testimonial value of the material remains of the vestiges prevailed, understandably, over the construction of symbols of a "rhetoric of memory" used mainly to strengthen the national spirit and the sense of belonging through a sort of new "civil religion".

The reflections presented below, although based in a purely historical-anthropological dimension, provide an important cognitive contribution to begin to understand the "practices of narration" that, over time, have accompanied and outlined the complex process of "construction of memory" of the Great War. The definition of how this evolutionary

285 MOSSE, 1990; MINIERO, 2008; SAVORRA, 2019.

286 In the Thirties, numerous memorial shrines were built in which the theme of the walk, the triumphal staircase, or the via Crucis was particularly significant: the importance was not only compositional and architectural but above all symbolic of the upward journey of a pilgrimage undertaken by veterans and their families, as well as by groups of students, associations and parties. As an example, we would like to mention some important shrines built in Italy: alongside the 12 shrines built by Greppi and Castiglioni (Grappa, Redipuglia, Caporetto, Timau, San Candido, Passo Resia, Colle Isarco, Pian di Salesei, Bezzecca, Feltre, Pola, Zara), there are those in Bassano, Stelvio, Fagarè, Tonale (Pietro del Fabbro); Castel Dante in Rovereto (Ferdinando Biscaccianti): Pocol in Cortina (Giovanni Raimondi); Asiago (Brenno del Giudice and Orfeo Rossato); Oslavia (Ghino Venturini); Montello (Felice Nori). For an in-depth study on this subject, see also SAVORRA, 2019.

path has affected the different warscapes with different declinations and depths of vision is essential to better understand the quid value that today recognises the set of remains of the First World War as a cultural heritage on which the European identity has been built, thus defining its unique character to be known, protected and transmitted to future generations.

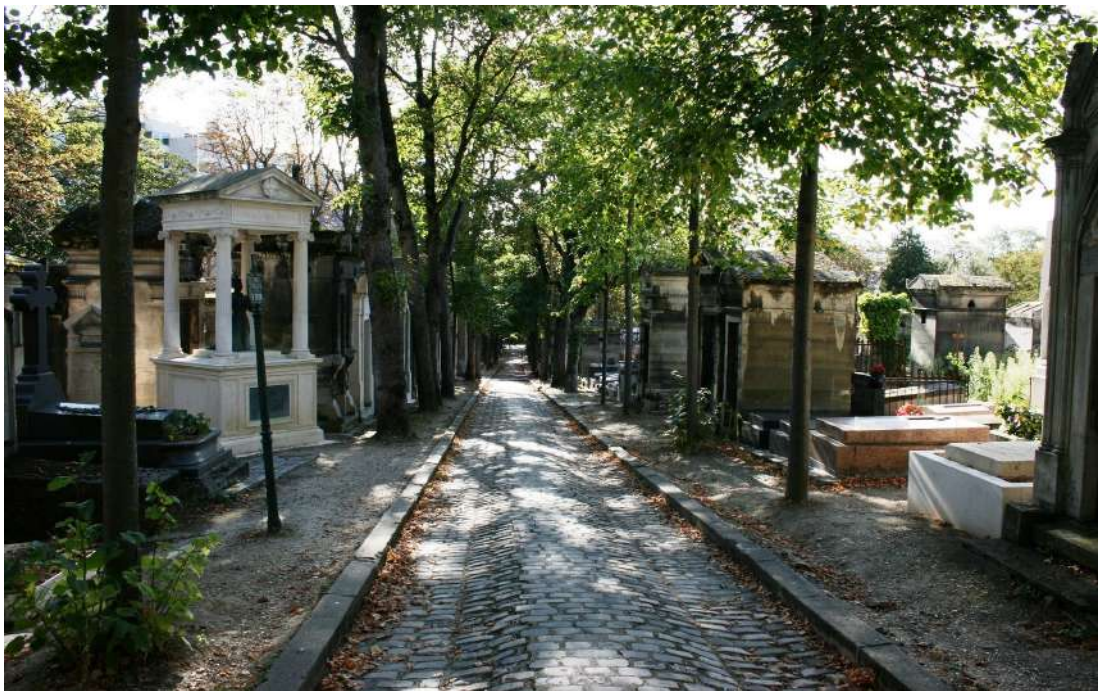
War cemeteries.

Within the cult of the fallen soldier, death in battle represented the sacrifice that soldiers had made for the salvation of their country, thus becoming martyrs, destined to rise again and be sanctified in imitation of Christ. In this ceremonial rhetoric, a fundamentally important aspect was the way in which the various countries, victors and vanquished, thought of commemorating fallen soldiers through the organisation of their own 'war cemeteries', but to fully understand the significance of the central role assumed by the 'cult of the dead', it is necessary to better frame this theme in the socio-political situation of pre-war Europe.

In the age of the Enlightenment, in fact, the idea of death as a real opportunity for 'training in virtue', or rather as a stimulus to an existence that could represent a virtuous example to be imitated, was increasingly affirmed: This new sensibility, which gradually replaced the image of the 'grim reaper' with a sort of educative function of death itself, not only led to radical changes in the structure of cemeteries, incorporating nature as a design element, but was also the right premise for the process that led to the 'sacralisation' of military cemeteries as sanctuaries of the national cult.

The development of the cult of the fallen soldier and the use of myths and symbols as self-representations of the nation with which the people could identify go back mainly to the French Revolution and the German wars of liberation: from that moment on, the nationalisation of death became the common denominator for all forms of commemoration of the dead, privileging first the collective perception of death itself and, only later, the individual dimension of mourning.[287] The transformation of the perception of death also brought about changes in the structure of

287 An example of this is the project for a gigantic collective tomb drawn up in 1801 by the French architect Pierre Martin Giraud, in which he demonstrated the futility of traditional cemeteries, in that the dead would have to be buried in a single large pyramidal monument surrounded by a colonnade with four entrances, made of glass produced from the bones of the deceased. Alongside this single memorial for all the dead of Paris in which the dead were part of the mass, Giraud's project also envisaged the creation of individual medallions with the portraits of the various deceased, which family members would be able to keep in their homes as an inspirational memento for the men and women of the present. See also MOSSE, 1990; MINIERO, 2008; WINTER, 2014.



Pic.5.7 - Some graves in the Père Lachaise cemetery, France, Paris.

Christian cemeteries, favouring more and more a delocalisation towards the outskirts of the cities[288] and an increasingly close relationship with the natural dimension, in accordance with the eighteenth-century idea of the garden as an Arcadian place, a symbol of serenity and happiness. In these gardens, in fact, the burials were not surrounded by a "rhetorical and constructed" nature, but symbolised precisely the fusion of the cemetery with the garden, in which people could meditate on nature and virtue, surrounded by a contemplative aura but without pathos. Despite the reappearance after the French Revolution of a private ostentation of mourning as opposed to the collective dimension, nature always retained a decisive role in the structure of cemeteries, precisely because it was a symbol of authenticity, melancholy and resurrection.

The most famous example in this respect is certainly the closure of the cemetery of the Holy Innocents in Paris[289] and the subsequent opening of the Père Lachaise cemetery, whose structure, designed in

288 The relocation of cemeteries to the outskirts of cities dates back to the end of the eighteenth century, the combined result of a renewed awareness of health and hygiene, probably following the great plague that struck the whole of Europe in the seventeenth century, and a specific desire to ‘banish death,’ relegating it outside the cemeteries attached to city churches.

289 Foresaw the closure because of the conditions in which the cemetery found itself: from the corpses overflowing from their graves to the use of the cemetery grounds as an open-air dump for all those living on the streets.

Pic.5.8 - Other graves in the Père Lachaise cemetery, France, Paris.

close relation to nature, became a paradigm for cemetery architecture throughout Europe (Pic. 5.7 - 5.8) The new cemetery-garden, opened outside Paris in 1804, was organised according to an alternation of tombs, paths, gardens and places of meditation in which to walk and reflect, all without changing the original perception of the landscape. This new idea of cemetery architecture as a large English garden "populated by birds and animals, as well as by the dead", in which death as eternal rest was softened by becoming part of an enchanting landscape, had considerable influence throughout Europe, from England to Germany.[290] In the United States, on the other hand, the cemetery-park movement (1830-1850) developed, which opposed the artificial design proposed by Père Lachaise, proposing that the new cemeteries be set in forests entirely untouched by human hand.[291] The idea was that cemetery-parks, with their power so uncontaminated and organised in their natural cycles of creation and destruction, had a moral function for man, capable of stimulating an ever-growing bond with the land of origin and a renewed patriotism. And these ideologies also arrived in Europe, particularly during and after the First World War, when these

290 In Germany, the best example is the cemetery in the city of Mannheim, enriched with trees. This idyllic place proposed a new vision of death, softened by the serenity of nature.

291 The most famous achievement of the cemetery-park movement was Mount Auburn Cemetery in Cambridge, Massachusetts (1831).

Pic. 5.9. - Treuenbrietzen’s “Woods of Heroes,” 1925.

meanings came back with force in the hearts and minds of the soldiers at the front, who saw in nature and in the forest "my companion, my protection, my shield against the bullets of the enemy", in a mutual identification that consecrated nature as a place of the authentic, as "Arcadia behind the lines", symbol of their homeland, for which the soldiers were called to fight and die. Nature thus symbolised not only remembrance and melancholy, but also the hope of an immortality that each soldier could share through the sacrifice of wartime. In the light of these considerations, it can be understood that the Waldfriedhof cemetery in Munich, designed by Hans Graessel in 1907, was the main precedent for the Italian remembrance parks created after World War I, as well as the so-called Heldenhaine (heroes' woods) in Germany (Pic. 5.9) or the jardin funèbres in France, where each tree represented a fallen soldier.

In the context of the cult of the fallen soldier, therefore, the war cemetery played an important role. After the First World War, a new kind of cemetery had become established, understood as a cemetery-garden symbolising death, no longer seen as a cruel reaper of human life, but as a peaceful sleep for the deceased and a moral warning for those still alive. However, alongside this exhorting function towards a righteous life in accordance with the precepts of morality, military cemeteries were to become symbolic places where personal regeneration was strictly subordinated to the renewal of the respective nations: the cult of

the fallen was to provide the various countries with their martyrs, and consequently the cemeteries and memorials were to be symbols of the strength and virility of national youth, to offer subsequent generations examples to follow.

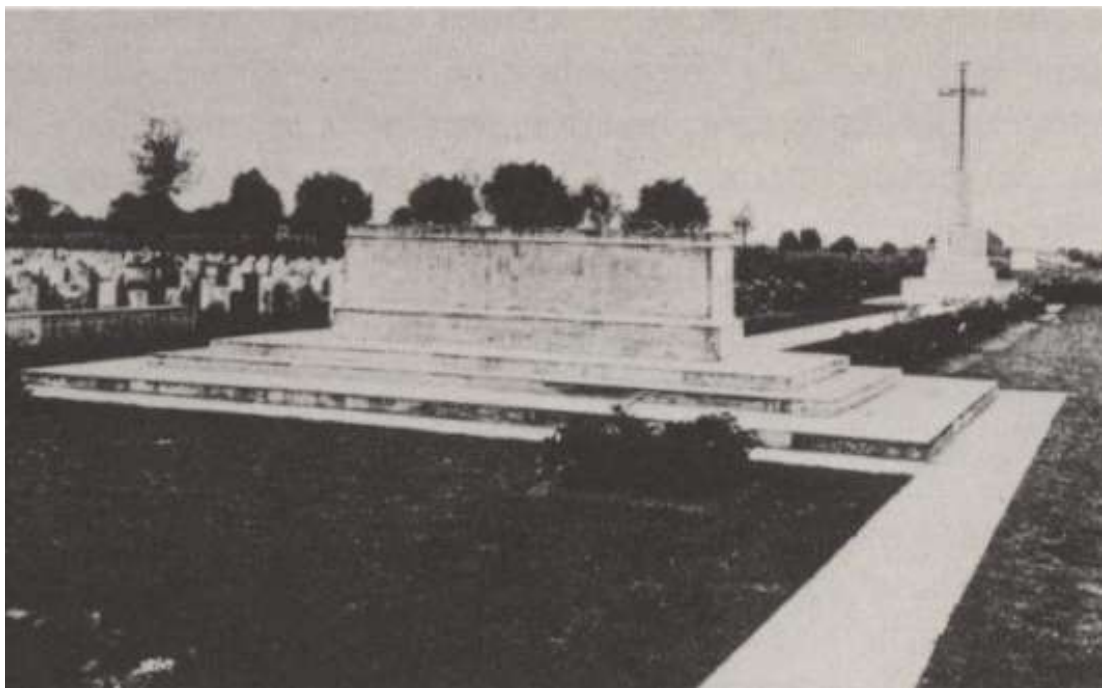
In line with these objectives, units were set up from the very beginning of the conflict to register individual graves and the names of the dead: in 1914 France passed a law for the creation of military cemeteries, and England soon followed suit, paving the way for the architecture of war cemeteries. In Germany, on the other hand, a special unit, the so-called Gräberoffiziere (Graves Officers), was set up at divisional headquarters to look after individual graves. In September 1915, the German Ministry of War issued specific regulations to ensure that the graves scattered on the various battlefields were brought together in separate and dedicated cemeteries, while in all belligerent nations organisations were set up to design and maintain the architecture of the commemoration: in the victorious countries it was the governments themselves who initiated these practices[292], while in the defeated nations the peace conditions had been so harsh that the state did not have the financial means to take care of the fallen, and therefore private associations took on this task. In Austria the "Black Cross" and in Germany the "Volksbund Deutsche Kriegsgräberfürsorge" (created in 1919) soon claimed all activities associated with the memory of the fallen, such as the establishment of the Volkstrauertag (day of national mourning); However, their activities were in fact rather limited, as most of the German dead were on foreign soil, and the Treaty of Versailles had made it obligatory for every nation to take care of enemy dead buried on its own territory.

Most of the cemeteries of all the belligerent nations retained a very similar basic layout and symbolism, but the leaders of these models were undoubtedly the British allies, and an analysis of their holy fields can provide useful information for understanding their essential features. The Commonwealth War Graves Commission (CWGC) was the intergovernmental organisation that managed (and still manages) the war graves of Commonwealth countries internationally. Consisting of six independent member states, the main function of the organisation was to identify, record and preserve the graves and memorial sites of Commonwealth armed forces personnel who died during the world wars. In the fields of Flanders, for example, the cemeteries maintained

292 In England, the War Graves Commission was established, a commission representing the government but acting autonomously (in keeping with British tradition) under a royal charter, which had sole responsibility for the planning and care of military cemeteries. On the other hand, in keeping with its tradition of centralization, France entrusted matters relating to military cemeteries directly to the Secretary of State for Veterans of the Front. In Germany, the Volksbund Deutsche Kriegsgräberfürsorge (created in 1919) was responsible for this, while in Austria, the task was taken over by the Black Cross.

by this association were scattered throughout the region, integrated within population centres as well as lost in the middle of what were once battlefields, now often turned into cultivated areas.

The layout, surrounded by a one-metre high boundary wall made of red bricks, and the presence of an entrance portal on whose lintel the name of the cemetery was engraved, were the first common feature of all these holy camps, making them immediately recognisable. More specifically, the whole structure of the cemetery converged around the 'cross of sacrifice' and the 'stone of remembrance', whose symbolism was closely linked to the two different meanings of war sacrifice and resurrection (Pic. 5.10) In the centre was always a massive, solid stone, cut in the form of an altar and engraved with the words 'their name liveth for evermore', directly suggested by Rudyard Kipling, who had lost his son in the war. In some cases there was a chapel with a representation of the resurrection in place of the stone of remembrance, accompanied by a book on which were written all the names of the fallen buried in the cemetery. Although the stone was conceived by the architect Sir Edwin Lutyens as a pantheistic symbol, the profound link with the Christian meaning of sacrifice and rebirth was evident, as was the importance given to viewing the fallen not as a series of individuals but as a united group, in a kind of metaphor for the camaraderie of war, skilfully represented by the regularity and uniformity of the arrangement of the graves and headstones. Another important feature was the contrast between the use of local materials for the stone, chosen from the most



Pic. 5.10. British military cemetery in Vlamertinghe, at the center the Stone of Remembrance and the Cross of Sacrifice.

resistant lithotypes available locally, and the choice of typically English shrubs and plants for decorating the tombs: from the moment they were created, in fact, the aim was to recreate a small English space in a foreign country, making direct reference to the cemeteries of country churches, a not accidental link that underlined how, at the time, England was a society anchored in the past, despite industrial progress. Apart from all the cemeteries in the Flanders Plains (see Tab. 5.1), other similar examples of this type are for instance the Kensal green (All souls) in London (Pic. 5.11) or the British cemetery Arques la Bataille in the Seine Maritime region of France.

In German cemeteries, on the other hand, the centre of gravity of the entire layout was not the stone or the cross (also present in these cases, but often in out of the way and not in the centre) but rather the soldiers' graves as a whole, which embodied the camaraderie of war in a strict uniformity given by the replacement of the tombstones with the 'Iron Cross', the highest German military honour dating back to the wars of liberation. A simple and ascetic atmosphere was to reign in the holy fields, and to ensure order and simplicity it was the communities that paid and not the families of the fallen. Unlike English cemeteries, for example, it was not even possible to bring flowers and decorative

Pic. 5.11. - Kensal Green (All Soul's) Cemetery in London, view of the "Cross of Sacrifice" and some of the graves.

Pic. 5.12. - A Totenburg. German military cemetery at El Alamein, designed and built by Robert Tischler (1956 -59).

plants, precisely to maximise the uniformity of the graves and the symbol of national unity: the few individual graves, in fact, had to be as discreet as possible because, as the principal architect of the Volksbund Deutsche Kriegsgräberfürsorge Robert Tischler stated, the fallen man was first and foremost a member of the nation. A case in point is the Cologne South Cemetery in the Nordrhein-Westfalen region of Germany. This view of the cemetery as a place of collective memory rather than individual remembrance is best understood in the so-called Totenburgen (Pic. 5.12) the fortresses of the dead. In the years before the Second World War, many such fortresses were built, all of them looking like huge fortifications with massive walls surrounding an open space on whose walls the names of the fallen were inscribed and inside which was a stone or patriotic altar, under which was a crypt in which the bodies were buried.

A final aspect to which Germany attached particular importance was the creation of the so-called Heldenhain, the forests of heroes, military cemeteries surrounded by nature. The Great War had demonstrated the destructive potential of technological development, while nature, on the other hand, represented safety and thoughtfulness, the immutability of time while renewing itself but preserving its identity. In the light of these reflections, the strategic importance of the close relationship between German nationalism and the cult of nature becomes clear. Trees, usually oak as a symbol of the German spirit, took the place of rows of graves and were arranged to form an empty space in the centre in

which to place an unhewn stone boulder, a symbol of the ancient power of nature. Approved by Field Marshal von Hinderburg and designed by the landscape architect Willy Lange, the Heroes' Forests sprang up in large numbers mainly in Germany, but the use of nature also greatly influenced the Jardin Funèbres called for by Edouard Herriot in France, some cemeteries in Austria and the famous 'Parchi della Rimembranza' in Italy.

Victory parades

The first forms of nationally organised commemoration of the millions who had fallen in the war began to appear in the aftermath of the signing of the Paris Armistice, when the idea of a large victory parade was born, which would have completely rearranged the tried and tested celebration schemes of nineteenth-century origin.[293]

The signing of the Treaty of Versailles on 28 June 1919, which marked the end of the work of the Peace Conference, was in fact a moment of joy and pride for all the victorious states, and in particular for the French nation which had seen its longed-for victory crowned, both in political and economic terms. These sentiments stimulated France's reflections to set up a grandiose celebratory apparatus capable of testifying to the French "apotheosis of victory", and they were immediately put into practice by the government architect, Guillaume Tronchet[294], who quickly began work on the project to decorate the Champs Elysées, starting from Place de l'Ètoile to Place de la Concorde. These symbolic places in the French capital marked the route of the traditional parade on 14 July, already a national holiday for France[295], now chosen as the date for the great French parade, and destined to become the reference for the subsequent 'victory parades' in Brussels and London. The popular character of the traditional parade was replaced by patriotic and nationalist sentiments aimed at celebrating the greatness and power of the nation and commemorating the 'war martyrs' who had sacrificed themselves for their country. The entire ceremony was organised in two main moments: the day of 13 July was dedicated to the memory of the

293 It is no coincidence that the design and idealization of the Victory Parade were carried out in conjunction with the celebration of 14 July, the storming of the Bastille, and a national holiday for France. The apparatus formed the structure of the subsequent celebration, held on 11 November of the following year, to commemorate and celebrate the signing of the Armistice with Germany (Armistice of Compiégne) at 11 a.m. on 11 November, was also designed to commemorate the Armistice.

294 Guillaume Tronchet (22 October 1867 - 7 February 1959) was the French architect to organize the parade celebrating the French victory in the Great War.

295 During the war, the celebration of this event had become an opportunity to emphasize and exalt patriotic and unity sentiments, as demonstrated by the parade itself, which had seen allied troops parading alongside French troops.

fallen at the Arc de Triomphe[296], the enormous monument wanted by Napoleon under which the cenotaph was placed, a sort of truncated pyramid surmounted by a tripod obtained from the fusion of the remains of a bombard destined to be the reference point for the entire parade.

"*Thousands of citizens gathered around the Cénotaphe in silence throughout the day, then on the night of the 13th to the 14th [...] a wake was held. As darkness fell, the blue smoke from the tripod was pierced by the beams of the photoelectric lights. At 10pm, Clemenceau paid his respects and exchanged a few words with those present. Then numerous delegations arrived in succession [...] at dawn the Cénotaphe, covered with flowers, was slowly pushed into the Place d'Etoile*".[297]

The following morning, the long-awaited parade began, strongly emphasising the tragic legacy left by the conflict: the procession was opened by a thousand amputees in uniform, some in wheelchairs and others on foot, a symbol of the million invalids that the State had to provide for. The pathos of the ceremony was enormous, especially when the amputees paraded past the cenotaph and passed under the Arc de Triomphe. National heroes, victorious generals and troops marched in a seemingly endless procession that lasted all day. Once the procession was over, an aura of silence and recollection reigned around the monument, transforming the cenotaph into a symbol of national piety (Pic. 5.13 - 5.14).

The example set by France opened the way for the organisation of the 'victory parades' in London and Brussels; in the first case, the victory parade took place on 19 July 1919[298] while in Belgium the trilogy of celebrations was organised as part of a visit by the French president Poncarè from 21 to 24 July 1919.

In London, the direction of the event was entrusted to Lord Curzon, head of the Foreign Office, assisted by a commission called the Peace Celebrations Committèé. The aim was to focus on the pomp and solemnity of the event, initially dividing it into four days during which

296 Had discussed creating a tomb to serve as a national symbol and an everlasting tribute to the fallen throughout the war. It came to fruition during the 1919 parade when troops paraded past a catafalque erected under the arch in memory of the war dead. France’s choice would give Britain the impetus to build the Cenotaph, the tomb of the Unknown Soldier.

297 MINIERO, 2008.

298 In the country, the elections of the previous year, which had seen the victory of Minister Llyod George, had subsequently been accompanied by discontent and dissent. The system used, last-in-first-out, had led some of the departments in the ports of Folkestone, Dover, and Brighton that were to return to France to mutiny. Moreover, the treatment of the veterans who now became the responsibility of the state did not meet expectations: this sentiment was compounded by the mockery that the state was holding up these same veterans as national heroes.

Pic. 5.13 - Paris, July 14, 1919. The amputees open the Victory Parade, on the right the Cénotaphe

Pic. 5.14 - Paris, July 14, 1919. The amputees open the Victory Parade, on the right the Cénotaphe

there would be a Victory March through the streets of the city, a whole day dedicated to religious services, one reserved for a major parade of boats along the Thames and finally the last day would be devoted to popular entertainment. During the three sessions held to organise the celebration, the most important was the last one, during which the Prime Minister Llyod George told Lord Curzon that a sort of memorial would have to be built in front of it, similar to the French cenotaph under the Arc de Triomphe. The Prime Minister's choice was controversial, Lord Curzon was against it because the initiative was alien to the traditional British temperament, and Sir Alfred Mond also saw in the monument a religious significance that would have little to do with the patriotic feeling of the parade. Although the completion of the works left little time to organise the event, it was Sir Mond who decided to consult Sir Edwin Lutyens, who had been working with the War Graves Commission since 1917, for the design of a temporary structure to be used during the Victory March. Lutyens proposed and built a cenotaph that would have to be dismantled after the event. But the evocative power of this abstract architectural form with neither religious nor patriotic symbolism succeeded in stimulating such an intense feeling of collective mourning and grief that the cenotaph became the monument par excellence of the commemoration of the fallen of the British world (Pic. 5.15 - 5.16).

As the first anniversary of the armistice approached, France and England together with all the allied nations in Europe, America and Oceania decided that the day dedicated to the memory of the war would be 11 November, in memory of when, at 11 a.m., the fighting on the Western Front ceased.[299]

If the meaning of the war and the cult of the fallen soldier caused important transformations in the commemorative model of these countries, in Italy the situation was still very unstable, above all because the end of the war and the Peace Treaty itself did not correspond to the

299 In the wars of the Italian Risorgimento, there were armistices of particular historical importance. Such as the armistice of Salasco (named after the Piedmontese general who signed it) on 9 August 1848, which closed the first phase of the first war of independence; the armistice of Villafranca (8 July 1859) ordered by Napoleon III, which cut short the Italians’ hopes of complete liberation. The Great War of 1914-18 also ended with armistices, the conditions of which, instead of being laid down by the supreme commanders of the various theatres of struggle, were established by the Supreme Inter-Allied Military Council in Versailles; the delegates in charge of signing the armistices only had the power to develop some administrative rules. In the two main theatres, the armistice of Villa Giusti, which put an end to hostilities on our front on 4 November 1918, was followed by the peace treaty of San Germano on 10 September 1919; the armistice, which put an end to hostilities on the French front on 11 November 1918, was followed by the peace treaty of Versailles on 28 June 1919. For more on the subject, see Armistice, Enciclopedia Italiana (1929).

Pic. 5.15. - London, July 19, 1919, Royal Navy units parade past the Duke of Cambridge's monument.

expectations.[300] These reasons led Italy to move away from the choices made by the French and the British regarding the days dedicated to the commemoration of the fallen, in particular by choosing 3 November (instead of 11 November) as the date to celebrate the national victory, in memory of the coming into force of the armistice of Villa Giusti. Specifically, the choice matured in the context of the discussion about the Caporetto enquiry, which began on 6 September 1919, and the subsequent signing of the Treaty of Saint - Germaine en Laye, according to which the foundations were laid for the creation of the Austrian

300 Discontent with the new world order created in Paris between 1919 and 1920 was not confined to the defeated powers but was intensely felt even in those countries that had won the war but believed they had lost at the peace table. The feeling that one's victory had been 'mutilated' was even more pronounced in Italy, a country that had lost more men in the war than Britain and whose population perceived that the promises made by London and Paris in exchange for intervention in the war had not been taken seriously [...] in the London Pact, which kept secret, agreed that Italy would be entitled to important territories: not only would it retain control of the Dodecanese islands (which it had occupied in 1912, taking them from the Ottoman Empire) and obtain a "protectorate" over Albania, but it was also promised Trentino (which was under the Habsburg Empire), South Tyrol up to the Brenner Pass (inhabited by an ethnic German population), northern Dalmatia and the entire Austrian coast, including the port city of Trieste. [...] by the end of 1918, no longer limited Italy's imperialistic ambitions to the territories that had been promised to it in 1915 but also extended to Fiume (Rijeka), the Adriatic port city that Hungary had administered until the end of the war. See also GERWARTH, 2017.

republic: following the announcement, Mr Gasperotto applauded the army and concluded his speech with the following words:

"*After so much scourge we feel freer, [...] better. Do you see what a miracle our soldiers, sailors, officers and gregari from all the arms and lands of Italy have performed? After discussing the pages of our defeat, the celebration of our great victory should finally be celebrated. And on 3 November, on the first anniversary of our peace, which is the peace of the whole world, on that day let these blessed sons of ours pass under the arches of Titus and Septimius Severus! Let them pass under the triumphal arches of Rome [...]*".[301]

Pic. 5.16- London, July 19, 1919. Before the start of the parade the crowd pauses around the Cenotaph.

The following day the proposal was taken up by the newspaper L'Epoca:

“The honours of the victorious army will take place in Rome on 3 and 4 November, the whole city will be decked out in flags. The troops will parade under the arch of Septimius Severus to renew the Roman rite and will arrive at the Altare della Patria. The procession will consist of fighters, some 10,000 men in all. During the parade of the troops, the bell of the Capitol will ring out”.

The newspaper then went on to get to the heart of the matter, "and to eternalize the country's gratitude to the fallen for its greatness, the names of our 500,000 thousand dead will be engraved on the walls of the Victor Emmanuel III Monument".[302] The issue of engraving the names of the fallen, the consequent creation of a Roll of Honour for the entire nation, and therefore the creation of a true national memorial represented a great novelty for Italy, but the project was not implemented on time as the government's attention was drawn to more contingent political issues, such as d'Annunzio's seizure of Fiume and the discussion of conferring the civic crown on Generalissimo Diaz and Admiral Thaon the Revel. The great victory parade only saw the light of day in 1921, when the army regiments paraded under Rome's triumphal arches and the Vittoriano was consecrated as the nation's altar (Pic. 5.17). Contrary to what happened in the capital, celebrations for the victory in the rest of Italy began in 1919, with patriotic and communal events, such as the commemorations of 4 November in Milan, reported by the Corriere della sera. Not all political forces, however, supported and agreed with these celebrations: l'Avanti, for example, contested the nature of these initiatives as illegitimate because all the dead were innocent victims of the war and the national patriotic rhetoric would have given them the last offence. The protest of the PSI (Italian Socialist Party) took the form of the decision to commemorate the fallen with separate celebrations from the official ones, the so-called 'proletarian commemorations', which spread both in large towns and in smaller Italian municipalities.

301 MINIERO, 2008, pp. 70-71

302 MINIERO, 2008, pp. 73

Pic. 5.17 - Rome, November 4, 1920. The feast of flags

The most striking example was in Milan where, on 2 November, there was a celebration organised by the workers' movement (in the morning) and an official ceremony presided over by the Count of Turin (in the afternoon).

The 'celebration of remembrance': military shrines and memorials to the Unknown Soldier

The organisation of these victory parades and related celebrations represented the necessary stimulus to catalyse political and social interests towards new forms of national unity. The reflections developed above show how, in the immediate post-war period, the need to create forms of commemoration in honour of fallen soldiers had become a fundamental need for all the communities of the belligerent countries: from the legitimate needs of mourning families to the instrumentalisation of trauma in order to stir the feelings of the masses at a political level, all the first forms of commemoration took the form of the construction of monumental war cemeteries and new memorials built in the various homelands in honour of fallen soldiers, more or less unknown. The empty tombs, which had attracted endless lines of mourners and mourners, began to become symbolic places with deeper meanings than the previous cemeteries, which resulted in the need to create a true national monument for the memory of all the fallen of each nation.

In other words, they opted for a real strategy of "construction of memory" that gradually led to the stratification on the different warscapes of new significant layers, consisting of commemorative monuments, shrines and memorials, often built specifically to house the remains of an unnamed fallen soldier, representative, as such, of every soldier who died for his country. This gave rise to the idea of building the famous monuments to the 'Unknown Soldier', which thus represented a political and social opportunity to catalyse the social and political interests of each nation in a single memorial. And it was precisely this uncertainty about the identity of the buried man, military rank, political ideal or religious faith, that brought all social groups together, making the grief collective and universal.

The idea of building a monument to the Unknown Soldier was born in France, still in 1916 during the war, and was realised in the immediate post-war period: on 12 November 1919 (exactly one year and one day after the end of the fighting) the project was officially recognised and it was decided to place the memorial in the Pantheon.[303] For mainly historical reasons, however, it was decided the following year to only honour the Unknown Soldier inside the Pantheon, but to bury him at the base of the Arc de Triomphe as recalled by legislation, unanimously approved, in the following articles:

ARTICLE 1: The honors of the Pantheon will be rendered to the remains of one of the unknown soldiers who fell on the field of honor during the 1914-1918 war. The transfer of the remains will be solemnly made on 11 November 1920.

ARTICLE 2: The same day, the remains of the Unknown Soldier will be buried under the Arc de Triomphe.[304]

Once the location had been decided, the ceremony to select the body was particularly significant for each nation. In France, for example, it was decided that the French Unknown Soldier would be chosen from eight 'nameless bodies' from the eight main French war zones (Flanders, Artois, Somme, Ile de France, Chemin des dames, Champagne, Lorraine, Verdun).[305] The place chosen for the ceremony was the

303 The Pantheon is a famous neoclassical building in Paris that contains the remains of some of France’s most prominent citizens and leaders, including the heart of officer Gambetta Lèon, French politician (Cahors 1838 - Ville-d’Avray 1882), the son of a Genoese father who became one of the most courageous opponents of the empire.

304 Article 1: The honors of the Pantheon will be paid to the remains of one of the unknown soldiers who fell on the field of honor during the 1914-1918 war. The transfer of the remains will be carried out solemnly on 11 November 1920. Article 2: On the same day, the Unknown Soldier’s remains would be buried under the Arc de Triomphe.

305 The recovery operations carried out in the eight war zones (Flandres, Artois, Somme, Ile de France, Chemin des dames, Champagne, Lorraine, Verdun) had come

Pic. 5.18 - Verdun, November 10, 1920. The selection of the body by Auguste Thin: at his side the minister André Maginot

stronghold of Verdun, around which the bloodiest battle of the entire war had taken place, and thus a symbol of the immense sacrifice made by France. On 6 November at 6 p.m., the eight bodies of the unknown soldiers arrived in Verdun, reassembled in oak coffins, and a company of infantrymen and veterans paid military honours. The bodies were placed in the area of the front where the fighting had been most bloody, and on their arrival the commander of the fort, General Boichut, recited the following formula eight times:

"Au nom du soldat inconnu qui va reposer provisoirement à la citadelle de Verdun et qui, peut-etre, aura les honneurs de l'Arc de Triomphe, au nom de tous les soldats inconnus de tous les champs de bataille, ouvrez le ban".[306]

After the ritual proclamations, the coffins were taken to the casemate chosen as the place for the actual selection ceremony, which was packed with wreaths and decorated with flags and banners for the occasion. The body was to be chosen by 'un ancien poilu de deuxieme classe', i.e. a veteran of the Chemin des Dames and Verdun, but he died on the day

across burials containing shapeless remains: French and German fighters, what remained, formed an indistinguishable tangle and the shreds of cloth used for identification were considered sufficient evidence to confirm fallen nationality. In the other seven as well, it was only at the eleventh exhumation that the Terrasses was certain to have found a French soldier. See also MINIERO, 2008.

306 MINIERO, 2008; GERWARTH, 2017.

Pic. 5.19- Paris, L’Arc de Triomphe (today).

of the ceremony, so an equally brave soldier who had carried out the exhumations, Auguste Thin, was selected. The eight coffins, covered to the ground with tricolour flags and decorated with fir branches arranged in the shape of the Lorraine cross, were lined up two by two, while Auguste Thin, together with the fortress commander and pensions minister André Maginot, was to place a bouquet of red and white flowers on the lid of one of the coffins. Thin chose the sixth of the eight coffins (Pic. 5.18), which was transported to Paris and placed in the chapel on the first floor of the Arc de Triomphe where it remained until 28 January 1921, when the French 'Unknown Soldier' was laid to rest in the place of honour at the base of the Arc de Triomphe[307] (Pic. 5.19 - 5.20). On 22 October 1922, the French Parliament declared the eleventh day of November each year a national holiday and the

307 The Arc de Triomphe de Paris, the most monumental of all triumphal arches and built between 1806 and 1836, is located in Place Charles de Gaulle, also known as ‘Place de l’Étoile’ at the western end of the Champs-Élysées. Napoleon built it in honor of those who had fought for France, particularly those who had fought during the Napoleonic Wars. Engraved inside and on top of the arch are all the names of the generals and the locations of the battles. The monument is considered the centerpiece of the historical axis (L’Axe Historique) - a sequence of monuments and major arteries on a route that stretches from the courtyard of the Palais du Louvre to the outskirts of Paris. Groups, friezes, figures, and bas-reliefs are the signature works of James Pradier, Antoine Etex, and Jean-Pierre Cortot. But there is no doubt that the most famous sculpture is the work of Francois Rude: La Marseillaise. Since 20 November 1920, the remains of the Unknown Soldier have been buried under its vault.

Pic. 5.20 - The Tomb of the Unknown Soldier (today) , L'Arc de Triomphe, Paris

Pic. 5.21- The Flame Rekindled Every Evening, L'Arc de Triomphe, Paris

following year, on 11 November 1923, Andre Maginot, the French Minister of War, lit the eternal flame for the first time. Two years after the burial of the Unknown Soldier, the journalist and poet Gabriel Boissy launched the idea of creating a 'Memorial Flame', a sort of large torch intended to be used for the memorial. a sort of large torch destined to remain permanently lit in memory of the fallen and the sacrifice they made for their country. The proposal was welcomed by both politicians and the public, and the project moved forward rapidly. Edgar Brandt, a wrought-iron craftsman, was chosen to make the torch, designed by the architect Henri Favier, which consisted of a circular bronze shield at the centre of which was a cannon muzzle from which a frieze of swords radiated. On 11 November 1923, surrounded by a multitude of ex-combatants, War Minister Maginot lit the flame for the first time and from then on, the flame was never extinguished[308](Pic. 5.21).

The example set by France gave the impetus to build monuments to the Unknown Soldier to other countries, first and foremost Great Britain, which inaugurated the memorial on 11 November 1919. According to the most accredited version, the 'Unknow Warrior' was chosen on the night of 7-8 November in Saint-Pol, a town some twenty kilometres from Arras where the headquarters of the British troops stationed in France and Flanders were located. On the evening of 7 November, the chapel of Saint-Pol received the bodies of four unnamed soldiers who were placed on stretchers covered with the Union Jack. It was the commander-in-chief, Brigadier L.J. Wyatt, who was entrusted by the War Office with the selection of the body, which was placed in a simple casket without ornaments, and immediately closed. The following morning a memorial service was held by three chaplains representing the Church of England, the Catholic Church and the Reform Church, after which the body was transported to Boulogne Castle where it was placed in another coffin made of oak from the royal palace at Hampton Court. The sarcophagus was sealed with two metal bands in the shape of a cross, on one of which a crusader's sword was fixed, chosen from the white weapons in the royal collection in London. Finally, the plaque: 'A British Warrior who fell in the Great War 1914 - 1918 for King and Country' was affixed. On 10 November, the unknown soldier was paid homage by civil and military dignitaries, including the King's representative, Lieutenant Sir George Macdonogh and Marshal Foch. The coffin crossed the town and reached the port, accompanied by Chopin's funeral march, where the destroyer Verdun was waiting for him. On board the ship, four sailors stood by the coffin with their

308 At the base of the Arc de Triomphe is a torch. Every evening at 6:30 P.M. it is relit, and veterans lay wreaths decorated in red, white and blue near its flickering flame. It burns in the darkness to remember the sacrifice of an unknown French soldier who gave his life during the First World War.

heads bowed and their weapons pointing down. At the port of Dover, the arrival of the Unknown Soldier was greeted with military honours rendered by the firing of 19 cannon volleys from the top of the Castle. The cortege made its way to the station, from where the carriage then moved on to London. The repatriation of the Unknown Soldier deeply affected the whole of England, since most of the British fallen were buried on the continent (families found it particularly difficult to visit their remains), as Churchill himself had decided: "those cemeteries will be unlike any other in which rest all those who have shared the common destiny of mankind. They will be built by the wealth of this great Nation and Empire; there is no reason why, in times as distant from us as we are now from the Tudors, the cemeteries of the Great War should not continue to be an eternal and supreme memorial".[309] The decision of the Imperial War Grave Commission not to repatriate the bodies of the British and Empire fallen (1,019,882) was motivated by the desire to give them a final burial as close as possible to the place where they had fallen, in the belief that in this way the memory of the dead could transform the battlefields into true holy fields, but the return of the Unknown Warrior became a symbol of rapprochement between the living, the veterans and all those who had remained buried in Flanders.

In London, the body was laid to rest in Westminster Abbey, which was so full of reminders of English history that it was unable to become the central memorial to the fallen and did not have the evocative power of, for example, French or Italian memorials. Probably for these reasons, as time went on, the real place of worship for the British fallen soldier became the Cenotaph created by Lutyens for the second anniversary of the Armistice (11 November 1920) in the centre of Whitehall Road. The cenotaph, literally "empty tomb" with the simple inscription "to the Glorious Dead", fostered the feeling of collective mourning and succeeded in arousing such deep emotions thanks to the essentiality of its architecture on which, declaring very little with its simple and archaic forms, everyone could "engrave their thoughts, their dreams, their melancholy"[310] (Pic. 5.22 - 5.23 - 5.24).

Pic. 5.22- London, November 11, 1920. The crowd gathered around the Cenotaph

As already mentioned, the rituals of commemoration of fallen soldiers and the need to create a monument-symbol at a national level interested

309 ROUZEAU, AUDOIN, BECKER, 2002.

310 There is an interesting analogy to this type of attraction: Maya Lin's Vietnam Veterans Monument of 1982. Built after the end of the Second World War, it becomes the very example of those thoughts, dreams, and melancholy that grips those who stop to reflect on the meaning of death in war. In its simple form, the monument invites reflection. It is devoid of any rhetorical or celebratory intentions about the nobility of arms or the dignity of dying for a just cause. All one sees is the list of names of the American dead in the Vietnam War and the reflection of their image for those who stop to read.

Pic. 5.23 - November 10, 1920, The voyage of the Soldat Inconnu aboard the Verdun.

Pic. 5.24 - The Cenotaph in Whitehall street, London (Today)

all the countries that had participated in the Great War, not only in Europe but also overseas, especially in the Commonwealth States. The case of Australia is interesting: its soldiers had fought so hard during the battle of Gallipoli that the anniversary of the battle became the date chosen to celebrate the memory of the sacrifice of all those soldiers who died on the front. In spite of the defeat, the courageous action on 25 November became a 'leitmotif' for Australian soldiers and the 'Legend of Anzac'[311] became a key part of the national identity. After the Gallipoli campaign in 1915, Australians from the 1st Australian Imperial Force (AIF) regiment, together with their war correspondent officer Charles Bean, moved to the Western Front in France and Belgium alongside British and French militia, where they fought valiantly, particularly in the engagements at Fromelles and Pozières in July 1916.[312] It was at Pozières that Bean was so deeply moved by the suffering of the Australian men50 that he took it upon himself to ensure that their sacrifice would not be forgotten, and in fact, only a month later, the idea of building a memorial to the fallen Australian soldiers began to emerge. Bean himself imagined what this memorial might look like:

"*on some hill-top - still, beautiful, gleaming white and silent, a building of three parts, a centre and two wings. The centre will hold the great national relics of the AIF. One wing will be a gallery - holding the pictures that our artists painted and drew actually on the scene and amongst the events themselves. The other wing will be a library to contain the written official records of every unit*".[313]

311 With Britain declaring war on the Triple Alliance in August 1914, Australia immediately sent its soldiers to support the Commonwealth. Like all warring nations, Australia was ready to carve out a place for itself in the new world that was forming. So on 25 April 1915, the Australian government launched an expedition with the ultimate aim of conquering Constantinople (now Istanbul), the capital of the Ottoman Empire and an ally of Germany. The action involved storming the Gallipoli Peninsula to open the Dardanelles Strait to Allied forces. Australian and New Zealand forces landed at Gallipoli on 25 April, meeting fierce resistance from the Turkish Ottoman defenders. What had been planned as a bold stroke to take Turkey out of the war quickly became a stalemate, and the campaign dragged on for eight months. At the end of 1915, evacuated Allied forces from the peninsula. In this battle, the future leader of the Turkish resistance, Mustafa Kemal, distinguished himself.

312 In 1916 the first commemoration of Anzac Day was held. 25 April was marked by a wide variety of ceremonies and services across Australia, a march through London, and a sports day at the Australian camp in Egypt. More than 2,000 Australian and New Zealand troops marched through the streets; a London newspaper headline dubbed them ‘The Knights of Gallipoli.’ Marches took place all over Australia; in the Sydney march, convoys of cars carried wounded soldiers to Gallipoli and their nurses. For the remaining years of the war, Anzac Day was used as an occasion for patriotic rallies, and recruitment campaigns and parades of AIF members were held in most cities.

313 “[...]on top of a hill still, beautiful, shining white and silent, a building of three parts, a center and two wings. The center will hold the great national relics of the AIF. One wing will be a gallery, holding the images our artists have painted and drawn on

Although the idea of commemorating our fallen soldiers with a memorial had already been born during the Great War, the realisation of this proposal took much longer. In 1927, an architectural competition was launched in which several architects took part, proposing very interesting but also very expensive solutions. The budget was only £250,000, so two Sydney architects, Emil Sodersteen and John Crust, the authors of the two most convincing designs, were asked to collaborate and come up with a joint proposal that would integrate the monumental vision and the cloister concept while staying within the budget. The final design, to be built at home in Canberra, was accepted and it was not completed and opened to the public until 11 November, National Remembrance Day 1941, when it was opened by the then Governor-General Lord Gowrie. When Australia declared war on Germany on 3 September 1939 and it was realised that the coming war would be on a scale comparable to the previous one, it became inevitable that the Canberra memorial, the construction of which had not yet been completed, would be transformed from a memorial to Australian soldiers who had only fallen in the Great War to a symbol identifying all the 'martyrs' who had sacrificed for their country as a memorial to the atrocities caused by all conflicts.

To understand the symbolic importance of the Australian Unknown Soldier memorial, composed of the memorial area, the gallery of memory (the museum part) and the research centre, one need only think that back in 1992 (on the occasion of the 75th anniversary of the end of the First World War) Australia asked to be allowed to exhume the body of one of its soldiers, Australia asked to exhume the body of one of its soldiers, which until then had been laid to rest in the common cemeteries of the Commonwealth in France, in order to place it inside the Australia War Memorial, in a small octagonal chapel with a dome and walls covered with tiny mosaic tiles and stained glass windows, the work of the Australian muralist Waller, who was an invalid of the Great War, during which he lost his right arm at Bullecourt. In front of the 'Hall of Memory', a narrow courtyard with a pool of water flanked by pavements and shrubs, including rosemary plantations,[314] was built around the 'eternal flame'. Above the courtyard, two long cloisters were built, containing the 'Roll of Honor', a series of bronze plaques on which

the stage and between the events themselves. The other wing will be a library to hold the official written documents of each unit [...] Source: www.awm.gov.au

314 Since ancient times, this aromatic herb has been considered to have memory-enhancing properties, which is probably why it became the symbol of loyalty and remembrance. Rosemary also has another symbolic value that should not underestimate to understand the decision to include it in the Australian memorial courtyard: it grows luxuriantly on the shores of the Gallipoli Peninsula, where Australian and New Zealand troops landed in 1915. Traditionally, sprigs of rosemary are worn on Anzac Day and Remembrance Day.

the names of 102. 185 Australians (servicemen and women) killed in war (including 66,000 World War I casualties) or in peacekeeping operations.[315]

To this day, the Australian War Memorial, behind which the Remembrance Driveway ends[316], commemorates its fallen with moving ceremonies held daily in the courtyard. Every evening, visitors can gather at the entrance to the Commemorative Area to watch the ceremony where the story of one of the 102.158 people whose names are engraved on the "Roll of Honour"[317] After the national anthem and a brief explanation of the ceremony itself, a piper and trumpeter descend from the Hall of Remembrance playing 'Forest Flowers'[318] while family members of the person honoured that day lay wreaths of floral tributes at the base of the 'Pool of Reflection', next to a portrait of the fallen person (if no photographs are available, the portrait is replaced with an image of an Australian flag). Following this, a member of the Australian Defence Force (ADF) tells the story of the soldier being commemorated and recites the Ode[319] of Prayer, before the piper plays the final salute.[320] The ceremonial demonstrates the strong symbolic value of the memorial in Australian communities, as evidenced by the tradition of inserting red poppies[321] in the spaces between the bronze plates of the 'rolls of

315 The presence of the historical archives within the monumental complex has allowed the creation of these index cards called Roll of Honour cards. The cards contain information transcribed directly from written records found during or immediately after the conflict. In recent years the records in the database have been updated.

316 A system of arboreal parks, landmarks, and stops along the road between Sydney and Canberra to commemorate the 24 recipients of the Second World War and Victoria Victory. Inside that Arboreal Park is a small bronze plaque mounted on a large boulder commemorating Indigenous Australians who fought for their country. Source: www.awm.gov.au

317 Unless further additions are made to the Roll of Honour, the ceremonies of remembrance of the fallen, which occur every evening at the memorial, will only see their conclusion in the year 2295.

318 To listen to the song: www.youtube.com/watch?v=UjztXQTa26s

319 During the ceremonies of remembrance, verses are recited to help the listener understand the experiences of the participants in the conflicts; the text repeated in the fourth stanza of the Ode, a poem was written by Laurence Binyon entitled For the fallen (published by The Times in 1914): “They shall grow not old, as we that are left grow old/Age shall not weary them, nor the years condemn/At the going down of the sun and in the morning/We will remember them” They shall not grow old as we that are left grow old/And the years shall not weary them nor the years condemn/At the going down of the sun and in the morning/We will remember them. For complete reading: www.awm.gov.au/commemoration/customs-and-ceremony/poems.

320 To listen to the song: www.youtube.com/watch?v=McCDWYgVyps

321 The symbolic value of the poppy is deeply rooted in Flanders, as red poppies were among the first flowers to appear on the devastated battlefields of northern France

Pic. 5.25 - Australian War Memorial

honour', next to the names of those they wish to honour (Pic. 5.25 - 5.26).

In Italy, the idea of building a national monument in memory of all the fallen began to take shape a few months after the start of the war, in 1915, but became more concrete immediately after the war with the organisation of the 'victory parade' in 1921. As already explained above, in order to properly commemorate the Italian dead, it was proposed to create a real Roll of the Fallen and to engrave their names on the walls of the Vittoriano, in Piazza Venezia in Rome, transforming the monument to Victor Emmanuel III into the Altar of the Fatherland, the place-symbol of the Italian homeland.[322] In 1920, the then Colonel

and Belgium, as if to represent, with their vivid color, the sacrifice of the bloodshed by the millions of soldiers who fell there. The poppy soon became widely accepted in all Allied nations as the ‘flower of remembrance’ to be worn on Armistice Day so much so that, on the anniversary of Armistice Day in 1921, the Australian Returned Soldiers and Sailors Imperial League began selling poppies, made from red silk, made in French orphanages, the proceeds of which were donated to charity.

322 Newspapers of the time, such as l’Epoca, wrote at length about the proposal, even going into operational details of the project, even though it was still in its embryonic phase: “the celebration of the Italian victory brings with it a problem: to ensure that the monument erected to the Father of the Fatherland bears the sign of the triumph fully achieved: to become the true national monument of the new Italy [...] it has been proposed that the names of our 500,000 dead are reproduced on the various walls [...] can implement the proposal. The appropriate place would be the corridor of the flags,

Pic. 5.26- Australian War Memorial: the roll of honor with poppy flowers.

Giulio Douhet[323] put forward the idea of honouring all the Italian dead of the Great War, whose bodies had never been identified, by symbolically burying the body of an unknown soldier in the capital as a representative of all the 'nameless' dead, taking care to 'confer [on the Unknown Soldier] the highest honour, the honour to which none of its leaders can aspire even in their wildest dreams of ambition'. The idea of laying the body inside the Pantheon "at the same height as the Kings and the Engineers" was contested[324] but the whole proposal caused such a stir that in the summer of 1921 a special law was approved (no. 1075 of 11 August 1921, published in the Gazzetta Ufficiale del Regno no. 197 of the following 20). Article 1 of the law stated: 'On 4 November 1921, on the third anniversary of Victory, the unknown body of a soldier who died in combat in the 1915-1918 war shall be given a solemn burial by the State in Rome on the altar of the Fatherland'. In addition, it was

where the names would be in evidence', in MINISTERO, 2008.

323 The Roman Press was at the forefront: among the new projects proposed, one stood out, that of Colonel Giulio Douhet, who was animated by an animated bitterness towards the hierarchies and politicians who had 'thrown the Italian soldier naked and defenseless' at the enemy.

324 Initially hindered his project precisely because of the controversial charge with which it was cloaked: after all, Garibaldi himself had been denied burial, and the monument was on its way to becoming a Royal Necropolis; burying the body of a soldier there meant returning the temple of the Pantheon to being the burial place of the great.

particularly significant that on 31 October 1921, just four days after the Victory parade, the Corriere della Sera published a long anonymous article entitled 'To the unknown hero', in which a series of apocalyptic images culminated in the apotheosis of the hero's sacrifice as a religious vision of sacrifice: the infantryman as a new Christ, and the suffering of the trenches as a guarantee of resurrection. The anonymous author began by referring to the commemorative actions carried out in France and England regarding the placement of the body of an unknown soldier in the temples of national glory (Westminster and the Pantheon), and went on to emphasise that Italy should have done the same: "in Rome, in the Altare della Patria, the Unknown Hero".

4 November 1921

I am the Unknown Soldier
Long live Italy
I did not love the Fatherland
So much
To die in battle
My country was Clara
Family, friends
The plants, the houses
The people who knew me
I am the Unknown Soldier
I died in battle
Long live Italy

The monument to the Italian Unknown Soldier was therefore built according to the decision and was inaugurated on 4 November 1921 with a great patriotic event that, in the symbolic transfiguration of the unknown soldier and in the apotheosis of that religion of the Fatherland capable of recognising values, virtues, meanings and memories, found an unprecedented participation and sharing by the community.

In the Italian case, too, the choice of the body of the fallen 'nameless' represented a significant and painful moment. The Minister of War Luigi Gasparotto delegated the commission[325] chaired by General

325 To ensure that the whole army was represented in its various ranks and qualifications, it was decided that there should also be representatives of the army in the Commission. The appointment of the other four members was entrusted to Luigi Spezzetti, mayor of Udine, who nominated respectively lieutenant Augusto Tognasso from Milan, sergeant Giuseppe De Carli from Azzano Decimo corporal Giuseppe Sartori from Zugliano, and soldier Massimo Moro from Santa Maria di Sclaunicco.

Pic. 5.27 - Aquileia, October 28, 1921, Maria Bergamas

Paolini together with Colonel Vincenzo Paladini (head of the Gorizia War Memorial Office) to issue the relevant provisions for the identification of eleven corpses, each one chosen among the many unknown ones, eleven bodies, each one chosen to represent the eleven main sectors of the Italian front where the fighting took place, from the Stelvio to the Adriatic Sea (Cadore, Alto Isonzo, Altopiani di Asiago, Pasubio, Grappa, Gorizia, San Michele, Montello Monfalcone and Basso Piave). The coffins, all rigorously the same, were taken to the ancient basilica of Aquileia and on 28th October 1921, during a moving ceremony, a common woman named Maria Bergamas (mother of the Trieste volunteer Antonio Bergamas, who fell and was never found), who in that context represented all the mothers, wives and women of Italy, made the choice: She passed in front of the first coffin, paused at the second, went further and arrived in front of the penultimate one, fell exhausted and on her knees embraced the coffin calling her fallen son by name. With this poignant ceremony, the body of the Italian Unknown Soldier was chosen, while the other ten bodies were buried in the consecrated ground of Aquileia, the same ground where, years later, Maria Bergamas was buried to rest forever with the "ten unknown soldiers". The body of the Unknown Soldier was enclosed in a second zinc coffin and a third oak coffin, on which were placed a flag, a helmet and a rifle. The coffin was placed on the shaft of a cannon and transported to the station of Aquileia where it was placed on a specially prepared wagon decorated with flowers. The journey took place on the Aquileia-Venice-Bologna-Florence-Rome line at a very moderate speed, through countryside, towns and cities, so that, stopping along the way and at each station, the population could pay due honours to the coffin. The journey of the coffin of the 'Unknown Soldier' was an event that triggered an unexpected and exceptional spontaneous popular participation: crowds gathered in the railway stations, weeping women bent over the tracks, many people who silently prayed with dignity to their loved ones who had never returned. And then many children and young people throwing flowers along the railway as the train passed. On 3 November, the train arrived at Termini Station in Rome, where the King, the royal family and the highest authorities of the State were waiting for it. Twelve soldiers, decorated with a gold medal, carried the body outside the station and deposited it on a cannon shaft, on which it was transported to the Basilica of Santa Maria degli Angeli, where it was greeted by a large crowd and watched over by fellow soldiers and many ordinary citizens.

On 4 November 1921, amidst the ringing of all the bells in Rome, the procession left the Basilica of Santa Maria degli Angeli and, along Via Nazionale, reached Piazza Venezia to the delight of the people. Removed from the cannon barrel and carried on the shoulders of

Gold Medals for Military Valour, the Unknown Soldier went up to the Vittoriano and stood in front of the open shrine under the statue of the Goddess Rome, while the war flags of all the regiments honoured him. After the rite of burial, the motivation for the Gold Medal for Military Valour awarded to him was read out and nailed to the lid of the coffin by the King himself: "Worthy son of a valiant lineage and of a millenary civilisation, he stood firm in the most contested trenches, lavished his courage in the bloodiest battles and fell fighting, with no other reward than victory and the greatness of his country". When the burial was completed, the sacellum was closed with a slab on which, in Latin, was engraved the eternal epigraph "IGNOTO MILITI", and the dates MCMXV and MCMXVIII, the year of the beginning and the year of the end of the conflict. During the Thirties, the coffin of the Unknown Soldier was moved to the crypt inside the Vittoriano, called Sacello del Milite Ignoto (Sacellum of the Unknown Soldier), where it can still be found today (Pic. 5.27 - 5.28 - 5.29 - 5.30 - 5.31 - 5.32).

In the light of the considerations presented above, it is easier to understand what has already been anticipated in the examination of the dynamics of post-war transformation[326] addressed in chapter 3, in particular with regard to the definition of the different dynamics of post-war transformation in relation to specific and different driving forces. In this specific regard, it is evident how, in the first post-war period, the

326 See Chapter 3.

Pic. 5.28 - Aquileia, October 28, 1921, the coffin is hoisted on the wagon that will take it to Rome

Pic. 5.29 - Rome, November 4, 1921. The group of mothers and war widows follows the coffin

Pic. 5.30 - Rome, November 4, 1921, the conclusion of the ceremony.

Pic. 5.31 - The Vittoriano or Altare della Patria in Rome (today)

Pic. 5.32 -The Tomb of the Unknown Soldier (today)

need to commemorate and celebrate the sacrifice of millions of fallen soldiers represented the main stimulus that led to the construction of these new "architectures of remembrance" developed by individual countries independently but with the same objectives.

These new overwritings deposited further "signs" and meanings on the already complex palimpsest of material evidence left by the conflict, alongside the first approaches that, at the same time, were beginning to recognise the value of the "war landscapes" as precious guardians of the "historical and human memory" of the war event.[327]

Parks and memory trails, battlefield memorials

Complementary to the approach presented above, another attitude began to develop, not politically oriented, which aimed at recognising the value of historical testimony of the places where the conflict took place as a necessary condition for operating in them, proposing different ways of narrating the traumatic event through experiential paths of remembrance, based on the necessary personal perception of the material traces in themselves, understood as monuments, or physical mediums capable of activating memory through sensations and emotions to be "experienced" directly in situ.

As we can well understand, this orientation introduced a different and at the same time complementary approach to the commemorative practices previously described, which was not exclusively declined in new rewritings on the different warscapes, but rather in design proposals that had the objective of developing with the set of physical remains left by the war, alongside and in support of them, to preserve them from the "risk of loss" and transmit to the future their meaning of memento.

These were the first forms of recognition of the "war landscapes" as "places of memory" in the contemporary meaning of the term, which over time became the universally shared attitude that led to the identification of the remains as cultural heritage, "material evidence with a value of civilisation" and therefore to be protected and handed down to the future.

In this direction of meaning, since the first post-war period, along all the lines of the various fronts, numerous "parks and paths of memory" have sprung up in which to walk in the trenches, visit the fortifications and meditate at the war cemeteries and memorials built, in this case, on the battlefields.

As an example, here are some significant cases in which these experiential routes were proposed, such as on the Western Front in

327 It is precisely these aspects that will address in the following sections of this chapter.

Pic. 5.33 - Australian soldiers after the Battle of Passchendaele, Flanders

Flanders, Belgium and France, on the fields where the main battles took place, such as the Ypres salient, the Meuse line, the plains near Verdun and the Somme, to name but a few.

Particularly significant is the Ypres salient, in Belgium, the scene of some of the most important offensives of the entire conflict and whose name, despite itself, is still associated with the deadly gas used by the Germans for the first time here in July 1917, namely mustard gas, the chloroethane thioether or also called mustard gas because of its smell (Pic. 5.33). The first battle of Ypres was fought between October and November 1914 and resulted in 238,000 dead and wounded, as well as an incredible number of missing persons and boys drowned in the mud, incinerated or shattered into so many pieces that it was impossible to identify them. The following spring, the new German offensive was carried out in four relentless and unscrupulous battles, during which the 168 tons of mustard gas on a six-kilometre front killed more than 5,000 Allied soldiers in less than ten minutes. The carnage came to nothing and the battle continued for months on end. In the summer of 1917 the final act was triggered by the Passchendaele counter-offensive, in which the Allies hoped to pierce the enemy defences by pushing them out of Flanders. The massacre cost half a million lives while the landscape was radically transformed by the bombardment, which left such deep wounds whose craters are still visible today (Pic. 5.34). In the aftermath of the peace treaty, Major Henry Beckles described this devastated territory as a 'holy land' and everyone agreed that these places should be preserved unaltered in memory of the sacrifice made there. Four

Pic. 5.34 - Australian soldiers after the Battle of Passchendaele, Flander

memorials were erected in the area, one of which was the Menin Gate, built on a site chosen because it was the obligatory passage for all troops heading for the front. The project was designed by the English architect Sir Reginald Blomfield[328] in an openly neoclassical style, with allusions to the city of Ypres itself, recognisable in the figure of the lion that dominated the monument together with a sarcophagus, both works by the Scottish sculptor Sir William Reid Dick.[329] The 'triumphal arch' structure inspired by the seventeenth Porte de la Citadelle in Nancy, France, was made of reinforced concrete clad with Euville stone[330] and

328 Blomfield Sir Reginald Theodore. British architect and architectural historian (Bow, Devon, 1856 - Frognal, London 1942), grandson of Sir Arthur William (London 1829 - Broadway, Worcestershire, 1899), designed Tudor-style churches and public buildings in London. He studied Renaissance architecture, drawing particular inspiration from French architecture. His works include reconstructing the Regent Street Quadrant and Piccadilly Circus (1910-30) in London and the Menin Memorial Gate in Ypres (1926). His writings include History of Renaissance architecture in England (1897), History of French architecture (1911), Modernismus (1934). Encyclopaedia Treccani Online.

329 He was a Scottish sculptor known for his innovative stylization of form in his monumental sculptures and simplicity in his portraits. He became an Associate of the Royal Academy in 1921 and a Royal Academician in 1928. Dick was president of the Royal Society of British Sculptors from 1933 to 1938. He was knighted by King George V in 1935. He was sculptor in ordinary for Scotland to King George VI from 1938 until his death.

330 Euville stone is a grey limestone originating in France.

Pic. 5.35- Ceremony of inauguration of the Memorial

Pic. 5.36 - The “Menin Gate” today

red bricks, while inside the central hall a number of panels were set into the stone, on which all the names of the missing soldiers were engraved (Pic. 5.35 - 5.36).

In addition to the construction of the memorial, the idea of preserving the unaltered 'war landscape' did not only apply to the battlefields near Ypres, but also to the whole of Flanders, where numerous entrenched camps, which can still be visited today, were carefully preserved. The Sanctuary Wood Trenches and Hill 60 in Zillebeke, as well as the Trench of Death in Diksmuinde, are true open-air museums where the evocative power of the original trenches and craters allows for a unique emotional experience, in a sort of spiritual journey of all-round commemoration (Pic. 5.37 - 5.38).

In France, the place symbolic of national sacrifice was identified with the plains around Verdun, where one of the most important battles of the entire world conflict took place in 1916. The French town and its surroundings witnessed not only a real massacre with more than 700,000 victims and almost 60 million bullets fired, but also a radical transformation of the landscape towards a rarefied and almost unreal dimension, full of suffering, pain and blood: Verdun was the rawest and most real example of the hell caused by war. And precisely for this reason, with the passage of time, the unaltered landscape of the battlefield, with its still open wounds, took on a fundamental symbolic meaning for a profound understanding of the need to work with every means and possibility to ensure that such horrors do not return

Pic. 5.37- The "Sanctuary Wood Museum," Hill62 near Ypres, today.

Pic. 5.38 - The death trench, Dodengang, Belgium, today.

to repetition (Pic. 5.39). With this in mind, the construction of the 'Douaumont Ossuary' was financed, which collected more than 130,000 dead from both sides, a symbol not only of national unity but above all of the new Franco-German reconciliation. The memorial, designed by architects Léon Azéma, Max Edrei and Jacques Hardy, took the form of a gigantic sword handle driven into the ground as a symbol of the end of the war, under which, in a 137-metre-long cloister, the tombs with the remains of French and German soldiers were placed, divided according to the various geographical areas of the battle of Verdun. But the evocative power of the Douaumont monument is such only thanks to its value as a testimony to the places where it was built: a landscape that today appears beautiful and peaceful, covered in forests and meadows, but which, in the undergrowth, still reveals the remains of craters and trenches, stratified signs of a tragic past impressed in the physicality of the ground and preserved as a warning for posterity. And in Verdun, the soil itself has become the most important "witness" to the atrocities brought about by the bombardments of the war, which not only transformed these plains into a lunar landscape but also soaked the ground with so many poisons and toxic substances that access was impossible for at least another seven centuries. And it is precisely this concrete danger that embodies the current legacy of the war and stimulates its memory more than any other specially constructed monument or memorial (Pic. 5.40 - 5.41).

The tendency to invest in the testimonial value of 'war landscapes' as

Pic. 5.39- The craters of the bombs dropped in the Battle of Verdun, still perfectly visible in the contemporary landscape.

a tangible memory of the war event in all its complexity also affected Italy, where the Ministry of Defence declared as monuments "some of the most conspicuous areas for the splendour of the theatre of war 1915-1918" with Royal Decree Law no. 1386 of 29 October 1922, which identified Pasubio, Grappa, Sabotino and S. Michele as four of the most significant places to be preserved and protected as monuments of art as "the highest and most symbolic expression of the war, its anxieties, its sacrifices and its triumphs "68. Michele four of the most significant places to be preserved and protected as monuments of art as they were "the highest and most symbolic expression of the war, of its anxieties, sacrifices and triumphs".[331] In the aforementioned decree the four

331 According to Royal Decree-Law No. 1386 of 29 October 1922: 'The intention of declaring 4 November - the day of the apotheosis of our war - a National Holiday is to raise to the dignity of national monuments the sites of our battlefields that are most closely linked to history for their immortal glories of heroism and sacrifice, in keeping with a dutiful and patriotic assumption. On that same anniversary, 4 November 1921, the nation consecrated the Tomb of the Unknown Soldier to the religion of its cult. This year, it is appropriate to integrate the patriotic gesture by consecrating the cornerstones of the arena on which the Italian Army fought, sacrificed itself and won, so that the vision of the epic struggle may be handed down to future generations as an everlasting testimony to the grandeur and virtuosity of the deeds. [...] In this way, several sacred landmarks or monumental areas were designated - capable of summarising and symbolizing the genuine vision of war, understanding its heroic features, and embodying its torment, sacrifice, and apotheosis. With these concepts, the four monumental zones were chosen and designated to summarise in them - almost as a symbol - the entire epic of the war. They are Pasubio, Grappa, Sabotino and San Michele. Pasubio embodies the strenuous

Pic. 5.40 - The Ossuary of Douaumont near Verdun. View of the memorial with fields of crosses and the Lantern of the Dead. (today)

Pic 5.41 - The ossuary of Douaumont with the Lantern of the Dead (today)

designated areas were officially declared "monumental zones" (art. 1), delimiting their boundaries and making them subject to the supervision of the Ministry of War "which will provide for their delimitation, custody and preservation, and the inviolability of the monuments [...]".[332]

These noble intentions, however, suffered a serious setback immediately after the march on Rome and the consequent resignation of the President of the Ministers Facta, when Mussolini's rise to power inaugurated a historical and ideological season with a nationalist imprint that developed, as already mentioned, in the field of the commemoration of the fallen and of which the most representative example is undoubtedly the Redipuglia Memorial, in the province of Gorizia. Built to replace the Sant'Elia Cemetery[333] and inaugurated on 18 September 1938, the ossuary on the slopes of Mount Sei Busi was designed to be the largest and most majestic national centre of war memorial architecture, and was planned in the places that were the scene of the violent battles on

defense of the Tridentine front, Grappa the unshakeable resistance of the Italian front between the mountains and the sea, Sabotino and S. Michele the ordeal of the first years of our war that raged on the arid cote of the Karst; from Tolmino to Monfalcone, the sword of the Piave and Vittorio Veneto. Other milestones are linked to these milestones to integrate their educational and moral significance [...]. All these relics must be consecrated and claimed in their features derived from the war itself, without any other suffrage of special works of art that would alter the austerity of the heroic face".

332 According to Royal Decree-Law No. 1386 of 29 October 1922:
"Art.1- To consecrate the gratitude of the Homeland for centuries to the Sons who, for its greatness, fought epic battles in the war of redemption 1915-1918, the following areas, chosen from those most linked to immortal glories, are declared monumental:1. MONTE PASURIO; 2. MONTE GRAPPA; 3. MONTE SABOTINO; 4. MOUNT S. MICHELE.
Art.2 - The monumental zones are delimited as follows:
PASUBIO the mountain's summit is rising on the 2200 meter contour line, including the Dente Italiano, the Palòn peak, and the hilltop immediately to the south of this peak. Access road: Ponte Verde carriageway (at Pian delle Fugazze) - colle Xomo - Scarubbi - Porte Pasubio, then mule track to Palòm. GRAPPA, the mountain's summit above an altitude of 1700 meters, with the Nave spur, the Vittorio Emanuele Gallery, and the Milano barracks, excluding the southern part on which the Madonnina and the Alpine Club refuge are located. Access road: Romano Alto-Osteria del Campo-Monte Grappa carriageway. SABATINO, the summit of the mountain above the contour line of 520 meters from Sasso Spaccato to the west, to the ruins of the church of San Valentino (excluding) to the east. Access road: Gunjace road, Bala crossroads, Verholje- Sabotino. SAN MICHELE, the top of the mountain above the 250-meter contour line with peaks 1,2,3, and the Ferrara Brigade memorial, southeast of the peak4. Access road: the Peteano-San Michele carriageway".

333 Originally, Colle S. Elia housed the old Cimitero Degli Invitti (Cemetery of the Undefeated), which constituted the first Military Shrine of Redipuglia. The tombs of the fallen, arranged in concentric circles, were alternated with war relics that identified the specialties and divisions that fought there. After the construction of the new ossuary, the hill became a large Park of Remembrance, rich in commemorative works and small and large fortifications (defensive posts and tunnels), relics of past wartime events.

the river Isonzo. Strongly desired by the fascist regime, the memorial wanted to celebrate the sacrifice of the fallen with a three-tier structure, symbolically representing the army descending from the sky at the guidance of its commander, surmounted by three crosses, as a clear allusion to the image of Mount Golgotha and the crucifixion of Christ. The light-coloured marble construction was designed by the architect Giovanni Greppi and the sculptor Giannino Castiglioni and essentially consists of a monumental staircase made up of 22 steps containing the bodies of the 40,000 "recognised" soldiers, arranged in alphabetical order in niches covered with bronze plates, while at the top two large communal tombs were built for the 60,000 bodies of the unknown soldiers. Each step was crowned by an architrave engraved with the words 'Presente' (Present), which with its evocative power expresses the clear Fascist rhetoric (Pic. 5.42 - 5.43 - 5.44 - 5.45).

Regardless of the formal outcomes produced, the design phases of these memorials constituted an important moment in the "construction of memory" of the First World War at an international level as they declared a clear will to work interpreting the different "war landscapes" through very different solutions that recognised the value of historical testimony. For the first time, the complex reflections on what symbolic meanings monuments could take on, whether they concerned a collective burial or entire landscapes, and on what languages were best suited to express the universality of loss and the sacredness of the various warscapes, were extended to a territorial scale. It was thanks to these stimuli that the awareness began to develop that the landscape itself could be considered a "monument dilated in space and time", permeated by an aura of sacredness that made it unique and unrepeatable.[334]

In this direction of meaning, the recognition of the sacred character of the different warscapes ended up, very often, by defining almost a sort of 'absolute untouchability' in order to preserve their authentic integrity. Following a sort of ideal compromise between the need for commemoration and this attitude of profound respect for the state of places, new forms of representation of shared memory were gradually defined, no longer selective and circumscribed only to war theatres, but recreated and evoked in the so-called gardens, parks and avenues of Remembrance. These were real "substituted landscapes", that is, places that were not directly affected by the war but were built in memory of it, often in urban and peri-urban areas, where it was possible to dedicate "a tree to each soldier", but also to insert sculptures, steles, altars, often subsidised by the committees of disabled amputees and ex-combatants.[335] These were further formal declinations in which the

334 SAVORRA, 2019.

335 The literature on war memorials erected in urban centers in Italy has recently

Pic. 5.42 - The Redipuglia Memorial in Friuli-Venezia Giulia in the town of Fogliano in the province of Gorizia.

Pic. 5.43- Sacrarium, also known as the “Hundred Thousand” Sacrarium, holds the remains of 100,187 soldiers who fell in the surrounding areas.

Pic. 5.44 - The tomb of the Duke of Aosta and, in the background, the urns of Generals Chinotto, Monti, Paolini, Prelli and Riccieri.

Pic. 5.45- The two large tombs, covered with bronze slabs, which hold the remains of more than 60 thousand unknown soldiers.

monument as an "externalised memory" of the war landscape had to represent the collective memory, through scenographic and theatrical re-evocations, touching iconography, rhetorical inscriptions and the display of various war relics.[336]

5.1.3 The action of the recuperators: from a second phase of deconstruction towards the "recuperators of memory".

In spite of what has been explained in the previous paragraph concerning the identification of some particularly significant areas, and therefore already protected in the immediate post-war period, the processes of recognition of the testimonial value of the material remains left by the First World War, and therefore, as a consequence, of the remains as heritage, did not develop in the short term, but only began to take shape consciously after the Second World War.

In the first years of peace, in fact, the desire to re-elaborate mourning by trying to forget the traumas inflicted by the war translated into a propensity to erase the physical traces of the past from which one wanted to distance oneself, embracing a sort of "right to oblivion" that favoured the practices of sacralisation of memory, as described above, rather than the ability to focus on and understand the historical and identity values stratified by the war event on the different warscapes. and silently guarded by the fragments of vestiges that represented its remains.

In reality, paradoxically, it is precisely this understandable act of voluntary distancing from the physical remains left by the conflict, in search of a lessening of pain through forgetting, that represents the temporal genesis in which, for the first time, these remains [the vestiges] are recognised as having the capacity to keep memory alive, and therefore as being physical mediums capable of reactivating it even at a distance of time. This, however, is a retrospective reflection, which will find consensus only half a century later, starting from the 1970s and especially in the Italian context, together with that Copernican revolution within the discipline of those who deal with the "care of the objects of the past", which has already been mentioned in chapter 2/3 and which will be further explored in the next paragraph.

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been enriched by several studies, partly due to the stimulus provided by law 78/2001. As regards some specific geographical areas, see ISOLA, 1997; MARCHESONI, MARTIGNONI, 1998;VIDOTTO, 1998; TREVISAN, 2005; DE ANGELI, 2006; MANGIAVACCHI, VIGNI, 2007; SPIAZZI, 2008; BALOSSINI, MONGIAT, 2009; LABANCA, 2010;NAPPI, 2011;BRUNORI, 2012; CAZZANI, 2012; MANTINI, 2014; QUENDOLO, 2014; SAVORRA, 2019.

336 For a more in-depth examination of this, see PINOTTI, 2014. As far as the construction of war memory is concerned, see also RIDOLFI, 2006.

On the contrary, the priority needs of the first post-war period, apart from the socio-anthropological aspects, were essentially focused on the need to revive, also economically, the conditions of the various countries that had been destroyed by the conflict. As already mentioned in chapter 3, the need to quickly find raw materials and semi-finished products without importing them from abroad led the various governments to authorise a gradual recovery of war material left over from the battlefields. In the various states, specific laws were promulgated to regulate these activities, legally recognised and paid, which gave rise to a first massive phase of operations by salvagers. Men, women and sometimes even children set off for the mountains armed with shovels and pickaxes to face the long days on the front lines and return to the valley with every type of material that could be reused, such as trench stoves, field kitchens, provisions, unexploded shells, copper, iron, lead and scrap metal, to be sold or exchanged to earn a living.[337] Bending over under the weight of overloaded rucksacks, the scavengers thus followed, but in the opposite direction, the same routes as the fighters of the Great War, triggering a sort of "reverse transport" with respect to what had been done, with effort and sacrifice, to build those very works only a few decades earlier. In the following period, also in response to specific political rearrangements at a general level, a real "iron race" began, which lasted until the 1960s, leading to the gradual and systematic dismantling of permanent fortifications, main armoured works and military villages. These operations were no longer carried out only "on sight", by collecting what was left on the ground, but also through excavation, removal and demolition of the structures themselves to recover every metal element present, from the armoured domes to the metal coverings, from the iron girders drowned in the thick layers of concrete to the expanded mesh used to reinforce the vertical closures.

In this way, the various warscapes underwent a veritable second de-composition that greatly affected the physical consistency of the remains, which, if not destroyed during the conflict, were often blown up during these authorised spoliations in order to remove any precious iron material. But the actions of the salvagers also had a strong reverberation on a wider scale: as a result of these actions, in fact, visits to the different warscapes became increasingly sporadic and the war relics, made increasingly fragile in terms of physical permanence, were gradually affected by a general process of abandonment, forgetting, physical obliteration but above all emotional.

A renewed interest in such material evidence began to develop after World War II, in connection with the celebrations of the 50th anniversary

337 See footnote 68 Chapter 3.

of the Sarajevo bombing. In this phase, a new figure of the "recuperator of memory" began to emerge, who worked to ensure that the testimony of the dramatic events preserved in the remains would not be lost and would serve as a warning to future generations, and who therefore returned to the different warscapes with very different objectives from those of the immediate post-war period. Very often they were veterans accompanied by relatives and friends who recalled stories and events directly related to those places, or enthusiasts in search of objects and remains, recognised as material evidence of the daily suffering endured by soldiers during the years in the trenches.

This new attitude laid the foundations for the development of a growing awareness of how the physical remains of the relics, i.e. the objects but also the artefacts themselves, were "custodians" of the memories of the past, not only of the war in general but also of the infinite number of personal stories with which they had come into contact and of which they had become participants. This approach was increasingly developed from the 1970s onwards, reflecting the renewed interest in material culture as an informative potential to be preserved and passed on to the future.[338]

It was in this context that the first projects for the recovery and valorisation of the various warscapes for museum purposes were developed, designed to deal with the fragile state of conservation in which they found themselves, which corresponded to the "risk of loss" of the "possibilities of knowledge" to which they bore witness.[339] In other words, the awareness, now universally acknowledged, that the memory of the Great War is not limited exclusively to the recognition of the historical importance of tangible evidence, but is nourished by the intangible heritage of meanings, stories, traces and experiences deposited on such evidence, was beginning to emerge.

338 Reference is made to the theme of the “contemporary debate” within the discipline of architectural restoration, with respect to which we also refer to: BELLINI,1978-1980-1989-1990-1997; BONELLI, 1980; BRANDI, 1977; CARBONARA, 1987-1988-2002-2007; CARUNCHIO, 1996; DEZZI BARDESCHI, 1982-1988-1991; DI BIASE, 1996; DOGLIONI, 1997-2008; FANCELLI, 1984; LA REGINA, 1984-1989; MARCONI, 1986-1988; QUENDOLO, 2008; RIEGL, 1903; TORSELLO, 1988-1990; VASSALLO, 1995.

339 For further information on these projects, see Chapter 2, in particular footnotes 118-119-121-125.

5.2 Warscapes: high-capacity “value capacitor”

In the light of the reflections presented above, it is evident how long and articulated has been the process that has led to the current recognition of the remains of the Great War as a fragile and highly complex heritage, to be known and preserved as a witness and custodian of important historical and cultural values. In this regard, in a new perspective focused more on historical preservation rather than on commemoration practices, over time there has been a growing interest in the recovery of a memory of the war based on the preservation of the authenticity of the "war landscapes", of which Italian law no. 78 of 2001 is an important point of arrival and departure.[340] Within this horizon of meaning, the different warscapes understood as "places of memory" have been recognised as a historical space on which European culture and identity were built, and for this reason they must be protected and preserved.

In order to understand to what extent, in the aftermath of the celebrations for the Centenary, these vestiges can continue to be or become a concrete resource for the future, it is necessary to better understand that set of historical-identity values, manifest and potential, which define the quidditas that characterizes them and distinguishes them from other types of "material goods having a value of civilization " so as to have stimulated the promulgation of a specific law in this regard, at least at national level. In fact, it is precisely the understanding and sharing of this quid value, defined both in its tangible dimension of material permanence and in the potential meanings contained therein, that represents the cognitive basis on which to responsibly set out future valorisation practices, so as not to "betray" the character of these "war landscapes" while preserving their potential significance from the "risk of loss". In other words, these strategies will have to propose different ways of "narrating memory", finding the right balance between the preservation of the character of the different warscapes, in its material and historical features, and the modifications/changes that obviously stratify over time. This is a debate that is already very much on the agenda with regard to the management of the landscape, in this case the "war landscape", as cultural heritage, in a dialectic between the safeguarding and protection of the integrity/authenticity of the permanences and the possibilities of transformation/innovation.[341]

In this perspective of meaning, twenty years after Law n.78/2001 and in the light of all the numerous restoration - recovery - enhancement projects that followed it (both with respect to the forts and to that more fragile and also difficult to recognise fabric of permanence), today it is

340 For specifics regarding Italian law No.78/2001, please refer to Chapter 2.

341 See note nr. 338 p.442.

more important than ever to reflect on what it means to "take care" of this complex set of signs, questioning first of all on the very meanings of "cultural heritage" and "place of memory" declined in relation to the remains of the Great War, as well as on their mutual relations.

5.2.1 From the commemoration practices to the testimonial value of vestiges: the construction of the "sense of place".

Taking up what has already been introduced in the previous chapters, the "landscapes of war" are to all intents and purposes multi-layered palimpsests as the outcome of dynamic and processual aspects in continuous evolution and interaction, complex systems formed by subsystems with different depths of meaning. From the physical "signs" built in anticipation of the conflict to the "traces of destruction" inflicted directly by the war, up to the erasures and overwritings deposited in the following years, the "war landscapes" can in fact be defined as veritable "libraries that house the testimonies, the signs, the traces of the making of things and the succession of mutations along the ramified paths of History "80. 1 But, as already mentioned in chapter 3, it is not only a matter of material, objective, quantifiable and physically measurable evidence, but also of an intangible substratum of values also formed over time, made up of memories, experiences, stories, perceptions and emotional experiences. These two aspects are intrinsically linked and indispensable for a holistic understanding of the "character" and "personality" of these warscapes, to better define the "sense of place"[342] that characterises and unites them.

In the words of the English geographer Rose, if "the expression "sense of place"[343] [...] is used to highlight how places are significant as the focal point of personal feelings"[344], it is evident how the different communities have constantly demonstrated a strong "sense of place" towards the "war landscapes", charging them with spiritual and even symbolic meanings in relation to the emotions and perceptions they aroused. In the course of time, as previously discussed, this attitude has led to the development of multiple "commemoration practices" and

342 ROMANI, 2008, p.18.

343 Yi-Fu Tuan is a Chinese-American geographer. He is one of the key figures in human geography and probably the essential originator of humanistic geography. According to Tuan, the primary purpose of geography is to study human spatial feelings and ideas through experience through feelings, sensations, and perceptions of spaces and places. While quantitative geography had focused mainly on the study of objective, abstract area, quantified according to the principles of Euclidean geometry, humanist geography focuses its attention on places, which cannot be defined only according to geometric categories, because they are essentially crucial as repositories and communicators of the values, meanings, and aspirations that man manifests...

344 ROSE 2001, pp. 65-66.

restoration, recovery and valorisation projects carried out by pursuing various "narrative forms". These are the formal outcomes of an interest that has gradually turned into a growing feeling of topophilia[345] towards the "places of tragedy", an "emotional feeling" nourished by a strong sense of belonging to those places where millions of young lives were sacrificed and which, precisely for this reason, are recognised as "places of memory", are recognised as "places of memory" or, as defined by Pierre Nora in his work Les Liewux de Memoire, "significant areas of material and intangible order in which the experiences and significant facts of the past, sedimented over time, are active elements capable of establishing connections with the contemporary world ".[346]

Within this horizon of meaning, the historian Michel Conan's shared consideration is correctly contextualised. By bringing together the

345 YI-FU TUAN, 1974.

346 The concept of place can be traced back to the ancient philosophical writings of Aristotle. The place or topos, in his view, was the dimension of ‘where’ in people’s relationship with their physical environment, evoking a feeling of ‘belonging.’ The Romans, centuries later, used the term genius loci, the ‘spirit of a place, a ‘genial spirit’ of a physical place. Many disciplines have begun to take up these concepts in recent years, increasingly considering the heterogeneous physical and intangible components that define just such a ‘sense of place.’ In 1966 Venturi encouraged to consider the semiotic meaning of the outer façade of buildings and the meaning of the spaces behind the walls: he argued that architecture was born in encountering the internal and external forces of uses and “space.” A decade later, in his boo.”The Psychology of Place, Carter stated that “place” is a combination of actions, conceptions, and physical environment. In 1892, Saarinen described this ‘sense of place’ as a unifying concept that extended attention beyond geographical space to people’s experience of being in a particular landscape environment. The value of the term “sense of place” is in emphasizing the “sense of emphasizing particular environments. This definition of ‘place’ is also mentioned by Proshansky, who in 1983 introduced the concept of ‘place identity as a physical environmental referent for a more familiar and widely used term: ‘self-identity. As he suggested, “humanistic geographers have argued that through personal attachment to geographically locatable places, a person acquires a sense of belonging and purpose that gives meaning to their lives. These concepts are taken up by the Norwegian architect and phenomenologist Christian Norberg-Schulz, who works hard to study the concept of genius loci in-depth, defining it as the thein-depth at people have of a place, understood as the sum of all physical and symbolic values in both nature and the human environment”. The link between genius loci, sense of place and character of places is, thus, evident. And it is precisely based on these reflections that it is even more immediate to understand the path that led the French historian Pierre Nora to define the concept of lieux de mémoire. A place of memory is any significant entity, material or immaterial, which, by force of will or human labour, over time, has become a symbolic difflabor between history and memory. Nora argues that ‘memory is life,’ while ‘history is the reconstruction of what is no longer. Memory’ is subject to remembering and forgetting; it is vulnerable to appropriation and manipulation. The lieux de mémoire, material, symbolic and functional places, are the interaction between memory and history. They embody the will to remember (memory) and to record (history). For more on this subject see also: VENTURI, 1966; RELPH, 1976; NORBERG-SHULZ, 1980; STEELE, 1981; SAARINEN, 1982; PROSHANSKY, 1983; NORA, 1996; ASSI, 2008.

two prevailing interpretative dimensions of the landscape (spatial and temporal) and highlighting the identity of the interweaving of these relationships, he reinterprets these places as areas of "compressed time", in which the frames of the endless film of history accumulate to form a semantic surplus that makes it possible, if appropriately narrated through specific cognitive-perceptual paths, to reveal the "multiple times experienced".[347] In the light of these considerations, it is even better to understand how "war landscapes" can be considered to all intents and purposes places with a high memorial charge, physical and mental environments made up of different tangible elements layered with different symbolic values, in which communities recognise themselves and their own history.

In this perspective of meaning, relating the considerations on landscape and memory, once again the concept of time is central, which if on the one hand circumscribes and determines the dynamics of transformation intrinsic to each landscape[348], on the other influences the perceptual and relational links that can be established with communities. In fact, at a general level, in the process of "constructing the memory" of a place, the degree of attention and interest in observing such an environment is inversely proportional to the level of familiarity of the observer with it: to use the words of the geographer Tuan, "if it is true that knowing a place and becoming deeply attached to it takes time, it is also true that this attachment is acquired unconsciously and that time itself, by increasing our familiarity with the place, can make us so familiar with it that we no longer look at it with attention or interest".[349] In other words, such awareness implies a potential and gradual attenuation of the sense of belonging to such places, favouring an indirect but progressive "sense of forgetting" of them, even though we recognise their identity charge.[350] In fact, forgetting is an important and recurring phase in the processes of constructing the memory of every dramatic event which, especially in the immediate future, can become more painful than the event itself in that it 'perpetuates it and loads it with emotional resonances'. In reality, even commemorative practices, which attempt to alleviate pain by signifying death as a heroic sacrifice in the name of certain values, constitute 'palliative' forms of collective externalization of mourning, of little use in actually 'healing the wounds' caused by trauma. The need to

347 SORCINELLI, 2009.

348 On the role of time and its different possible interpretations, see Chapter 3.

349 YI-FU TUAN, 1977.

350 In this regard, it should be stressed that this slow fading of memory is quite different from the ‘right to forget’ discussed in the previous section, in which the conscious will not to remember was essentially driven by grief and mourning for the loss. See Chapter 3.

forget, therefore, spontaneously appears as a natural alleviation of pain which, through temporal and physical distancing, often has a beneficial and healing value in the short term.

Being proper to the cycle of formation of the memory of every place, this reasoning is well suited to the process of construction of the memory of the Great War, as it has been addressed in the previous paragraph. In the immediate post-war period, in fact, the need to celebrate the sacrifice of millions of fallen soldiers stimulated feelings of great attention and fervent interest towards the different warscapes, which were expressed in the first "memory practices", essentially translated into the many "commemorative narrations" of which memorials, shrines and monumental war cemeteries are a direct testimony. These actions, as well as the identification of the first areas to be declared "monumental zones" at an international level, contributed to make less painful the legacy of the Great War phenomenon, in which mourning for losses was somehow replaced by celebratory wills that worshipped dead soldiers as "national heroes". If on the one hand these "practices of memory" contributed to alleviating the pain of the "wounds", as explained above, at the same time they also favoured a gradual weakening of interest in these places, which were progressively abandoned, triggering constant processes of slow estrangement, both temporal and perceptive, towards ever greater oblivion.

With the passing of time, this feeling of gradual distancing stimulated the development of a dual perception of the war event: If, on the one hand, the temporal and physical distance from the material traces of the war had helped to weaken the need for new celebratory and memorial narratives, also healing the painful "wounds" inflicted by it, on the other hand, an increasing awareness of a new necessary form of memory gradually began to develop, which would recognise in the constructed material, in this particular case better defined as "signed" by history in its different temporal frames, the capacity to keep alive the memorial perception, and to reactivate it even at a distance of time, as an essential condition for the awareness of one's own identity.[351] In other words, especially from the 1970s onwards, a renewed interest in "war landscapes" began to emerge, not for commemorative purposes as it had been in the first post-war period, but with different objectives, less politically oriented and more directed towards the need to preserve the tangible remains of the Great War as the only custodians of the physical and intangible memory of the conflict.

In this new "necessity of memory", the need to keep alive the memory

351 “Isn’t memory the condition of our identity? Won’t removing at will what we can no longer bear from our past - if possible - make us happier individuals and less wise? With a reduced burden on our shoulders, but a reduced moral conscience?” LAVAZZA, 2020.

of the tragic nature of the conflict takes on a more interior and profound dimension, which forms a new awareness capable of recognising the value of sacrifice precisely in "what remains", in the physical remains of the war as a place in which the "message-bearing signs" are sedimented, the loss of which represents the "loss of the possibilities of knowledge "93, and therefore the risk of "loss of memory".[352]

In this sense, the "landscapes of war" are once again investigated as "places of memory", understood not only as areas characterised by a specific geographical and spatial position, but also as the outcome of an articulated anthropological construction, evident and hidden, tangible but also spiritual, marked as much by physically recognisable elements (permanent and semi-permanent fortifications, military infrastructures) as by a weaker but pervasive and equally significant writing (temporary and field fortifications, "signs of destruction"). These are areas with a high semantic significance of a material and intangible order in which the significant experiences and events of the past, sedimented over time, are active elements capable of establishing connections with the current reality of the moment, stimulating in the community a "sense of past"[353], i.e. a conscious perception of the past, a reasoned reflection that "feels" the experience not only as something that "has been" but above all as a phenomenon of the present and, as such, able to affect the contemporary and to condition the future in some way.

If we add to these reflections the considerations already discussed in chapter 3 regarding the significance of symbolic meanings and values deposited over time and metaphorically preserved in the tangible imprint of the war that has shaped the landscape as a testimony of its passage, it is even more appropriate to identify the different warscapes as real "deposits of memories", densely pregnant mines in which these semantic sedimentations define and continuously reinterpret the identities of places and the sense of belonging of communities. In fact, these are landscapes in which "individual memories, light and ephemeral, are superimposed on collective memories, more solid and lasting, which are intimately linked to the history of society and its significant topoi, which are like territorial stations of its history, of its affirmation on the territory ".[354]

In recognising this informative and valuable potential inherent in the

352 From a strictly etymological point of view, the term memory derives from the Greek “mimnésco,” the word memory indicating “an activity of the mind linked to a precise need and also to an ethical value, the faculty of keeping alive the contents of the past” refers to an essentially intellectual action/exercise. The loss of memory is, therefore, the loss of an intelligent function of the mind.

353 LOWENTAL, BINNERY, 1981; BATTAINO, GATTI, QUENDOLO, 2015.

354 TURRI, 2006, p.136

"materia signata", from the 1970s onwards, this orientation, supported by the new "salvagers of memory ", had first of all to deal with the state of conservation of the remains themselves. In fact, recognising that memory is "the present of the past", the possibilities of perceiving it depend strongly on the conditions of the place and the approaches according to which they are observed. Even though degradation has a different connotation than just material decay, but as an indication of a "process of construction and transformation "[355], the remains of the Great War, abandoned for more than half a century, were in an advanced state of physical decay, in some cases to the point of compromising the very possibility of their permanence. Within this horizon of meaning, the different projects of restoration, recovery and valorisation of these "places of memory" began to be elaborated in order to prevent the "risk of loss", following multiple formal narratives, modes of communication and language, which have already been discussed at length in the previous chapters.

In this regard, reflecting on the different warscapes as "places of memory" has highlighted some important considerations that go beyond the formal results of the different interventions carried out, but substantiate a question of internal coherence with respect to the way of approaching the theme of memory that, once again, focuses attention on the centrality of a necessary, profound and holistic cognitive process of the object/landscape that one wants to "take care of".

5.2.2 Recognition of the “character of exceptionality”: understanding the “valuable quid”

Resuming the previous reflection on the "war landscapes" as "deposits of memories", it clearly emerges the need to go back to addressing the theme of memory through a deep and holistic cognitive process of the object/landscape we want to "take care of". Knowledge, in fact, must always be the essential prerequisite to be able to develop conscious "memory practices", in a continuous process of recomposition and reinvention, which each time allows us to re-know reality from a different perspective.

In this sense, in the light of the many "memorial narratives" already implemented in the past, a statement made almost twenty years ago by the French philosopher Paul Ricoeur is significant: "I am disconcerted by the disturbing spectacle that gives rise to an excess of memory here, an excess of oblivion there, not to mention the influence of commemorations and the abuse of memory - of oblivion".[356] What

355 DOGLIONI, 2016; BATTAINO, GATTI, QUENDOLO, 2015.

356 RICOEUR, 2003, p.7.

clearly emerges is an evident imbalance towards which current "memory policies" seem to overflow: a paradoxical disproportion between the now consolidated awareness of a "duty of memory", which defines the centrality of the theme in public policies, and a still too superficial knowledge of what is the very object of memory, that is, in this specific case, the different warscapes. In the words of the French historian Henry Rousso, in fact, "the illusion is to believe that memory contributes to the formation of social identity, that it gives access to knowledge. But how can we remember something that we do not know about?[357] In other words, in the face of a manifest 'obsession with the past' that translates into collective rituals, planning interventions and educational practices organised mainly in response to institutional indications/pressures to promote a so-called 'responsible citizenship', what is missing, or most lacking What is lacking, or more lacking, is a profound and intimate understanding of the knowledge acquired, a sort of inner metabolisation that enables one to enter into a mental and emotional relationship with the various warscapes in order to understand their profound significance, to 'feel an emotional closeness' to them as 'places of memory' with a high value potential.

In other words, identifying the "objects of the past" as dense condensers of testimonial values stratified over time, and in this essence recognising their dignity as a cultural asset, is a founding assumption for the disciplines dealing with the fate of such assets, but with respect to "warscapes" this is not sufficient.

In this specific context of investigation, in fact, the adoption of an analytical approach that studies the different warscapes through a path of knowledge based exclusively on observation, on the careful and deep investigation of stratification, on the most precise and detailed description of the "materia signata", fails to return, despite its correctness and methodological consistency, a complete and fully satisfactory understanding of these very special landscapes. What is perceived, because it is a perception, is a sort of acephalous completeness, distance, inability to grasp the complexity as a whole and to describe it according to the rules of logic and rationality.

The reasons for this condition are to be found in what can be defined as the intrinsic essence of these warscapes, a "second essence ", that quidditas of value that identifies and characterises them with respect to any other type of heritage, and which becomes manifest at the moment in which these landscapes are recognised not "merely" as signed matter, physically connoted in time and history by the works of "human endeavour" (in this case war), but as embodied matter, in which man himself has literally become an integral part of the landscape,

357 ROUSSO, 2005.

personifying it, making it "alive".[358]

Indeed, it was precisely during the conflict that the heaps of rubble on the battlefields were mingled with the corpses of all those soldiers who died in the fighting, producing a unique stratification of debris and human remains, establishing a "close connection, an osmosis between the death of men, objects and places".[359]

The defenceless bodies of soldiers 'slaughtered like animals taken to the slaughterhouse' were often not even moved from 'no man's land' to be buried, but immediately became part of the 'new landscapes of war', becoming footholds for rifles, reference points for orientation in the trenches or even 'human shields' to limit exposure to enemy fire. In this way, the defenceless body of the soldier became a simple 'element in the landscape' on a par with all other ordnance, remains and rubble.

In this sense, it is easy to understand how the "destruction of earth and life" met precisely at the sites of the tragedy, creating new symbolic landscapes in which the ground metaphorically nourished itself with the sacrificial blood shed by the many young men who fell in battle, in which animate matter joined inanimate matter in a symbiotic relationship that transcends the dimension of the tangible, imbuing the various warscapes with an aura of sacredness.[360]

358 These reflections refer to the great theme of the ability to recognize the aura of things, perceived precisely in the mixture of its natural and supernatural dimensions, in a sort of “double identity.” In his writings, Giacomolli defines “the aura as the manifestation of an unexpected, second essence of things; which the second essence one would say wants to recall the belonging of the thing to an afterlife. Suppose the essence tells us that it is what it is and is not what it is not. In that case, the second essence instead reveals (it seems to reveal) that the thing is what it is not, that is to say, that it is not only a finite thing, limited in its simple essence of a thing identical to itself and different from every other thing; but it is also (so it seems) different from itself and coinciding with the other from itself: a visible part of the beyond, a fragment of the Absolute: in short, a revelation of the Infinite in the forms of the finite. The essence of the thing delimits the thing in its closure, in its interiority: it is its inner soul. The aura, on the other hand, as a second essence, <illimits> the thing, restores it to its open and boundless dimension: the aura is, therefore, a sort of external soul, an addition of soul that seems to come from the absolute Outside, from an Elsewhere that however is part - just like an external soul - of the thing itself”, in GIACOMOLLI, 1993. In this perspective, we can better begin to understand the real quid value that distinguishes and characterizes the heritage of vestiges from any other type of heritage and that in Italy, perhaps partly unconsciously, has stimulated the drafting of a specific law to protect them.

359 AUDOIN-ROUZEAU, 1992.

360 In this perspective of meaning, the use of the term warscape is better understood than war landscape: the war transformed the “skin” of the landscape on the surface. It influenced its personality, conforming its shape through the imprint left as evidence of its passage. The physical “signs” of this passage and the traces of the unfolding of the conflict are as much a part of this heritage as the meanings that were preserved in such evidence.

In other words, man's ability to transcend the limits of the visible as "mind", "soul" and "body" activates in the "things observed" the ability to return this gaze, a possibility of response that therefore implies an awareness of the possibility of establishing a dialogue with these "objects", transferring a mode of reaction normal in human society to man's relationship with the objects of the past.[361] It is precisely this dialogue, made up of gazes and "counter-gazes ", of feelings and perceptions, that enables us to grasp the infinite web of correspondences between things themselves, but also their being "something more and something else", their "aura"[362], which refers to a "spiritual life" in which "what appears distinct to the human eye lives. The ability to go beyond the limits of the visible thus becomes the ability of "poetic seeing "[363], of

361 In this sense, Ruskin already expressed the awareness of an intimate relationship between "man and object": "It is not possible to say anything about the value of human existence if this is not objective, through an artifact, at the same time the object has value in that its existence refers back to a man. We are in the presence of the circularity between man and culture: the presence of man in his peculiar specificity is signaled by culture, and culture, in turn, is significant because it bears witness to a human act [...]" in RUSKIN, 1998. See also BELLINI, 1984; MARAMOTTI, 1989.

362 "To perceive the aura of a thing is to endow it with the capacity to look. The findings of memory involuntary confirm this. (They are, on the other hand, unrepeatable: and they escape the memory that tries to pin them down. Thus, they come to support a concept of aura, which means the <unrepeatable apparition of a distance>. This definition has the merit of rendering transparent the cultic character of the phenomenon. The essentially distant is inaccessible: and inaccessibility is an essential quality of the cult image). It is unnecessary to emphasize how familiar Proust was with the problem of the aura. But it is always noteworthy that he touches on it incidentally in concepts that imply its theory: <Some lovers of mystery want to believe that something remains, in objects, of the gazes that have touched them>. (i.e., the ability to return them). <They believe that monuments and paintings only appear under the delicate veil that the love and devotion of so many admirers over the centuries have woven around them. This illusion - Proust concludes evasively - would be transformed into truth if they referred it to the only reality existing for the individual, that is, to his sentimental world>. Analogous but oriented in an objective sense, leading further away, is Valery's description of perception in dreams as auratic. <When I say: I see this thing, I do not put an equation between myself and the thing...In the plan, on the other hand, there is an equation. The things I see me as I see them. And typical of oneiric perception is the nature of the temples of which it is said: l'homme y passe a travers des forets de symboles. Qui l'observent avec des regards familiers"; in BENJAMIN 1995.

363 "The reference to the counter-gaze of things refers to a vision of the thing that places its gaze on the beholder; but this gaze is activated by the very act of looking at it, it is the quality of seeing that provokes the gaze of the thing, a quality that according to Benjamin is proper to the poet. Seeing as "poetic seeing" configures a perception of things that is "enchantment," it is the feeling of the infinite web of correspondences existing between things themselves, their "being for themselves and of themselves" but also being "something more and something else" until arriving at the "experience of the infinite as infinity that rests in things," at the awareness of the mystery that belongs in an inseparable way to every place, thing, creature," in QUENDOLO, 2001. For more on this theme, see also BENJAMIN 1995, 1997; DE LUCA, 1995.

adopting a gaze that, at different depths, is able to "look" at the vestiges and the "wounds" impressed by the war on the landscape not only with the eyes of rationality but through the "perceptions of the heart". A "heartfelt knowledge "[364]that allows one to grasp the "sentimental value" of these pregnant "deposits of memories", seeking to empathise with them through the development of a sort of affective identification, which makes them participants in a creative destiny where the life of things, the life of man, and of nature are necessarily linked.[365] The ability to acquire this "poetic seeing" becomes the necessary condition to be able to define and understand that quid value that deeply characterises "war landscapes" and makes them a very special cultural heritage, unique and different from any other type of heritage.

In this horizon of meaning, thinking about the "care" of the different "landscapes of war" means first of all starting to re-establish such a dialogue with them, starting from a sincere capacity of "listening", of humble predisposition to "silence", in order to allow what remains of the vestiges, even in conditions of fragment or ruin, to express its own voice, its own emotions, its own needs in the spiritual space of meditation. It is only in the ability to enter into harmonious harmony with these "voices" that the work of memory can be activated and understand how to "tune" the different modes of "care" in a choral way, thinking about the destiny of this heritage.

At the operational level, the recognition of the aforementioned quidditas makes it possible to broaden the field of reflection, going beyond the operational limits, albeit necessary, of the eternal dilemma of conservation/innovation to set up a new paradigm that highlights how the need to "take care" of the different warscapes, if carried out without

364 “Benjamin pursues an attempt to construct what he calls ‘paradoxical knowledge,’ ‘felt knowledge,’ which combines the power of alert reason with the power of sensation and memory. With this knowledge, we can look at things with the same intensity with which images appear to us in a dream and recognize their logic and meaning. Reality appears to us with the force of an epiphany but without the temporary character of epiphanic experiences. The attempt is unprecedented in the history of thought. It cannot be assimilated to those philosophies that have opposed to vigilant reason, to the <day>, the <night> of the dream, and the archaic and mythical images in the dream. In them, says Benjamin, what is close to us is pushed far from us, sinking into individual and collective prehistory, into a primordial forest from which it spies on us, without us ever being able to grasp it”; in RELLA, 1988, pp.89-90.

365 Ruskin also argued that “the object is individual insofar as history (its entire history) has made it so. Its presence is therefore dense with memory in that it is loaded both with the signs that have given it form and those inflicted on it by the passage of time. Moreover, the object in its materiality has a <antique> consistency [...]. But beyond the use of words and the pleasure in seeing where the nature of entities passes into something other than themselves, Ruskin arrives at an irresistible observation for the intellect: every entity has in itself something that qualifies it as unrepeatable”; in MARAMOTTI, 1989, pp.151-152.

betraying this quid value, becomes a sort of ethical and educational "duty of memory", a tool for interdisciplinary mediation between the physical dimension of territorial systems and the intangible one linked to the social and anthropological sphere.[366] If the polysemy of meaning inherent in every landscape defines its material nature and at the same time its interpretation by society[367], as already explained in chapter 3, educating on the "landscape of war" does not only mean guaranteeing its preservation and improvement, but implies the need to "increase the awareness of everyone's rights and responsibilities" towards it.[368] It is therefore an ethical duty that must stimulate communities to show, first and foremost, profound respect for this very special type of heritage, in its polysensical declinations: a sincere feeling of pietas that evokes the need for "care" towards the heterogeneous set of fragments of the remains, which becomes a temporary suspension of "value judgement"[369] in order to deepen understanding before proposing any possible action, before deciding whether to cancel, preserve or transform the material already densely signed physically and intangibly.

Only through a profound cognitive path, in fact, is it possible to understand the informative potential guarded by the set of material remains that form the complex ensemble of vestiges, a potential that goes beyond the tangible dimension, enriching itself with an immaterial value charge built up over a hundred years of life, which began with the human sacrifice consumed on those battlefields during the conflict and stratified further in relation to those dynamics of transformation discussed at length in the previous paragraph. Through the metabolized knowledge of this value quid, it is possible to understand the real meaning of the "necessity of memory", of this ethical duty towards a renewed "culture of care "[370] towards the objects/landscapes of the past

366 TURRI, 1998.

367 Reference is made to the concept of 'landscape wit' as defined by Farinelli and explored in Chapter 3.

368 CASTIGLIONI 2012.

369 See note nr. 338 p.442, in particular LA REGINA, 1989.

370 In his message of greeting for the World Day of Peace 2021, Pope Francis chose as his main theme "The culture of care as a path to peace," highlighting "the importance of caring for one another and creation, to build a society founded on relationships of brotherhood and to eradicate the culture of indifference, discard and confrontation." Distant from this context of reference, the Holy Father's words make explicit reference to the close relationship between mutual "caring" among people and between people and creation. Promoting a 'culture of care means pursuing a common, solidarity-based and participatory commitment to protect and safeguard the dignity and good of all. Therefore, the objects of the past understood precisely as 'deposits of identity memories' of communities. This implies a predisposition to listen, to the ability to pay attention, to compassion, and to respect. By declining these attitudes concerning the need to take care of the cultural heritage, it is possible to understand how this has a

in order to hand down their meanings to future generations.

One hundred years after the conflict, when the survivors are definitively disappearing, and with them the possibility of "remembering", perhaps this is the great legacy of the war: the ability not to oppose the present to the past, stopping only at the superficial contemplation of the memory of what has been, but to have the courage to systemise these memories so that the memory becomes a "remembered present", that is, a past recalled not through the rationality of the mind but through the "perceptions of the heart "[371]. This can only be expressed through the development of new enhancement practices that are able to spread the understanding of this "second essence" of the warscapes through projects and weak overwritings, which allow communities and future generations to empathise with what remains of the vestiges through experiential paths of listening to their "voices", in order to welcome them within themselves and give them new life in a continuous cycle in which present, past and future intertwine.

5.3 The The threshold-space between the “visible” and the “submerged”: an accumulation basin to be “poetically investigated” to unveil the permanence of the “imprint”.

As a synthesis of what has been presented in the previous chapters, and also with respect to the new keys of interpretation provided by the considerations concerning the polysense concepts of Heritage and "deposits of memories", a further question emerges strongly, which transversally crosses the different depths of analysis according to which the different "war landscapes" have been interpreted and investigated, and "opens the eyes" towards the possible ways through which to make operative and effective the first considerations proposed concerning the future approaches to be adopted in order to consciously set up

profound educational purpose useful in improving human relations themselves. Today’s heritage is the heritage of the future, so caring for it means caring about building a better future, cultivating hope, and sowing it around us. See “Message of the Holy Father Francis for the celebration of the Fourth World Day of Peace,” 1 January 2021.

371 If we analyse the etymology of the word remembrance, ricordare, it derives from the Latin word re-cordis, meaning something that returns, goes back, is recalled, and cordis, meaning the heart, which in the past was considered the place where experiences were stored. Remembering therefore means recalling something from the heart. The heart, it is true, was considered to be the seat of memory, but the heart is obviously the place where a person’s emotions are stored. If, with the passage of time and the evolution of knowledge, it has become clear that memory is obviously located in the brain, it cannot be denied that the heart remains the place where the impressions one experiences, the sensations one feels, accumulate. In other words, remembrance is therefore the act of bringing back to memory not only something from the past, but a past that has left an imprint on the person remembering, i.e. a past that was experienced at a particular time.

the choices concerning the fate of this meaningful heritage. Bearing in mind that the objective of the entire research does not concern the definition of precise "guidelines" to be followed in the future practices of protection and enhancement, but consists in the elaboration of a general cognitive method that, through an inter-scalar holistic approach, helps to consciously address the future "practices of narration", it is necessary to understand whether some semantic areas can be identified as particularly relevant but "at risk", with respect to which to circumscribe the field of action of the research and specifically deepen the reflection.

Among the many observations presented, the current "problem of scale", which is present both in the understanding and in the management of the "war landscape" as a system, certainly represents a first important aspect to be taken into account. The investigation by means of the "order matrix" and the study of the potentialities/weaknesses of this heterogeneous set of vestiges proposed in the previous chapter have in fact highlighted how the condition of fragmentation constitutes a point of weakness essentially if an organic and systemic vision at a general level is lacking. Referring to the previous chapters for a more in-depth analysis of the subject, in short, this translates into the current inability to recognise even in the most minute and fragile "signs" in terms of permanence the same semantic and memorial depth that is more easily recognised in permanent fortifications.[372]

Secondly, and no less importantly, another fundamental issue to reflect upon concerns the themes addressed in the previous sections of this chapter, namely the ability not only to recognise in the vestiges an informative potential such as to define their nature as "cultural heritage", but also to enter into deep empathy with them, in order to be able to grasp and understand that quid value which substantiates that auratic dimension of sacredness that characterises and distinguishes them from any other type of heritage. In this regard, all those material traces on which the atrocities of the conflict were consumed, tangible evidence of the conformative imprinting of war and at the same time guardians of those intangible values mentioned above, acquire particular significance.

The ability to put these summarising considerations into a system does not aim so much at identifying geographically identified territorial areas with a high testimonial value but little investigated and therefore on which to focus attention and "take care", but it represents an opportunity to gradually begin to "focus" on what constitutes the most pregnant and characteristic physical space of the different warscapes, despite not having been adequately considered until now, that is, the "accumulation basin" in which the "tangible signs of history and time"

372 These considerations are linked to the analysis of potentials and weaknesses presented in Chapter 4, to which reference is made for further details.

are literally stratified, impregnating themselves with those symbolic and memorial values referred to above.

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It is the constituent material of the landscape, that is, its morphological conformation, the soil, the attack on the ground of that imprinting which has connoted its skin and "signed" its essence. After having been a decisive element in the design choices of the plans for the militarisation of the territories118, in fact, in the wartime the soil was literally tortured, "wounded", transformed and distorted. And in the post-war period, further significant layers were deposited on what remained of it, such as the "overwriting of memory", the erasures caused by changes of use and restoration, the further destruction caused by the first wave of recovery, up to the post-depositional layers of degradation accumulated during the phases of abandonment, which very often "submerged" the vestiges themselves, preserving them below the visible, in a sort of "time capsule ".[373]

In the light of these considerations, therefore, the soil of the "war landscapes" is not merely a physical space but is charged with profound meanings and becomes the sacred place where history becomes memory, where material evidence, though partially hidden from view, continues to live on, waiting to be revealed. In this perspective of meaning, the

373 The “time capsule” concept refers to archaeological disciplines and will be discussed in more detail in Chapter 8.

"accumulation basin" in which the different significant layers have been deposited becomes a fascinating threshold-space between the visible and the "submerged", between the evident permanence of the conflict and the latent imprint of the war that persists in the contemporary landscape at different temperatures.

Analysed from this point of view, this threshold-space truly embodies that "signed matter" on which the "message-bearing signs" are impressed, embodying precisely that quid value whose recognition is the necessary condition for succeeding in establishing that empathic relationship of affinity with the remains, for succeeding in welcoming them into the existence of those who observe them, for "representing them in our space (and not representing us in theirs)", in the awareness that "it is not we who move into them, but they who enter our lives ".[374]

This is the direction in which future "memory practices" can develop, through a new type of approach that is able to recognise, within this threshold between the manifest and the latent, the areas with different value charges, in which to "feel" the infinite correspondences between what remains of the vestiges and the relative meanings and potential values that remain at different intensities.

Until now, in fact, these "signs", being mainly weak and latent traces, have very often not been investigated and affected by the many projects implemented, which, as already explained, have instead mainly dealt with the most clearly recognisable evidence, such as permanent fortifications. Yet the soil was also the undisputed protagonist of the most everyday aspects of what was to all intents and purposes an eternal "war of position", during which soldiers literally lived in it, digging trenches, underground shelters and temporary shelters. And it was precisely on the morphology of the land that the most atrocious battles of the conflict were fought, the place where the sacrificial blood of millions of young dead men penetrated deeply and mixed with the ground, becoming an integral part of it, giving it an aura of sacredness.

In addition to these considerations, placing this limes at the centre of the analysis also provides the possibility of recovering that systemic vision, now weak but unquestionably necessary, to be able to overcome the current condition of fragmentary material remains of the vestiges, particularly with regard to the most fragile elements in terms of permanence. The ability to investigate the place where the different elements of the war machine were functional for the purpose for which they were designed, as they functioned in a reciprocal relationship, provides the possibility of recovering the memory of these connections and putting the fragments isolated today back into tension in order to strengthen their significant charge as part of a system.

374 BENJAMIN, 1982.

And it is precisely with respect to the need to strengthen the gaze towards the different warscapes as a "fortified system" that this cognitive approach also makes it possible to study the real space of relations on which, a hundred years ago, the fate of Europe was determined, going back to investigating the fundamental concept of the front, not in terms of a physical limit or barrier, but understanding it too as limes, as a threshold.

Although it may seem obvious, the very idea of war, and even more so of trench warfare, has in fact always conceived of fronts as closed curtains in opposition to one another, and even the various projects that have been concerned with the recovery/restoration/enhancement of the entrenched systems and the "front lines" have almost always paid greater attention to the ways in which the space inside the individual fronts is formally narrated, essentially the entrenched systems, rather than looking at what was the real field of action of military tactics, the place of sacrifice, the "no man's land ".[375]

Even though we are aware of the difficulties in concretely identifying this "space between" due to the post-war transformations, being able to reinterpret, where possible, the opposing fronts and the space between them through this view is the necessary condition to highlight the intrinsic relational nature of this pregnant space-threshold through a new and different view.

Reinterpreting this concept metaphorically, it is indeed interesting to note how the "front lines" of the opposing fronts essentially represented two independent entities placed in reciprocal tension like the poles of a capacitor, not physically connected but firmly linked to each other through the electric field that was generated precisely thanks to and in the space of separation: in the same way in 'no man's land' this potential was 'charged' through the dense networks of tangible but also visual relationships, creating a kind of magnetic density that permeated this space-threshold in depth, depositing material traces and value layers at different depths of meaning on it.

In the course of time, the fragility of this pregnant heritage of "signs and values" has increased in relation to the multiple post-war transformations and rewritings and to the gradual emotional distancing of the communities, but the imprint of these "signs", although latent, is still present in the morphological conformation of the contemporary

375 A very interesting project that dealt with the space “between” the enemy front lines was developed in Belgium in the area around Ypres. Trees were planted along the front lines, and each of them was associated with a sign with a different color (red or blue) depending on whether the tree indicated the French or German front line. In the space created between these rows of trees, open-air exhibitions and cultural and educational activities were set up to bring war places directly to life. For a more in-depth discussion of this, see Table 4.60 and 4.64 in Chapter 4.

landscape.

In this perspective, it is evident how what had been defined as "deposits of memories" can be consciously defined as real "condensers of high capacity values", areas with a high potential value that, through future enhancement projects and practices, must be responsibly protected and safeguarded to avoid the "risk of loss" and, with it, the "possibility of memory".

In conclusion, therefore, being able to recover this systemic-relational vision, which is currently lost, is the indispensable prerequisite for facilitating the process of unveiling this set of "submerged" fragments, and the palimpsest of intangible values of which they are the silent guardians. Through this gaze, the revelation of this latent heritage, in its twofold physical and intangible aspect, represents a unique opportunity for knowledge and induces in the observer a deep "feeling of pity" towards it, a sort of compassion, understood precisely in the etymological meaning of the term cum-patior, according to which one "emotionally perceives the suffering of others, wishing to alleviate it ".[376]

In this sense, the meanings used by Eastern cultures to describe this term seem particularly appropriate, such as Buddhism, which interprets this concept in the double meaning of karuna, from the Sanskrit "pity", "mercy" and "empathy", but also of maitri, or "love", "benevolence" and "charity ".[377] But also in monotheistic Hinduism, mercy, compassion and respect for life in all its forms, and therefore also with respect to the objects of "human making", are inescapable values, which stimulate an attitude of charity placed at the service of one's neighbour.[378] And these

376 Luigi Volpicelli, Lessico delle scienze dell'educazione, ed. Vallardi 1978, p.191

377 In Mahāyāna Buddhism, "compassion" (karuṇā) is, together with "wisdom" (prajñā), the two pillars of its religious doctrines and practices. The Mahāyāna doctrine and practice of "compassion" is based on the awareness (wisdom, sans. The Mahāyāna doctrine and practice of "compassion" are based on the awareness (wisdom, sans. prajñā) of the "Truth of the Middle Way" (Sanskrit mādhya-satya) preached by Nāgārjuna, that is, on the co-presence of "absoluteness" (paramārtha-satya) or emptiness (śūnyatā-satya) and "singularity" or "impermanence" (saṃvṛti-satya) in every aspect of the ultimate Reality, interdependent, every phenomenon exists both in its subjective nature ("conventional") and simultaneously in its relation to others ("absolute") representing the "singularity" one of the many manifestations of one ultimate Reality: individual faces of a 'great shining one'. The distinctions that the mind continually makes, solely by dividing and categorising perceptions, are therefore seen as illusory and the ego if not also holistically understood with the whole of Reality is only an illusion since there is no ego separate from everything else.

378 For the Vaishnava school of thought, matter is by nature temporary, destined to agglomerate, transform and decay in a continuous cycle, while the jiva, the soul or spiritual particle that inhabits the body, possesses exquisitely spiritual characteristics: eternity, knowledge and happiness. It is for this reason that we all aspire intimately to a serene, happy, and fearless existence, but we mistakenly seek these conditions in the

meanings coincide exactly with what Pope Francis himself has defined as "a precious heritage of principles, criteria and indications", from which to draw the "grammar of care" to which each individual must be inspired, towards himself and towards creation, in order to gradually build a "culture of peace".[379]

In other words, these feelings must become living nourishment for the future "care practices" of the different warscapes, and in particular of this space-threshold to be unveiled and known: narratives oriented first of all to give them back the possibility to tell their own "being in time" and to express their own "voice", but also to find again a shared "choral sense", in the awareness that each thing is related to the others and that "neglecting the commitment to cultivate and maintain a correct relationship with my neighbour, towards whom I have the duty of care and custody, destroys my inner relationship with myself, with the others, with God and with the earth ".[380]

wrong direction, trying to procure the pleasure that will satisfy us completely through the body and the material senses. The greatest mercy is therefore to illuminate the path that leads beyond the duality of the phenomenal world, the highest compassion is the act of slowing one’s pace to help those who are progressing more slowly on the path of spiritual awakening and to encourage those who have not yet even begun this journey. In “Reflections on Vedic Culture” by Parabhakti das, Mercy and Compassion, April 2013

379 Reference Pope Francis speech 1 January 2021.

380 Encyclical Letter Laudato sì, Pope Francis on Care for the Common Home”, 24 May 2015, 70.

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Chapter 6

(Great War)-scapes: the “testimonial gradient” as a new paradigm for future perspectives

The identification of the different Warscape Classes through the renewed systemic view presented in chapter 4, which allowed to find a first “possible order” in the complexity and to better focus on the “potentialities and fragilities” of this articulated heritage, and the reflections about the recognition of the different “war landscapes” as “pregnant deposits of memories” (chapter 5) to be known and revealed, with particular reference to the threshold-space between the “visible” and the “submerged,” represent the direct declination of the **necessary holistic approach** already introduced in chapter 3, which wants to investigate the warscape in its entirety, about how it is “felt” by the communities and through the relationships between the natural, cultural, social and historical factors that have defined its development. Only through this multi-scalar and all-encompassing vision that allows observing closely but also to “look away,” to be both external and internal observers, can it be possible to overcome the current interpretation-operational gaps and understand the “deep sense” that underlies the need to “take care” of such a heritage, providing a practical knowledge base on which to set future “enhancement practices consciously.” Before entering into the details of these last considerations regarding the modalities according to which the destiny of these works should be “taken care of,” it is now opportune to briefly deepen the contextualization of the relationship between “war landscapes” as “deposits of memory” and the **“paradigm of heritage”** to understand better what has already been explained in chapter 2 regarding the intrinsic essence of the vestiges of the Great War recognized as **“cultural heritage with a value of civilization.”** Even if the identification of the heterogeneous set of relics as “cultural heritage” is now universally acknowledged and is also supported by all the previous studies, a specific reflection on the different meanings with which the “Heritage of war” can be declined

is beneficial to contribute to "focus" that quiddity (see chapter 5) that makes the different warscapes unique and, for this reason, to be preserved and protected through the future "narration and valorization practices."

6.1 The declination of the concept of "heritage of war": comparing semantic nuclei.

Approaching the theme of the memory of "wartime landscapes" in its various forms poses innumerable questions of knowledge. While the previous chapters have already introduced the recognition of the heterogeneous set of remains as "cultural heritage with a value of civilization," it is now necessary to investigate more deeply the meaning of the concept of **"cultural heritage,"** both tangible and intangible, expanding the observatory of reference from the scale of the single asset to the entire landscape. The physical remains linked to wartime activities can be considered to all intents and purposes as "territorial cultural heritage" insofar as they are symbols of the cultural heritage of the events that have marked the evolution of societies and bear witness to a precise succession of historical events on a global scale. These findings are part and parcel of a debate underway at the European level for many years, which has been studying the **territorial value** of cultural heritage in-depth and reflected in the Council of Europe's extensive work on culture and development relations[381]. In the light of what has also been presented in Chapter 2, it is clear that this reflection is also fully reflected in the Italian legislation, which, since the fundamental principles of the Constitutione[382] recognizes cultural heritage as "heritage," the wealth of the nation and its constituent element.[383] As the concept of 'place of memory' discussed in the preceding paragraphs, the idea of 'Heritage'

381 In France, numerous research projects are active on the meaning of heritage and its domains, characteristics, and categories that preside over its definition, involving numerous institutions ranging from the Ministry of Culture to Datar to CNRS. In particular, within the latter, there is a team coordinated by Jean-Pierre Jeudy, which has produced numerous studies on heritage, investigating the plurality and complexity of its components: ideological, mnemonic, social, semiotic, etc. (Jeudy, 1989 and 1990)

382 The Republic promotes the development of culture and scientific and technical research. It protects the landscape and the historical and artistic heritage of the Nation. - Art. 9 Italian Constitution.

383 Recent research by the Council of Europe has been interested in investigating the evolution of the concept of heritage in European countries, aimed at identifying the constitutive values and operational implications of cultural heritage. The comparison of the lines of development allowed to highlight the role of cultural heritage in the formation of the concept of the nation; the influence of social forms on the consolidation of the perception and representation of cultural heritage; the value of the conceptual transition from the historical monument to the "memory of the past" to the "cultural heritage" (Council of Europe, Committee on CulturalHeritage, 1994).

has also been the subject of multiple historiographic evaluations and interpretations since, in the words of historian Paolo Sorcinelli, it refers to '*everything that concerns the past in a concrete and abstract sense*'.[384]

In any case, according to the Encyclopaedia Treccani, heritage is "*the totality of wealth, material and non-material values that belong, by inheritance, tradition and so on, to a community or even to an individual,*" i.e., the set of goods and wealth that society has inherited from its ancestors and that it must pass on to posterity. In this sense, the concept of *Heritage* as **Inheritance** is defined from the point of view of communities, i.e., those who inherit this cultural heritage understood precisely in the sense of "*a gift handed down through a transaction-based not on market economy principles, but on a concept that intimately links the issues of inheritance and identity*".[385] This sort of "transfer of ownership" implies a juridical passage concerning the physical consistency of the goods and the rights and duties connected to them. In this particular sense, the communities to whom these "goods" are entrusted, which in this case are the remains of the Great War, are invested with a sort of "moral obligation of responsibility," in particular towards the palimpsest of intrinsic values preserved in them and concerning the need to **"take care of them"** to build the "legacy of the future" to be handed down to posterity. At this point, however, it is worth remembering that heritage, also understood as "inheritance," is not only synonymous with a work of art, an architectural asset, a monument, or a museum, but reflects the entire history of a community, its values, the traditions handed down through the generations, and is therefore profoundly connected to the concepts of history, memory, and identity of the territories and landscapes to which these assets belong and of which they are an integral and substantial part. In 1998, UNESCO defined heritage as "*the set of tangible and intangible natural and cultural elements, inherited from the past or created recently. Through these elements, social groups recognize their identity*".[386] The importance of this definition has been decisive in "opening up" and expanding the concept to include all intangible aspects of customs, social, work, and cultural activities, as well as the places where these relations take place. And it is thanks to this semantic evolution, several specific terms have gradually joined the notion of heritage, including cultural, to categorize better the different areas of reference in which it can be manifested. Aware that in reality, each era has developed its specific definition, at the 12th General Assembly held in Mexico in October 1999, ICOMOS

384 SORCINELLI, 2009.

385 NIGLIO, 2014.

386 UNESCO 1998.

defined cultural heritage as "*a broad concept that includes the natural as well as the cultural environment. It includes landscapes, historic places, sites, manufactured environments, biodiversity, collections, cultural practices of the past and present, life experiences, and knowledge. It records and expresses the long processes of historical development that form the essence of diverse national, regional, indigenous, and local identities and is an integral part of modern life. It is a dynamic reference point and a positive tool for growth and change*".[387] Cultural heritage is, therefore, the physical evidence of the time and duration of the cultures that have succeeded one another on a given territory, stratifying it with the 'signs' of their civilization which, over the years, have become the physical mediums, the semiophores,[388] charged with ever greater significance capable of triggering the construction of a sense of belonging to such places.

Applying this reasoning to the "landscapes of war," it is evident how the material remains of the vestiges represent those tangible *mediums* capable of activating the collective memory, insofar as they are the custodians of that characterizing *quid of value* which discussed at length in the previous chapter. In the light of these considerations, it is clear that the concept of heritage as "inheritance" can be flanked by a further semantic declination which, metaphorically inverting the point of view, places Heritage itself at the center of reflection as "**Legacy**", that is, as a tangible and spiritual "legacy," as described above, on whose safeguarding[389] is measured by the capacity not to betray its meaning and significance. In other words, safeguarding heritage as "legacy" means allowing communities to continue to perceive that "*sense of past*" to which "tangible and intangible heritage" bears witness, not only as "objective past" but also as "awareness of the past" which, in the present, manages to produce a

387 ICOMOS, Messico 1999.

388 For a long time, cultural heritage has been recognized as the support of multiple meanings that are invested in it both by its conservators and by those who use it. In this perspective of meaning, cultural heritage becomes the vehicle of a system of elements "bearers of visible characters susceptible to receive meanings" (CARTA, 2002). A dozen years earlier, Pomian had already defined these elements as semiophores, that is, bearers of signs: the sequence that transforms the object into a semiophore passes through a phase of decay that gives it the value of historical and memorial testimony that once recognized, lead the semiophore itself to be protected and safeguarded from degrading external influences of the environment or human actions. For a more in-depth study on this subject, see also CARTA, 2002.

389 Safeguarding' refers to measures to ensure the vitality of intangible cultural heritage, including identification, documentation, research, preservation, protection, promotion, enhancement, transmission, mainly through formal and informal education, as well as the revitalization of various aspects of that cultural heritage. In this regard, please refer to the UNESCO Convention for the Safeguarding of the Intangible Cultural Heritage, art. 2.3.

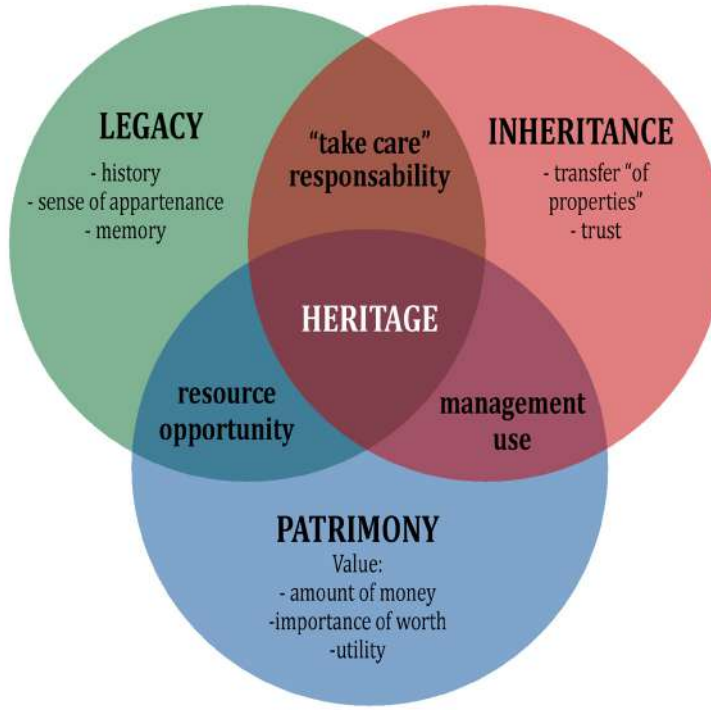
"cultural sense." And to confirm this, also according to ICOMOS, "*the specific cultural heritage and the collective memory of each locality or community are not replaceable and are an important basis for present and future development*".

Precisely in this regard, reasoning on the "present and future development" of the different warscapes, it is helpful to project the reflection towards the future "care practices" by introducing a further declination of the concept of "heritage" that, in addition to the meanings of "inheritance" and "legacy," tries to put in the system the objectives of protection, preservation and safeguard with the opportunity to consider the "cultural heritage" as a potential *driver* for local development. In this meaning of "heritage" as "**patrimony**" in fact, in addition to the palimpsest of meanings and values that the various communities recognize in "material evidence of the value of civilization," there are other reasons (economic, tourism, management) which, if appropriately studied, could transform these assets into **resources** capable of generating benefits and externalities of a different nature, activating virtuous circuits for the development of the communities themselves and the economic growth of the territories in which they are located. In other words, it is a question of investigating, once again through a holistic approach, the multidimensional concept of the multifaceted value produced by cultural heritage,[390] which is not only concerned with 'memory practices' as a 'possibility of knowledge,' but tries not to neglect the direct and indirect effects that such narratives and cultural activities can have as a stimulus to the endogenous growth of the local and territorial economy, precisely through cognitive processes and 'capacitation[391] in a renewed long-term perspective, 'propelling instruments' of knowledge, which become culture through curiosity and experience.

This kind of approach opens the field of reflection to the various policies related to the valorization and management of cultural heritage, that is to say to the theme of the debated and contrasting relationships that link the practices of protection to those of conservation and fruition that are developed at different scales and an interdisciplinary level, as will be better addressed in the following paragraph. In the light of these considerations, approaching the study of "war landscapes" from this observatory means recognizing the "places of memory" as a strategic symbolic, social, and economic capital in which to invest, in the future, to build a sustainable legacy for the

390 Several economists have worked on this multidimensional character of the value produced by cultural heritage, including MAZZANTI 2002, BAIA CURIONI, 2010. For further discussion on the subject, see also BARBETTA, CAMMELLI, DELLA TORRE, 2013.

391 BARBETTA, CAMMELLI, DELLA TORRE, 2013.



future. In other words, it is a question of declining the "responsibility of care" regarding the inheritance inherited from the past through that fundamental "right to cultural heritage" understood as the possibility of participating and contributing to its development through the conservation and sustainable **use/management** of the same[392]. In this sense, the awareness that "*the future of the cultural/environmental heritage [by extension, the future of the remains of the Great War] is built on the relationship it has with the territory and on the ability to develop this relationship in terms of a social perspective*"[393] and therefore linking the reasoning to the necessary rethinking of the current ineffective "functional divisions," which essentially reserve

392 In this regard, the most recent normative reference is the Faro Convention, a framework convention of the Council of Europe on the value of cultural heritage for society, adopted in 2005 and gradually ratified by almost all member countries (in Italy it was ratified in 2020). In the following paragraphs, the content of this convention will be better explored, at this time it is important how it clearly defines how communities must "have free access to cultural heritage, which must therefore be shared as a common responsibility to protect and conserve, and of which the State must ensure sustainable use". In addition to this, the Convention also introduces the concept of "heritage community", i.e. that group of people who value specific aspects of cultural heritage, and who wish, within the framework of public action, to sustain and transmit them to future generations.

393 CECCHI, 2014.

the functions of protection to the Superintendencies and those of enhancement to the museum institutions, to set up a more synergic and effective network of relations between the various stakeholders involved in the "care process," from citizens to voluntary associations, from institutions to government bodies.

In the light of the preceding reflections, the interesting declination of the concept of Heritage, in its polysense meanings of **inheritance, legacy,** and **patrimony,** clearly shows the different **semantic nuclei** according to which it is possible to define better the various facets of the ontological meaning of "heritage" itself ***(Pic.6.1).*** Like three highly polarised electrical charges with a dense signifying content which, when placed in reciprocal tension, generate a high-intensity magnetic field, this semantic triad, appropriately investigated and deepened, can provide an indispensable cognitive contribution to define and better understand what is defined as the **"witness value"** of a given heritage. This is the intrinsic "sense" that permeates its identity, as challenging to determine prosaically. It is perceptible through that transcendental "way of seeing" introduced in chapter 2, which relates the visible world with the language of the language sensations and emotions through the experiential dimension of knowledge. Concerning the various "war landscapes," the recognition of this "testimonial value" is profoundly linked to the ability to identify that specific quid-value described in the previous chapter, that *hic et nunc* that characterizes the remains of the Great War and allows us to understand them by overcoming their condition of fragmentary nature precisely through that holistic vision that manages to reconstruct the vibrations of intangible wholeness, now lost. In this regard, putting into the system what has been proposed by the hermeneutic analysis of the concept of Heritage, it emerges the awareness of how the future "care practices" of the "war landscapes" can be usefully inspired by the multiple attitudes activated by the need to strengthen the complementarity of the different meanings according to which this "fragile heritage of high complexity" can be declined.

6.2 Contextualizing the meaning of valorization: the concept of enhancement.

The renewed freshness brought by the analysis of the "war landscapes" through the multiple theoretical-operational declinations of the holistic approach, as presented in the previous chapters, has contributed to defining tools and methods necessary to build a solid knowledge base of the "potentialities and fragilities" of this exceptional heritage, as an essential requirement on which to set the reflections concerning the related policies of future management and enhancement.

After the celebrations for the Centenary, it is necessary to reflect on how the remains of the Great War can continue to tell their essence of "identity heritage" for the memory of the community without betraying the cultural capital preserved in them, and at the same time become substantial resources for the revival of the territory and the cultural and economic development of society. Anticipating what will be discussed below, conceiving of 'war landscapes' as sustainable drivers for social development and economic growth also implies the need to realize how some reuse chains, already widely pursued, have today exhausted their significant potential (such as the many forms of musealization)[394], and that therefore future "enhancement practices" must somehow find new *governance* capable of proposing participatory multidisciplinary scenarios, in which conservation and transformation are complementary aspects of a typical development horizon, through the conscious involvement of communities in the various phases of the enhancement process. A first conceptual nucleus from which to begin to understand which should be the main guidelines according to which to develop the reflection, and also which specific declination can assume the concept of "enhancement" in this context, concerns the possibility of putting into the system what has been proposed above regarding the hermeneutic analysis of the idea itself of "Heritage" with the considerations obtained from the SWOT matrix at the end of chapter 4, as a synthesis of the "potentialities and fragilities" emerged in the study of the different Warscape Classes.

6.2.1 Semantic nuclei VS SWOT matrix: identification of "weak links"

Following the identification of the different "Warscape Classes," set up an analysis matrix to identify the primary "potentialities and fragilities" of the complex heritage of the vestiges of the Great War, with the priority objective of solving these interpretative-operative gaps through the elaboration of cognitive methods and tools according to which future planning strategies concerning the destiny of these "identity cultural assets" can be oriented.

Referring to Chapter 4 for the specific details already presented regarding the three main "critical issues" that emerged from this SWOT analysis (concerning, in particular, the issue of recognisability of the most fragile material evidence in terms of permanence, the problems linked to problems of construction technique/technology and the process as mentioned earlier management policies), it is now interesting to

394 In this regard, see also the considerations previously made through the analysis of the files of the various projects concluded and underway, presented in Chapter 4.

reinterpret these considerations in the light of the hermeneutic analysis of the very concept of "Heritage" to identify any methodological and "sense" correspondences.

Observed from a different point of view, in fact, the identification of the three semantic nuclei through which the concept of "heritage" can be declined, together with the awareness of their complementarity for the achievement of the "testimonial value" of "Heritage" in accomplished terms, also represents a sort of "strengths and weaknesses analysis" developed essentially at a more theoretical than the strictly operational depth of meaning. In other words, it is a reinterpretation of the knowledge of the warscapes that has been built up to now, in particular concerning the initiatives and projects carried out, through this new "semantic code" that declines the "potentialities and fragilities" concerning the presence of the same degree of "care" and attention for the different declinations of heritage as inheritance-leftover-resource, that is, when in the projects carried out a valuable balance between the needs of protection, safeguard and development/innovation is recognizable. In this perspective, therefore, the two surveys can be substantially compared to identify possible correspondences or interferences, but above all to define the "weak links" between these nuclei of high semantic polarity, which future "valorization" practices will have to strengthen. To be more specific, Table 6.1 presents a summary scheme of the whole reflection. As can be seen in the center of this schematic diagram, in fact, from the SWOT matrix previously elaborated, the main critical points have been highlighted, which, at different temperatures, concern the different warscapes and the project interventions implemented on them[395]. These are essentially the "weaknesses" that have emerged about the "fragility" of the remains as a vast and heterogeneous set of fragments that are often not easily recognizable within the multi-layered contemporary landscape and not always safely usable (indicated in red), and the "threats" from external factors to which the various warscapes are exposed, especially about a lack of organicity and coordination of the legal-operational structures that too often fail to interpret the interdependencies that are at the basis of the heritage and its management (indicated in purple). In addition to these "criticalities," there are also other issues (shown in blue) concerning, in truth, qualifying aspects and opportunities for the various "war landscapes," such as the awareness that the remains can become active resources for local revitalization and development, as well as being activators of new participatory policies of social inclusion, to name but a few. However, these aspects, being dependent on exogenous factors as well as "threats," are subject to a high variability that, if not monitored, can quickly turn "opportunities"

395 For a specific discussion of the SWOT matrix and the main issues identified, see Chapter 4.

into "fragilities." For this reason, they are highlighted as qualifying but potentially "at-risk" aspects.

In the light of these considerations, it emerges the existence of a close "sense" link that relates the issues just described to the overlapping bands of the different aspects of the semantic triad of "Heritage." Better than any explanation, the scheme reported in Table 6.1 highlights, for example, the univocal relationship between the issues related to the fragility, fragmentariness, and vastness of the vestiges and the relative actions of 'care' and responsibility that these issues stimulate and that correspond to those same attitudes triggered in the communities to ensure that the legacy is not lost but conscientiously handed down to future generations (link 1: 'care' to connect inheritance and legacy). In the same way, the critical issues concerning current top-down management policies, the lack of community participation in the decision-making and operational phases, and the current weak coordination between the various stakeholders are intrinsically linked to the need to implement management policies for the cultural capital inherited through the development of "smart projects" that effectively propose new uses and methods of service capable of transforming the "fragility" and marginality of the remains into natural strengths for the relaunch of the territory, without betraying its identity and character (link 2: "smart policies" to connect heritage and patrimony). And it is precise with regard to the possibility of considering the remains as potential resources and drivers for the development of territories and communities, and therefore promote new projects able to transform these assets into real instruments that attract and propel culture on a broad scale, it is easier to understand the reasons why these issues, potentially not critical if not responsibly controlled could easily lead to uncontrolled interventions, distorting the tangible and spiritual legacy of the remains and betraying the "sense of testimony" (link 3: "safeguard" to connect legacy with patrimony).

As mentioned above, the recognition of this sort of theoretical-conceptual categorization finds complete correspondence in the analysis of the different practices and narratives that have affected the remains of the First World War over time, from time to time developing more some rather than other declinations of the concept of "Heritage." Reinterpreting through this "lens of observation" the many projects discussed in Chapters 2 and 4 (to which we refer you for direct reference to individual interventions), what we find is that, in most cases, the already present conscious need to adopt a comprehensive view often does not translate into a genuinely holistic approach capable of working for a balanced improvement and overall strengthening of all three "links" just described, but proceeds by simplifying the "parameters of complexity." In this way, the reflection is reduced to dualistic

+ LEGACY
+ INHERITANCE
– PATRIMONY

To this set belong the interventions that recognize an important value of testimony to all the permanence of the vestigia, even the most fragile "signs" (trenches, barracks, shelters, walkways). Very often the promoters of these projects are associations of volunteers, or public-private partnerships. Although the involvement of local communities is strong, these interventions very often are not part of large-scale enhancement strategies. In addition, there are also restoration/recovery interventions of forts that are currently closed and not accessible, for which long-term management strategies are lacking.

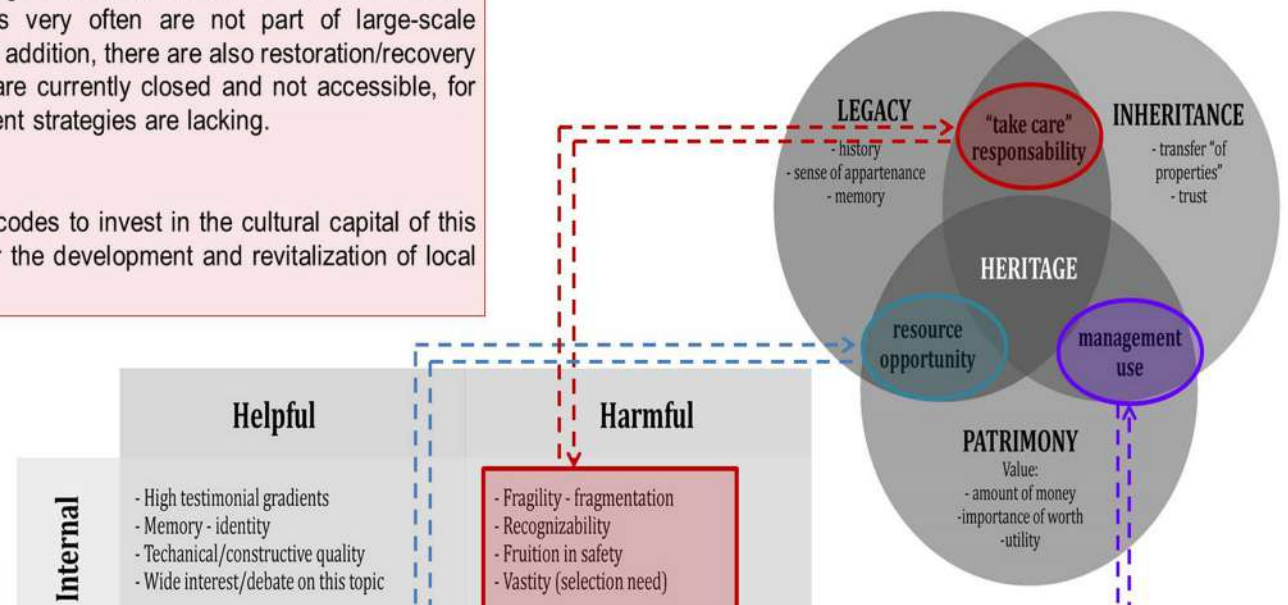
Future Objective:
Identify new interpretative codes to invest in the cultural capital of this heritage as a "flywheel" for the development and revitalization of local micro-economies.

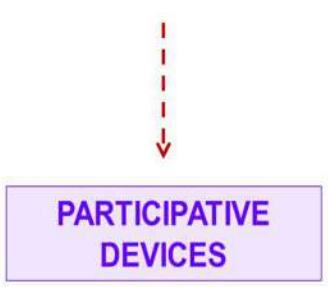
«NEW CODS»
for the *«memory's enhancement»*

+ INHERITANCE
+ PATRIMONY
- LEGACY

This group gathers all the projects that overflow towards an uncontrolled "opening of possibilities" of interventions which are not always compatible with the real character of these warscapes, developed in the name of a necessary "cultural sustainability" that responds more to the needs of the community than to the real safeguard of the vestigia themselves. This attitude is more and more present in European areas where reuse interventions have very often radically transformed the character of the forts, introducing totally different functions and adapting the works to new needs without taking "care" of the informative potential preserved by the "material culture" of the work.

Future objective:
To develop planning capable of responding to the needs of "cultural sustainability" without "betraying the sense and quality of the works".





	Helpful	Harmful
Internal	- High testimonial gradients - Memory - identity - Techanical/constructive quality - Wide interest/debate on this topic	- Fragility - fragmentation - Recognizability - Fruition in safety - Vastity (selection need)
External	- Active resources and local development - Social cohesion - civic sense - Reactivation through interdisciplinarity - Technical / constructive heritage of the GG towards subsequent experiments	- Projects top-down - Few participation in the process phases - Few awareness / knowledge - Non-integrated management among stake-holders

+ LEGACY
+ PATRIMONY
- INHERITANCE

This area groups the interventions that recognize the remains of the Great War as material evidence with values of memory and identity. At the same time, these projects aim to exploit the potential of this heritage to have an economic return, mainly to make the cycle of use more sustainable, at least in part, through the creation of support services and related jobs. An example is the tourism of memory. In this case the weakness is the top-down approach of the intervention, aimed more at the tourist than at the citizen: the active involvement of the communities in all the phases of the enhancement process is missing.

Future Objective:
Increase the involvement of people, because "heritage is not only for profits, but also for general benefits". Do not consider communities as clients, but as citizens.

Tab. 6.1 | Semantic nuclei and SWOT matrix: identifying “weak links”

comparisons. The projects tend towards semantic imbalances that, from time to time, are eccentrically conjugated towards the endiadi legacy-patrimony, patrimony-inheritance, inheritance-legacy, thus weakening the link with the third signifying nucleus "not equally included."

In the first group, for example, can be easily grouped all those projects that have recognized the tangible and intangible legacy of the remains of the Great War as physical evidence having values of memory and identity, and have oriented themselves towards interventions aimed at enhancing this "legacy" interpreting it also in terms of "cultural resource," not always, however, actively involving the different "stakeholders" and preferring a traditional top-down approach. The primary reference is to all those restoration and recovery projects[396] that have attempted, albeit with very different formal outcomes, to combine the need for protection and safeguarding with the reinsertion of these "assets" into cultural circuits to make them operational places with a high "propulsive and diffusive" capacity of memorial values. Apart from the many specific architectural choices made in the various cases, which are not the subject of this research, these interventions have also sought to invest in the remains to stimulate the revival of the territories through the reactivation of local economies by focusing on "memory tourism" and the related induced activities, such as the creation of new, albeit limited, jobs.[397] This is the case of the many interventions at the European level that have focused mainly on the recovery and restoration of permanent fortifications or some particularly significant entrenched systems, proposing for them essentially museum uses for tourism and/or educational purposes. While there is a general positive desire to combine the need to safeguard memory with the opportunities offered by these assets, the weak link in this chain, as mentioned above, essentially concerns the aspects linked to the management of these "cultural assets" and the policies for involving the various stakeholders,

396 See Chapter 4 for an understanding of how "restoration and recovery projects" are defined in this context.

397 Memory tourism is part of the broader category of cultural tourism: a willingness to travel outside one's area of daily experience for cultural reasons, going to enjoy goods with a substantial identity value. To "open" a place of memory to tourism in some way sanctions its future, and this depends mainly on how the valorization project is set up. A good tourist valorization should start from the archaeological or historiographical study of the place to direct the interventions of protection and material preservation towards an authentic and coherent design with the local historical characteristics, making the different stakeholders involved directly participate. Le Goff argued as early as 1982 that it was "*essential to maintaining a high degree of adherence to historical authenticity in order to be able to provide the visitor with that satisfaction which is felt in the awareness of having increased one's knowledge and having in part fulfilled the need for individual and collective identity, the search for which is one of the fundamental activities of individuals and societies today, in fever and anguish*." See also LE GOFF, 1982; CAVALLO, 2019.

including institutional bodies, associations, museums and, above all, communities. In fact, in addition to the awareness that the musealization chain, as it has been understood up to now, is now exhausted, most of these interventions are the result of planning based on a mainly "top-down" approach, without providing for direct and widespread involvement of the different "stakeholders," which can instead offer an essential contribution to understand the real needs of the communities, the "sense of belonging" that they "feel" towards the remains and the possibility of making them participate operationally in the various phases of the elaboration of these projects.

However, this participatory attitude must be appropriately controlled and mediated by competent figures able to manage the complexity of the theme, avoiding "semantic imbalances" in the opposite direction. This is precisely the case where attention is more oriented towards strengthening the inheritance-patrimony endiad, with projects that, in the name of a necessary 'cultural sustainability and the need to respond more to the needs of the community than to the real safeguarding of the heritage itself, overflow towards an uncontrolled 'opening of possibilities' of interventions, perhaps not always compatible with the real character of these warscapes. In these projects, the responsibility of giving new life to the heritage received from the past to prevent the "risk of loss" is essentially translated into the need to find new uses and different ways of using the vestiges themselves so that they continue to "live" in the present time, and therefore, as a reflection, can be handed down to posterity as "heritage of the future." Although these intentions are shareable and correct at a conceptual level, what emerges from the analysis of the status quo is a lack of unity between these proposed new uses and the safeguarding of the intangible quidditas that constitutes the true "cultural heritage" of this heritage. In other words, the proposed reuse interventions often tend not to establish the necessary empathic dialogue between the observer and observed that allows, in the game of gazes and counter-gazes described in chapter 5, not to betray the "sense and quality of the work" distorting their character as "identity places of memory." In fact, rather than associating the need to "give new life" to the remains with the ability to "take care of them," allowing them to continue to narrate their "being in time" to future generations, these interventions focus more on identifying the primary needs of the context and the communities, subjecting the assets to functional and even structural adaptations to "make them merely usable and usable" for the prefixed functions. As already highlighted in chapter 4, as far as permanent fortifications are concerned, this attitude is more present in European contexts where reuse operations have very often radically transformed the personality of the forts, introducing different functions and adapting the works to the new requirements without paying particular

attention and "care" to safeguarding the informative potential preserved by the "material culture" of the work in question, understood as "signed matter" on which the "signs carrying messages" are deposited.[398] The same attitudes can also be found at a national level, especially with regard to the recovery of field fortifications, promoted and very often entrusted to voluntary associations that, although with great willpower and dedication, very often do not have the skills to be able to develop integrated and comprehensive projects, ending up by developing essentially restoration interventions that are not always controlled and included in a broader and more organic program of activities, and that sometimes also distort the character of these fortifications.

Once again, therefore, the importance of a profound knowledge of what is the "material and intangible cultural heritage" of the Great War returns to the center of reflection as the founding basis on which to responsibly set up future "memory practices." Only through the recognition of the different warscapes as "condensers of high capacity values," in fact, it is possible to deeply understand their "value of testimony" to know how to ensure that the "memory of the Great War" becomes concretely a "common good" to be known and shared to build a future "culture of peace".[399] Once again, it is a question of finding the right balance between the different parts, in the awareness that even the most sensitive and attentive attitudes to the "value of memory and identity" of the remains must relate to the current "criteria of necessity" linked to use, reuse and, above all, the possibility of investing in the cultural capital of these assets to obtain not only a "cultural gain" in terms of more significant knowledge, awareness, and civic education but also a concrete possibility of development and relaunch of the territories. If this does not happen, the 'knowledge circuit' cannot be closed, nor

398 Please refer to the specific files elaborated in Chapter 4, in which it is highlighted how at a European level, there is generally not the same attention that characterizes most Italian interventions. In many Belgian fortifications belonging to the fortifications of Liege and Namur, but also in French forts or those insisting around Krakow, for example, totally different functions have been inserted concerning the natural vocation of the artifact, such as the transformation of forts into theme parks, industrial areas, wine cellars, restaurants, to name a few. These new uses have implied invasive interventions of functional readjustment going to modify the authentic condition left by the conflict. As expressed in Chapter 4, it is not a question of stigmatizing the inclusion of new ways of using the assets (which very often also have the favor of the community and are therefore sustainable from an economic point of view), but to understand the degree of transformability of these works in order not to distort the character and personality. Not all the forts, for example, took part directly in the conflict, and therefore retain the same quid values related to the experience of wartime. These reasons highlight even more the need for a holistic method to recognize this as completely as possible this character and then be able to responsibly plan future interventions of protection, preservation, or transformation.

399 See note nr. 115 in Chapter 5.

therefore activated: in fact, only shared and widespread knowledge can find complete meaning and become a culture, which can trigger mechanisms for social and even economic revival.

In this regard, one can recall, for example, the cases of the many fortifications that have been restored or recovered promptly but which, once the work has been completed, have remained unused and therefore abandoned due to a lack of wide-ranging and large-scale planning involving strategies of enhancement and management at a territorial level in a long-term perspective.

As is evident, this is the issue that has already been widely discussed regarding the inability to adopt a systemic vision capable of managing the different phases of the project for the "care" of the vestiges, from identification to restoration/recovery, up to inclusion in cultural reactivation circuits and maintenance plans.

Specifically, in addition to the permanent fortifications, this issue also involves the problematic recognition of all that "accumulation basin" deposited on the ground as "materia signata" consisting of the world of the most fragile "signs" in terms of permanence, such as trenches, barracks, and fragments of field fortifications, which increasingly, if recognized, are "taken care of" by voluntary associations on behalf of the municipalities but for which no large-scale enhancement strategies are thought up (territorial marketing, services linked to the aggregate offer...). In this specific case, the weak link in the system concerns the need to identify new interpretative-operative codes that are able not only to "recognize" the more fragile remains deposited in the threshold-space described in Chapter 5 but also to "make known" the fundamental role that this heritage of "signs" played not only in wartime, as an arterial system on which the functioning of the entire war machine was based, but also as a "time capsule" in which the latent "signs of history" are waiting to be able to return to express their voice. There is, therefore, a need to identify new narrative forms and perspectives, to disseminate and share this "knowledge" to "cultivate" an ever-greater awareness of their cultural capital, which is necessary in order not to "betray" the character of this polysensory "Heritage" with future valorization practices.

In the light of the above, it is even more evident how the direct comparison between the SWOT matrix and the hermeneutic interpretation of the concept of "Heritage" are fully comparable and, at the same time, complementary analyses to be able to understand the inadequacy of the methods and tools that have been implemented so far in the practices of "care" of this extraordinary heritage ***(see Table 6.1).***

The failure to strike a balance between the needs of protection, safeguarding, reuse, and management at the same time highlights the inability to govern the complexity of the issue and the tendency to fall back

on inappropriate simplifications that tend to bring the case back to more easily manageable dualistic comparisons which, indirectly, reverberate the outdated dialectic between innovation and conservation[400]. In the light of all the previous considerations, it is now possible to understand how precisely these simplifications are at the root of those gaps in interpretation and "meaning" previously identified (chapter 2-3), the cause of that lack of systemic vision that does not allow us to grasp the current fragments of the remains as part of a system, but which is indispensable for responsibly setting up future practices of valorization. In other words, it is now clear what a fundamental contribution the holistic approach can provide to future projects dealing with the fate of the remains, through which they will have to develop new tools and methods capable of investigating, interpreting, and understanding the complexity of these "war landscapes," setting up a new paradigm that goes beyond the traditional dualism of innovation-conservation and combines, at territorial level, the concept of valorization of this heritage-landscape.

As it will be later explained, in this perspective of sense, the valorization of the "war landscapes" assumes a specific connotation that becomes a sort of "enzymatic cure" through which strengthening those "weak links" (currently produced as "not equally included" in the endiads legacy-patrimony, patrimony-inheritance, inheritance-legacy endiads, as described above), to guarantee in future projects that semantic balance which is now lost but indispensable for understanding that "testimonial sense" embodied in the different warscapes which, expanded to the scale of the landscape, will subsequently be defined as a "testimonial gradient."

With this objective in mind, the main focus of attention will have to be on the threshold-space between the visible and the "submerged" previously identified, that "accumulation basin" whose unveiling will allow the vestiges, once again "revealed" as a "system," to recompose the significant unity of the different warscapes, giving them back the possibility of expressing their voice and continuing to tell their experience to future generations.

400 As can be inferred indirectly from the preceding considerations, these "dualistic reductions" reverberate, in truth, the well-worn dialectic between conservation and innovation, that Hamletic dilemma which, to use Carbonara's words, "remains ever-present and it is not enough to resolve it by denying one of the terms, acting, on the one hand, as nonchalant innovators and, on the other, as avid conservatives; it can and must be faced each time with an act and a critical choice that, as such, is subjective, but not for this reason unfounded or arbitrary." See also CARBONARA, 1996, p.77-84.

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6.2.2 The strengthening of the valorial quid: considerations for future narrative practices

In recent years, the tendency to identify cultural heritage as an engine of development for the revitalization of the territory and the community has gradually become more and more consolidated at the international level through a series of multiple initiatives and projects, which may differ significantly in terms of objectives and declinations, but which share some "*problematic issues and the casual use of a jargon in which certain words, repeated in any context, take on a multiplicity of meanings*".[401] That makes its interpretation ambiguous. The concept of "valorization" now seems to be omnipresent and unquestionably necessary in all heritage and territorial projects, both in the Italian and supranational spheres, even though it is regularly shrouded in a nebulous aura of semantic indeterminacy which, if on the one hand, allows for the immediate convergence of even very distant interests and objectives, on the other hand, may cause irreconcilable misunderstandings in the long term, often with project outcomes that are different from what was imagined. For this reason, and in particular, in the light of the above considerations, it is, therefore, necessary to reflect briefly on the specific meaning that the concept of "valorization" can take on concerning such a complex heritage, already recognized as a "high capacity condenser of values."

In the different meanings and applications of the practices implemented at an international level, what appears to be the universally recognized common denominator is the awareness that dealing with the theme of the valorization of cultural heritage, and therefore also of the material and intangible heritage of the remains of the Great War, translates into the need to investigate the complex relationships that connect the spheres of protection to those of conservation and use of the heritage itself, in an interdisciplinary debate between restoration, conservation, innovation, and transformation. Without going into the merits of the specific examination of the historical and legal evolution of the concept of enhancement, for which we refer to the extensive bibliography of reference[402], it is useful

401 BARBETTA, CAMMELLI, DELLA TORRE, 2013.

402 The theme of the valorization of cultural heritage is wide and varied and has been addressed at an interdisciplinary level both in Italy and internationally. For more in-depth information, see also: EMILIANI, 1974; BIANCHI, 1985; ROLLA, 1986; ALIBRANDI, FERRI, 1988; MARTINI, 1992; EURISPES, 1996; COPPOLA, 1997; GUIDUCCI, NERI, TRAVERSA, 1997; FOA', 2001; BALDACCI, 2004; DE CESARI, NESPOR, 2004; CAVAZONI, 2009; CARCIONE, 2010; BARBATI, 2011; CASSATELLA, 2011; DONATO, 2011; PENCARELLI, SPLENDIANI, 2011; TROTTI, 2011; VAIANO, 2011; COVATTA, 2012; FIDONE, 2012; BARBETTA, CAMMELLI, DELLA TORRE, 2013; FANZINI, CASONI, BERGAMINI, 2014; TARTAGLIA, CE-

here to underline once again how the now consolidated combination of "protection and enhancement" is not just a "politically correct" semantic endiad, but refers to an actual deep link that substantiates two functions that are intrinsically synergic and inseparable. This is also evident in the context of what is proposed by the new "Code of Cultural Heritage and Landscape,"*which in Article 6 defines enhancement as "the exercise of functions and the regulation of activities aimed at promoting knowledge of the cultural heritage and ensuring the best conditions for its public use and enjoyment. It also includes the promotion and support of heritage conservation measures*".[403] Even though the Code clearly states that enhancement should contribute to the conservation of cultural heritage, and therefore to its polysensical meanings of inheritance, legacy, and patrimony as defined in the previous chapter, this does not seem particularly "felt" at an operational level, where there is usually a tendency to reduce its meaning to "*a simple possibility of use of the cultural heritage by the public, which can be achieved through greater accessibility to museums, through the creation of educational, reception, catering and commercial services; nothing to do, therefore, with the actions of study, heritage creation and cultural dissemination [...]*".[404]

Contextualizing these reflections to the observatory of this research, that is to say, the projects carried out on the remains of the Great War, the direct links with what has been stated in the previous paragraph regarding the lack of simultaneous coexistence of a balance between the needs of protection, safeguarding, reuse, and management, are evident. In this regard, however, a clarification is in order. Unlike other types of cultural heritage and even other territorial contexts, in the Italian context, the Great War heritage is protected by a specific national law, Law no. 78/2001,[405] which recognizes the value of historical testimony and undoubtedly constitutes a significant milestone concerning the safeguarding and protection of this particular heritage, representing the primary regulatory reference for the numerous restoration/recovery/enhancement projects carried out in recent years. This has undoubtedly reverberated on the specifically Italian attitude of adopting particularly cautious attitudes when working on 'objects of the past, at least in terms of intentions, but the 'applications' of these guidelines have not always led to the desired results. As has already emerged from the previous considerations while supporting greater attention to the recognition of the potential information stored in the material culture of the artifacts to

RATI, 2018.

403 Codice Beni culturali art. 6

404 PINNA 2005.

405 For further information on law no.78/2001 see chapter 2.

"take care of," even these projects have often failed to "overcome" the traditional dualism of innovation/conservation with long-term visions, taking pleasure in the immediate results without a "*responsibility for the future, without reasoning on the hypothesis of self-sustaining activities through innovative management models better integrated with the territory*".[406] In other words, even Law no. 78/2001 has not been able to manage the complexity of the situation operationally to achieve full exploitation of this heritage extended to a territorial scale. Therefore, after the celebrations for the Centenary, the need to systemize the experiences of the past emerges strongly to produce new action strategies, applicable at the international level, starting from a renewed "search for meaning" to understand which specific meanings the concept of valorization can assume concerning the future of this particular heritage. The valorization of the remains of the Great War, given new scenarios of sustainable use and fruition, cannot be declined only in a mere organizational reorganization in response to the market logic of the economic sphere and the tourist promotion. Still, it must constitute a general process of reworking at a cultural, programmatic, and managerial level, which is based on a profound reflection on the importance of the cultural capital represented by the remains of the Great War, concerning the material culture, to their identification as "memorial semaphores," to the recognition of the stratification of the territory of which this "Heritage" is both "creator and product"[407].

In other words, it is a question of elaborating new integrated strategies that can transform the awareness of complexity into a "method of complexity" capable of coordinating the different actors involved, going beyond any reductive logic and any simplification. Safeguarding these cultural assets is, therefore, a matter of being able to manage the changes taking place, reinterpreting the essential need to preserve the "possibilities of knowledge" not as a mere economic sacrifice and a creative limitation, but rather as an opportunity in which to invest forces and resources to obtain public benefits not only in terms of financial sustainability but also cultural and social. In this sense, creativity understood as the ability to develop innovative and interdisciplinary strategies starting from recognizing the values of a given heritage, becomes the indispensable tool to build new networks of relationships involving both different stakeholders (public and private) communities. In other words, a fertile combination of culture, knowledge, and the creative economy will make it possible to widen the view towards long-term projects and planning, also capable of overcoming many current gaps in legal and operational frameworks, which are based on the use

406 DELLA TORRE, 2013.

407 QUENDOLO, 2014.

of top-down tools and models that are often unable to interpret the interdependencies underlying heritage and its management. Concerning "Cultural Heritage," for example, the current separate and uncoordinated management, which seems to leave the superintendence with the sole authority in the field of protection and museums with the responsibility for its promotion, has repeatedly shown limits and inadequacies, highlighting the need to renew the "project culture" towards a more integrated action and above all investing in the active involvement of communities. The importance of the participatory aspect becomes fundamental also concerning the material and immaterial heritage of the Great War, whose potential of values and meanings, although universally recognized, has often not been realized in a conscious action by the communities, but in simple "passive" collaborations in support of restoration/recovery/ evaluation projects "dropped" by bodies or professionals on the wards, but not thought with and for them.

The future perspective is, therefore, to start from the bottom to make communities aware of the values embodied in this cultural heritage recognized as an identity, investing in a new "knowledge economy," i.e., promoting the cultural industry on the entrepreneurial front and with new strategies of social involvement, to transform these vestigesfrom a "*public good*" to a "*common good*".[408]

In this sense, therefore, the enhancement of the tangible and intangible heritage of the Great War is not declined in the identification of new values, and "other" redefinitions, which would make even more intricate and complex the already articulated semantic and cultural capital of the remains, but is understood in the etymological meaning of the English term enhancement, that is, an improvement and growth of those precise values already identified previously, which is expressed in the strengthening of the "currently weak links" between the various components of the semantic triad already described, through which the recognition of the testimonial value of these landscapes is made possible, to be handed down to future generations. In this perspective of meaning, the enhancement of the different warscapes is not objective. Still, a complex methodological process that is based on a deep knowledge of what exists to be disseminated and shared with the communities, so that they, recognizing and sharing the potential value of the vestiges, become active promoters for the future, in the awareness that the cultural heritage, and therefore also the warscape, "is capital of irreplaceable spiritual, cultural, social and economic value, [...]. "*The destruction of this capital, built up over centuries, impoverishes us, and nothing we can create again, however*

408 Unlike a 'public good,' i.e., not private, a 'common good' represents the driving force of a group of individuals who recognize shared identity values in it and who therefore feel directly involved in and responsible for its existence and maintenance.

wonderful, makes up for the loss".[409]

This means activating new forms of cooperation and coordination between public and private bodies, first of all by extending the active involvement of voluntary associations not only to the operational phases but at all stages of the enhancement process; by investing in the training of non-professional workers specialized in the restoration of the constructional features of such a specific heritage, and by focusing on study and research as indispensable tools for "sharing knowledge" at a social level and thus increasing a new awareness of these assets. This is a long and articulated process, which has to be developed in a long-term perspective, in which the time dedicated to planning, to the management of the relationships between the different stakeholders, to listening and building consensus, as well as to the discussion of the practices in place to identify possible implementations or improvements, are slow and tiring times, but necessary to found new methods based on a renewed awareness and a more "felt" ethical responsibility of the communities towards these heritage-landscapes. In other words, the approach of this new declination of enhancement, which is a certain sense "overcomes" the traditional rigid disciplinary dichotomies between protection, conservation, innovation, and management, fully reflects the most relevant aspects of what was declared by the Faro Convention, the Council of Europe Framework Convention on the "Value of Cultural Heritage for Society," presented on 27 October 2005 in the Portuguese city of Faro and subsequently signed and ratified by several European countries. Referring to the following paragraphs for more details, in this Convention through the introduction of the concept of "cultural heritage," *the focus of reflection is shifted from questions of protection to the idea of "right to cultural heritage" understood as the possibility to participate in cultural life and to contribute to its development through its conservation and sustainable use*."[410]

By applying these new models of participation/management to the enhancement of "war landscapes," such renewed attitudes could be beneficial to increase a broader awareness in the communities about the multiple potentialities of the cultural capital of these warscapes, but also to better develop the capacity to insert future interventions on the heritage in a perspective of sustainability, not only social and cultural but, as already mentioned, also economical. As already described in the European Charter for Architectural Heritage, in fact, "*our society*

409 Carta Europea del Patrimonio Architettonico (Consiglio d'Europa, 1975a)

410 In Italy, ratification of the Faro Convention took place in the spring of 2020. For a specific analysis of the contents of this framework convention, see the following paragraphs.

must connect with its resources: far from becoming a luxury, this cultural heritage is an economic opportunity that can use to increase collective resources".[411] What is evident is that to make the high costs of management and maintenance of these assets sustainable, it is probably necessary to adopt a broader and multi-scalar planning approach, also sensitive to the dynamics of aggregate supply and demand, capable of flanking the indispensable "care" towards the safeguarding of the quidditas embodied in the "material culture" of the various warscapes as "materia signata," with the same attention and sensitivity to the network of goods and services that can be implemented and offered to support the use of the heritage itself with long-term planning. In this regard, approaching future enhancement practices on a diffuse heritage such as that of the vestiges, following a logic that is not episodic but prospective, implies the need to invest in planning practices that are relatively new for this field of study, which first of all involve a solid ability to manage changes (intrinsically characteristic of this landscape heritage), but which also take shape in terms of planning times and resources, and in the organization of procedures and moments of validation to monitor the quality of what has been implemented through indicators, controls and moments of validation. However, planning and validating also means being able to share, communicate and transmit to the communities, through a transparent and comprehensible language, what has been known and understood (the "testimonial gradient"), but also planned for the future (the enhancement project). As far as the "war landscapes" are concerned, since they are not "traditional cultural assets," for which the practices implemented in the literature can provide multiple solutions, but rather a fragile, fragmented, and widespread heritage, it is necessary to identify and define "new codes" through which to "read," interpret and "make known" to the communities the potential values they hold. Precisely in this regard, it is essential to stress the importance of addressing the issues related to the enhancement of the different "war landscapes" by adopting the same depth of vision both at the architectural scale and at the territorial level. Extending the concept of protection, usually associated with a single material asset recognized as a "monument," to a "diffuse heritage" made up of a vast and multiform system of works such as the "war landscape," requires a conceptual leap, more qualitative than quantitative, underpinned precisely by this expansion of what can have testimonial value, and therefore the basis for saving a possibility of "memory." From the methodological issues related to the possibility of recognizing fragments of vestiges that are very fragile because they are subject to repeated natural and anthropic changes, to the ability to direct the gaze to create a "civic

411 Carta Europea del Patrimonio Architettonico (Consiglio d'Europa, 1975a)

conscience" as an indispensable cultural basis for reflecting on the future "possibilities of life" of this heritage, this is a significant challenge, which poses questions at different levels of meaning and which can only be sustained with the awareness that the "things of interest" as cultural assets live only thanks to the reciprocal relationships and the relationship with the context in which they are inserted. In this sense, therefore, the expansion of the concept of protection to the scale of the landscape cannot be resolved exclusively in the physical protection of the fragments themselves but must be conjugated about the co-evolving processes of mutual interaction between the individual pieces and the space of relation between them. It is precisely based on this "protection of co-evolutionary potentials"[412] that we should focus our attention onis based on the ability to increase the different warscapes without "betraying" their authentic character. Thus, cultural heritage is indeed a resource but a "non-renewable resource".[413]

In this renewed horizon of meaning, even the economic incidence of the activities of restoration and maintenance of the heritage-landscape acquire a different sense, as they no longer represent a pure cost in themselves but, taking up the metaphor used in the previous chapter that recognizes the different warscapes as "deposits of memories," they constitute the "cost of extraction" of these memories, which are precisely those "raw materials" in which enhancement projects must prospectively invest to stimulate the endogenous growth of local micro-economies, through interesting experiential processes of knowledge and "capacitation"[414].

The "Faro Convention" and the bottom-up policies

As mentioned above, the setting of this new horizon of meaning against which to think about future memory and enhancement practices fully reflects the principles contained in the "Faro Convention," a fundamental instrument designed and developed by the Council of Europe to promote cultural heritage, consolidating the previous methodological approaches for the protection of architectural and archaeological works of the Member States, but also emphasizing the most salient aspects about

412 DELLA TORRE, 2013.

413 BELLINI, 1996.

414 Capacitation is a learning process in which competencies and skills are developed, even tacit ones, that influence and changes things' vision, making it broader, more conscious, and more shared. Capacitation understood in this way is very close to practices of deliberative democracy, which are deeply connected to the principle of subsidiarity, and therefore of individual freedom and mutual support. In other words, it is a question of considering subsidiarity itself as a capacitating practice. For more on this topic, see also BARBETTA, CAMMELLI, DELLA TORRE, 2013; MOIOLI, BALDIOLI, 2018.

human rights and democracy, to strengthen an ever broader understanding of heritage and its deep relationships with communities and society. Indeed, the central role of 'cultural heritage and the need for an active and synergic participation of all the actors involved (public, institutional and private), to increase awareness in Europe of the value of cultural heritage and its contribution to well-being and quality of life, are the inspiring principles of the Framework Convention on the 'Value of Cultural Heritage for Society,' presented on 27 October 2005 in the Portuguese city of Faro and ratified by Italy in September 2020. It represents a sort of 'Copernican revolution' of the traditional perspective of identification of cultural heritage. In fact, by recognizing the right of each 'heritage community' to benefit from the 'cultural heritage' and the duty of responsibility towards it, the decision-making authority is shifted from the top (often the Superintendencies) to the bottom, thus investing in physical, human and social capital to find 'new codes and tools' of valorization, through honest relationships between communities and their environments. The institutional nature of this approach, in addition to compensating for the lack of an adequate legal status that is still not recognized for current participatory devices (such as ecomuseums, for example), should facilitate the concrete application of theoretical principles through the direct involvement of stakeholders in the decision-making process[415] at different levels, from consultation to active participation. In this perspective, voluntary 'passive partnerships,' which are currently the only ways of involvement, would result from new enhancement and management policies developed and shared by the new stakeholders (the communities themselves) in concert with local governance. Furthermore, the indispensable knowledge and skills of technicians specifically trained for the 'care' of the various heritages could be operatively shared and integrated with the proposals coming from the communities through the implementation of already tested participatory devices, such as the establishment of civic centers and cultural associations, and the experimentation of new forms of involvement also at a technological-digital level, such as telematic groups and computer databases, practical to involve also the younger generations, to guarantee a continuous contribution of new ideas and stimuli. The Convention's strength lies essentially in its tremendous flexibility: although the Action Plan suggests several "good practices" that have emerged from the experiments carried out in

415 CLARKE, 2015.

the pilot projects in Marseille[416] e Venezia,[417] Faro defines only the general objectives and normative guidelines as a framework agreement but leaves the signatory countries free to express, through participatory processes, the implementation policies and the most suitable means and instruments for their practical application. The application of these new models of participation/management could increase widespread awareness of the multiple potentialities also of the Great War material heritage, acknowledging that to make the high costs of managing and maintenance of these assets sustainable, it is probably necessary to adopt a broader planning view, In other words, not focusing only on the material culture of the "remains," but investing on the whole network of goods and services that can be implemented and offered to support the use of the heritage itself, thus generating new jobs and increasing the attractiveness of these places, without "betraying" their authentic character. At the same time, the new forms of participation in the "care" of this heritage could represent significant opportunities to create a new "civic conscience" of local communities, called upon to invest time and energy for a common good, developing and sharing ideas and proposals through new cooperation strategies that increase "social cohesion," and even becoming potential opportunities for integration for some weaker sections of the community, by putting everyone's skills and abilities into a system. In short, therefore, the Faro Convention is a useful guiding tool that can complete and integrate from a holistic point of view the traditional regulations concerning the specific actions of protection and safeguard of heritage, stimulating first of all the diffusion of a fundamental awareness of the communities towards the artistic potential of this heritage that, recognizing it as an "inheritance," triggers a sort of "ethical responsibility" for the "care" of its physical consistency and,

416 The dynamic community of Marseille has promoted interesting cultural proposals and innovative management models that were particularly successful during the event "Marseille, European Capital of Culture 2013", primarily by encouraging the active participation of citizens to achieve a careful analysis of aspects related to cultural diversity, sense of belonging, prevention of intolerance and discrimination. Furthermore, through practical actions in deprived urban and peri-urban areas, the application of the inspiring principles of the Faro Convention has triggered the development of new participatory policies capable of creating favorable conditions for urban rehabilitation, working against poverty and discrimination, in defense of the urban environment and the improvement of living conditions for all inhabitants.

417 Since 2008, Venice has been home to a cultural association inspired by the Council of Europe Convention called "Faro Venezia," which organizes numerous activities to raise awareness of the issue, the most important of which was undoubtedly the International Conference in Venice on 2 March 2013, in collaboration with the Council of Europe and MIBACT, the results of which launched a more structured phase of the Faro Workshop, bringing together citizens and institutions with the common aim of testing the proposed models of governance.

above all, of the value charge kept in it.

The Ecomuseal Experiences

In the light of the reflections proposed, one of the possible operational strategies already consolidated appears to be that of the ecomuseum: a non-traditional museum institution which "*aims to conserve, transmit and enhance the culture of the territory [...] and represents what a territory is, and what its inhabitants are, starting from the living culture of the people, their environment, what they have inherited from the past, what they love and wish to show to their guests and pass on to their children*"[418].

The aspect that makes this "territorial museum" a strategy particularly suited to the needs of enhancing the vestiges of the Great War lies essentially in its being a network of relations that arises "from below" when the condition is identified to transmit to the future the testimonial gradients of a given set of elements present in a territory, through the integrated involvement of public institutions, existing entrepreneurship, research and development centers and, above all, local communities. To achieve this, the ecomuseum implements a synergic strategy that acts simultaneously in apparently different directions, but in reality deeply interrelated and converging towards the single common objective of enhancing cultural heritage. The creation of an ecomuseum system able to activate new local development processes requires a considerable economic commitment. For this reason, it is necessary to work in parallel on both social and environmental. Financial assets, using active participation as a stimulus for cohesion and inclusion, research to combine projects able to provide new employment and reduce consumption and waste of resources, and the implementation of creative projects to "educate" new forms of cultural tourism[419].

A real ecomuseum experience that is particularly significant concerning the cultural heritage analyzed is undoubtedly the "Ecomuseum of the Great War" initiative of the Veneto Region, promoted in November 2011 as part of the national project for the "protection of the historical heritage of the First World War" (drawn up following Law 78/2001), to create a cultural institution founded on a broad participatory base and capable of putting together all the existing Venetian realities operating on the subject[420]. The operational lines of the Ecomuseum were based

418 DE VARINE, 1971; RIVA, 2017.

419 RIVA, 2017.

420 According to what is reported on the institutional website of the Ecomuseum of the Vicentine Prealps, "the general objective of the project is to "put into practice the memory" that aims to recover, even before the material remains, the testimony of the facts. A "light" approach aimed at preserving and making readable what remains of the works

both on actions to recover the remains of the Great War, involving voluntary associations coordinated by suitably qualified technicians and on specific programs of promotion and dissemination based on a system of information centers distributed uniformly throughout the territory. The intention was to encourage the understanding and dissemination of the testimonial values that the material culture of the remains could narrate, thus stimulating a renewed "memory tourism," capable of recognizing in conservation a tool for knowledge. The high level of fragmentation in a very vast territory and the plurality of implementing subjects significantly increased the project's complexity. Still, the organizational and structural capacity of the Ecomuseum managed to guarantee the completion of the restoration and recovery work, returning the community an enormous heritage of jobs and routes, which are now presented as a giant "open book" that narrates the dramatic events of which those places were the scene, preserving their memory over time.

The experience of the Great War Ecomuseum of Veneto shows how a renewed multidisciplinary approachable to combine the socio-economic interests of the different actors involved with the need to protect a fragile and highly complex heritage can trigger new virtuous circuits able to produce culture and at the same time income, to be reinvested in services to improve the quality of life of local communities. Nevertheless, other current ecomuseum experiences highlight some critical elements that, in perspective, testify to the wide margin for improvement of this type of institution, also concerning the authoritativeness and contractual power that it can increase in future territorial development policies. In addition to the lack of recognition of legal *status*[421], the ecomuseum institution currently still shows a divergence between theoretical principles and realized projects, probably due to a limited strategic vision, in favor of regulatory and methodological rigidities that often lead to the re-proposition of typical faults of the traditional musealization chain, with a look "at the past" that is too static and not very open to the prospects of cooperation for

carried out by the belligerent armies during the Great War, putting into system the specificities and the potentialities present on the territory. This is done in the awareness that the diversity of these places is an irreproducible heritage, and the disappearance of the works preserved in them would represent a dry and irreparable loss, not only for the memory of the Great War but also for the very identity of the territories that contain them. For a specific discussion see also: PASSARIN, 2017; CAROLLO, 2017; BERNINI, 2012. Therefore, a historical valorization of the territory is accompanied on the one hand by an overall environmental requalification of the places, and on the other, by a more general program of promotion and communication structured on an integrated system of Information Centers, distributed throughout the territory.

421 As stated in the previous paragraph, the non-recognition of a legal status can be resolved through the ratification of the Faro Convention.

the construction of the heritage of the future.[422] Nor does it help that it is challenging to identify guidelines and best practices to follow, the lack of which legitimizes the implementation of spontaneous interventions that are 'poorly controlled,' often carried out by associations of hard-working volunteers but lacking specialized coordinators.

6.3 Preserving "testimonial value" at the landscape scale: the concept of "testimonial gradient"

In the light of all the previous considerations, and in particular of the new participatory/operational approaches promoted by the Faro Convention, it is clear that the specific declination of the concept of enhancement concerning the different warscapes implies a necessary paradigm shift that, overcoming the traditional dualisms between innovation and conservation, aims at setting new methodological approaches and related operational tools to consciously face the complexity of "war landscapes" without "falling" into inappropriate simplifications and legacies of past attitudes. This is a renewed holistic approach to the "care" of this extraordinary heritage, which must be based on a solid, wide-ranging cognitive process, intended as a fundamental basis for the recognition of what, at the landscape scale, may have testimonial value, and therefore, as a reflection, for any future choice in terms of protection, conservation, and transformation. It is, therefore, a question of innovating the approach to heritage through a crucial moment of cognitive revision which, using these new "methods of complexity," can expand the concept of testimonial value, usually applied to individual assets, to the scale of the landscape, starting from the recognition within it of areas in which the "testimonial sense" remains at different temperatures, that is, at various "testimonial gradients." It is precisely the recognition of these other "gradients" that will make it possible to plan diversified enhancement strategies, calibrated from time to time about the need to strengthen the weakest and most fragile aspects, facilitating their recognisability and therefore the possibility of "care" and, as a result, "memory."

422 Concerning reflections on the strengths and weaknesses of ecomuseums, reference should be made to the experiences presented at the international conference "Forum Communication and Exploration" held in June 2005 in Guiyang, China, during which over 120 museologists from 15 countries from the entire continent met to create perhaps the most extensive review ever presented on the theme of ecomuseums. In particular, see the arguments of M. Maggi (IRES) and the SWOT analysis of the ecomuseums of Soga, Zhenshan, and Olunsum, in central China, presented in "AA.VV., Diversity in dialogue. Dalle prime esperienze al laboratorio Cina 2005, Assessorato alla Cultura della Provincia Autonoma di Trento, Trento, 2006".

6.3.1 The search for a "method in complexity": the setting of a new paradigm

Based on all the above considerations, it is clear that the "war landscapes," precisely in their dual ontological and semantic essence, can be considered to all effects as complex palimpsests, expression, and outcome of the repeated interactions between nature and culture, between the historical sedimentation of human actions on the landscape and the dynamics of transformation in the use/management of the same over time. To the multi-layered stratification of material "signs" deposited on the morphology of the land, the potential values and memories preserved by these fragments have been added, transforming what were the original spaces of interaction/clash into a natural "accumulation basin" with a high concentration of densely pregnant material "traces." As already argued, the recovery, restoration, and valorization projects that have concerned the relics of the Great War up to now have mainly focused on the individuality of the most transparent material remains, failing to fully grasp the potential of these "deposits of memories" inherent precisely in the ability to understand them as "territorial systems" of fragments linked by deep networks of relations and interactions. These networks represent specifically those physical and intangible infrastructures on which, in the past, the very functioning of the "war machine" was based and which today, if recognized and improved/strengthened, can restore that holistic or systemic. This vision is necessary to allow us to understand what the "cultural sense," but also the ethical/educational sense, that these assets can have in the contemporary world and towards the future, can be[423].

This consideration underlines, once again, the need to expand our gaze to the scale of the landscape to recognize even in those "minor ruins" concentrated in the threshold-space between the visible and the "submerged," what may have testimonial value, and therefore the basis for a "possibility of memory." Despite their fragile condition, such material traces, as already highlighted in the previous chapters, are cultural testimonies on a par with permanent fortifications. They have always represented the arterial system. Although on a different scale of observation, this is what Maurizio Carta defines as "the evaluative conflict between the cultural asset already recognized as valuable and the asset whose cultural quality is not already ascertained but is highlighted

423 In this regard, it seems particularly eloquent to transpose to the territory what Italo Calvino affirmed to be one of the connotating categories of contemporary literature as a representation of the world, that is, the recognition of its encyclopedic nature as "a method of knowledge, a network of connection between facts, between people, between the things of the world. A system of systems in which each system conditions the others and is conditioned by them". See also CALVINO, 1988.

for the first time at the moment in which it is recognized",[424] which essentially takes up the perennial distinction between intentional and unintentional monuments already proposed by Riegl.[425] It is precisely this "accumulation basin," therefore, that could become the new "front of investigation" for future enhancement practices, the unraveling of which will contribute to re-establishing the significant unity of the different warscapes, a sort of "new ecosystem of memory" as a "common good." In other words, as already expressed above, we understand how future projects must feed precisely on the comprehensible richness offered by the complexity of these warscapes as "structural overall cultural assets," whose constituent elements represent the (in)variants configuring the places and characterizing the communities, the material traces of the evolutionary dynamics of history that determine the qualification of identity, whose recognition becomes the prerequisite for developing and designing new forms of "widespread knowledge" and narration. The ability, therefore, to be able to recognize the heterogeneous and complex palimpsest of material evidence of the vestiges that, at different degrees of visibility, remain in the contemporary landscape, especially in that space-threshold between the manifest and the "submerged," represents the necessary prerequisite on which to base future choices regarding the fate of this "Cultural Heritage." In other words, this implies the need to change and adapt traditional methods of analysis to identify new methodological approaches and related operational tools which, based on wide-ranging cognitive processes at different scales, can address, understand and interpret complexity in a responsible and anticipatory way, to be able to intervene responsibly, tracing out enhancement trajectories that can become a source of inspiration and balance the interests of the various parties involved, including those of the heritage itself, i.e., preserving its semantic significance without "betraying" it with trivial simplifications[426].

This change in perspective makes it necessary to develop a 'method of complexity' that is based on a cognitive process with a marked aptitude for dialogue and the integration of multidisciplinary approaches that extend at different depths of analysis, producing heterogeneous information and data that cannot be understood only through traditional

424 CARTA, 2002.

425 RIEGL, 1893, 1903. For further discussion of the concepts of intentional and unintentional monuments, as well as the links between these concepts and the values associated with them, see also SCARROCCHIA, 1995.

426 Spatial sciences cannot be considered abstract sciences based on rules, principles, and tools that are invariant in time and valid indiscriminately in every case: it is necessary to accept that these complex systems are in continuous non-linear mutation, with transformations that cannot be predicted except by developing scenarios and evaluating probability fields.

analytical methods of design and planning, as has been the case until now.[427]

In order not to "betray" the "deep sense" of these places [the different warscapes] with planning that is not holistically coherent, the new methodological approaches cannot, therefore, be based on an unrealistic simplification of the phenomenological framework under analysis, but must assume complexity as a starting condition, accepting the challenge of recognizing the "warscapes" as systems in continuous non-linear mutation according to trajectories that cannot predict except through the elaboration of scenarios and the evaluation of probability fields. From this point of view, these new approaches will have to be effectively resilient concerning this "mutant essence" that constitutes the intrinsic character of the different warscapes, but at the same time deeply resistant in order not to overflow towards uncontrolled and self-referential projects, to responsibly preserve the testimonial value of this delicate cultural heritage. In other words, it is a question of elaborating new tools and analytical models that are flexible and adaptive for both the issues to be addressed and the solutions to be proposed, to produce enhancement projects in continuous and dynamic becoming, which evolve and which set the reflections on variable analytical-operational indicators rather than on standards, principles, and tools that are invariant over time and valid indiscriminately in every case. In this regard, the different communities often describe the "heritage," even the one related to the Great War, as historical, artistic, and traditional, attributing to it the meaning of "value" and "identity" in an intuitive way and without fully understanding its significant scope. If this attitude can be legitimate and correct with specific "well-known" cases, what reality demonstrates is the impossibility of generalizing such an approach at the territorial level since cannot assume the concept of the value of widespread heritage to be absolute and valid indistinctly, but changes with the observer, the culture, the geography, and the social and economic conditions around it. In other words, this testimonial value is the "creator and product" of that "territorial complexity" of that "system of systems"[428], in which the very richness of diversity, the heterogeneity of permanence's, the conscious presence of a historical and memorial depth, become the indicators against which a given

427 In the field of modern sciences and history, every extension of the area of investigation has always entailed relative mutations and readjustments of analytical techniques and processing tools, if not of the connotating categories themselves. About the study of the territory, for example, "*from aesthetic perception we moved on to sociological knowledge, then came determinist and rationalist knowledge of models (of thresholds and gravitation, of matrices and inter dependencies, just to name a few that show their provenance from other disciplines) up to the most recent experiments with hyper textual modes of knowledge or produced by the action of neural networks.*" See CARTA, 2002.

428 CALVINO, 1988.

territorial area can be qualified and distinguished from the context. In fact, it is precisely the fundamental recognition of these indicators that makes it possible to expand the concept of "evidence value" to the landscape scale, in order to recognize and circumscribe areas in which this "sense of evidence" is graduated at different temperatures.

This is a necessary "leap in scale", an indispensable conceptual expansion directly consequent to the inevitable acceptance of the principle of complexity described above which, on an operational level, leads to the setting of a new conceptual horizon with respect to which future policies for the enhancement of the "Heritage of war" will have to orientate themselves in order not to limit their gaze to the individuality of the single fragments of remains, but to re-establish the systemic-relational vision that substantiates their meaning.

The possibility of sustaining these processes of "expansion of testimonial value", however, is measured against the ability to recognize and better define these indicators within the complexity, and therefore poses, once again, questions of knowledge and method.

In this regard, however, it is worth remembering how the awareness of "war landscapes" as "complex systems" implies the acceptance of a sort of "methodological principle of in-determination" in cognitive processes, of an intrinsic difficulty in outlining a univocal form to this multiform complexity in continuous becoming, which leads to the impossibility of arriving at a completeness of knowledge. Following a sort of demonstration by absurdity, in fact, if the complete understanding of a complex system were possible, it would constitute the very negation of complexity, which would therefore be fully identifiable and predictable[429]. Understanding that this is not possible, one understands that the objective of arriving at a "complete knowledge" of the different warscapes can only lead to ineffective simplifications of their cultural capital, as has happened in the past. Precisely for this reason, therefore, as well as accepting complexity, it is also necessary to consciously assume variability and probability as fundamental assumptions according to which to orient and set up future enhancement and management practices of the different warscapes. In other words, they will have to be developed through the identification of parameters and indicators, as mentioned above, which

429 The possibility of arriving at a complete knowledge of territorial complexity would be equivalent to full awareness of the territory itself, as if it were represented on a scale of 1:1, therefore without giving any information other than what reality would be able to provide. To use another metaphor, the reflection fits well with the Paradox of the Map of the Empire mentioned by Umberto Eco, starting with a quotation from a seventeenth-century work describing "*an imaginary Empire in which the art of cartography was so perfected that a map was drawn up that had the immensity of the Empire and coincided perfectly with it*". See MIRANDA, 1658; ECO, 1992.

are not static and invariant, but variable concerning the unstoppable transformations to which each landscape is subject in the long term.[430] Therefore, in this new perspective of meaning, even knowledge itself takes on a renewed processual connotation, literally combining the meaning of "cognitive process" in continuous updating, expanded with changes in boundary conditions and reference parameters. It is precisely within this horizon of meaning that can profoundly understand the necessity and significance of setting up a new, innovative paradigm to which all future enhancement the various warscapes must refer, a change of perspective that not only expands the concept of "testimonial value" to the scale of the landscape but also amplifies its meaning by enriching it with the temporal dimension, thus arriving at defining the concept of "testimonial gradient," recognizing its variability according to the various parameters and indicators that define it. In a perspective view, as will be explained later, the possibility of applying this new paradigm to "war landscapes" will allow the opportunity and ability to recognize, within the contemporary multi-layered landscape, areas with different "testimonial gradient," i.e., areas with a semantic concentration differently graduated, whose identification can become the basis on which to set future "memory practices" through different margins of design.

6.3.2 From "testimonial value" to "testimonial gradient": towards a mapping of "semantic density

Suppose the planning of a territory can be defined as a conscious action resulting from reasoning. In that case, the need to identify new methods and instruments capable of interpreting highly complex contexts such as 'war landscapes' translates into the need to understand the assumptions according to which such 'reasoning' should be set up, remembering how the indispensable cognitive base on which every planning/design must be based cannot be crystallized in the dogmatic acquisition of analytical information but must remain open in a continuous process of re-conceptualization determined by the changing and multiform character of the object itself "to be known." In this horizon of meaning, if it is true that every "cultural asset" is such insofar as it is in relation to the context in which it is inserted, the "testimonial value" of a "war landscape" is even less univocally definable than that of a single "architectural asset," precisely because of the intrinsically changing character of the landscape itself, and the

430 Scandurra argued that if the "behavior of our system is still somehow predictable in the short term, in the long term it is unpredictable and must be analyzed and observed with more adequate scientific instruments". These instruments must build a processual, progressive and dynamic knowledge, able to adapt concerning changes in the variables involved. See also SCANDURRA, 1995; CARTA, 2002.

simultaneous presence of variable factors and parameters in continuous reciprocal interaction that impose constant adaptations and updates. Recalling how the testimonial value of the various warscapes is based precisely on the complex networks of physical and value relations that are activated between the palimpsest of "signs" deriving from the recognition of "war landscapes" as "deposits of memories" and the whole other world of "signs" linked to the stratification of natural and anthropic actions over time, it is evident how a traditional linear analysis struggles to restore a global and systemic vision of these reciprocal interrelationships.[431]

Finally, if we accept the need mentioned above to base future enhancement and management practices of this heritage on the recognition of its testimonial value to preserve the "possibility of memory," it is clear that traditional analytical methods and tools are not sufficient to responsibly and effectively address the issue of complexity, without leading to reductions and simplifications that would imply a loss of the "possibility of memory." In the light of these considerations, it is easier to understand the actual need and importance of setting up a new paradigm capable of abandoning the traditional static and dualistic vision to accept and embrace complexity and thus define new multi directional knowledge models, woven through a plurality of actions that are interested not only in the elements but above all in the connections between them and the actions and counter-actions that these reciprocal influences generate[432].

As mentioned above, this is a profound and substantial change of perspective that reverberates at the various scales of analysis and interpretation through the adoption of a holistic approach that aims to

431 The representation of a system using linear language prevents the simultaneous vision of the interrelationships between all the elements involved in the discourse, of the factors that determine decisions, of the links between these and the policies of the system under consideration, of what is considered relevant and what can be temporarily neglected about actions and the accumulation of their effects, since the meaning of each element of linear language is uncertain about the semantic ambiguity arising from the superstructure which in turn depends on the structure of production and social relations of production at the time of its categorical formalization.

432 It is a matter of overcoming the mystification of linear language to arrive at the complexity of systemic language, for "*when, from the elements, interest shifts to the relationships between the elements, which generate actions and these, in turn, create feedback in complex circuits, when attention must be paid to the systematic behavior of an innumerable quantity of variables, all interrelated with decisions that generate accumulations of capital, which in turn has very high degrees of freedom of behavior for its own convenience through the combined maneuver of the structural and the super structural, when in short it is no longer a question of non-fiction but of complex operational research against an adversary that operates with advanced decision-making systems, linear language is insufficient."* In CABIANCA, 1980. Si veda anche CARTA, 2002.

organize a multidisciplinary system of knowledge that is operationally useful for the programming and planning of future intervention choices on this widespread heritage. Innovating the approach to the landscape as heritage through a substantial cognitive revision is a moment of fundamental importance, which opens up new forms of knowledge and new development opportunities through the recognition of the mental process as a shared basis of comparison within which each disciplinary field can renew its methods of analysis. In this way, a new typical cognitive structure is identified, through which can interpret the complexity and coherent proposals and responses developed concerning the issues related to the "care" and the destiny of the heritage-landscapes in question (the different warscapes in this case), declined in the complexity of their interrelationships. In other words, the operational proposal of this new paradigm is declined in the identification of a sort of new "cognitive skeleton" called "testimonial gradient" able to understand the value of testimony graduated about the variability of the cultural capital of the different elements that make up the complexity of warscapes, as well as to infer, precisely with respect to this "gradient," the possible potential of this heritage as a "flywheel of development" cultural, social and economic.

The very choice of the term "gradient" is particularly significant as it already embodies in its etymological meaning the evolutionary and dynamic connotation of this concept (from the Latin gradients -is, part. pres. of gradient "to walk, to advance"). As is evident, the metaphor is taken from the scientific language of the vector differential calculus, in which the concept of "gradient" of a function with fundamental values essentially refers to the formation of a vector field that, at each point of space, allows the calculation of the directional derivative of the function itself, concerning the variation in time of specific parameters and quantities. Without going into the mathematical specifications of these functions, the applications of this concept are actually many and directly linked to practical-operational implications that, qualitatively, make the understanding of this concept more direct and immediate. In physics, for example, the gradient of a scalar quantity is usually used to describe how it varies according to its various parameters. In contrast, in biology, the axial gradient represents the gradual variation of the intensity of specific physiological properties concerning a precise part of the organisms' body.[433]

433 A few examples to better understand the concept of gradient: in meteorology, vertical thermal g. of the atmosphere, the ratio between the difference in temperature at two points in the atmosphere and their difference in altitude; g. of the moving air, the temperature variation per unit of difference in height that, in the case of convective motions, the moving air mass undergoes due to expansion or contraction (if the air is dehydrated, and if the process takes place without heat exchange, this value, called adiabatic vertical g., is about -1 °C every 100 m increase in altitude); horizontal baric

The common denominator of all these different meanings is the ability of the gradient function to capture the variability of the parameters by which it is defined and to succeed precisely through this interpretation in conveying specific privileged orientations and trajectories concerning the variables considered. Applying this concept to the complexity characterizing the landscape heritage, and specifying this concept with the qualifier "testimonial," i.e., linked to the "value of testimony," the expansion of "meaning" is evident and is operationally combined in a renewed cognitive method of complex territorial resources in continuous evolution, which is based on an innate and profound analytical aptitude of the various aspects that characterize such complexity, not as an end in itself, self-referenced and self-validating, but as an operational tool to produce valid interpretations, development scenarios and enhancement of weak links and fragility in a long-term perspective.

To better understand the significant potential applied to "landscapes of war," we propose below an exemplifying metaphor, again taken from the mathematical field.

Assuming that a certain warscape is subjected to analysis, i.e., a portion of the contemporary landscape characterized by the presence, more or less evident, of traces of a fortified system composed of both permanent and field works, this spatial environment can be defined as the "field of existence" of the function to be analyzed. This function is nothing other than the "witness value," that is, the set of recognized and potential values, present at different temperatures within the function's domain and dependent on a series of variables characterizing the "field of existence" itself. Metaphorically, these variables are precisely the multiform aspects of complexity that define the "war landscapes" as "multi-layered palimpsests" (physical elements/variables) and as "high-capacity value condensers" (intangible elements/variables). The study of the "gradient" of this function represents the will to understand how this "witness value" changes in space and time with the variability of the parameters connoting the process itself. In other words, what is obtained through this method is a sort of mapping of the semantic

g., the ratio between the difference in atmospheric pressure at two points on the Earth's surface with the exact measurement and their difference in altitude; horizontal baric g., the ratio between the difference in atmospheric pressure at two points on the Earth's surface with the same height and their difference in altitude. (if the air is dehydrated, and if the process takes place without heat exchange, this value, called vertical adiabatic g., is approximately -1 °C per 100 m of increase in altitude); horizontal baric g., the ratio between the difference in atmospheric pressure at two points on the Earth's surface of equal height and their difference in latitude; g. a wind that for which, the horizontal pressure force being balanced by the centripetal force and the Coriolis force, the current lines coincide with the isobars, and the acceleration is therefore purely average. In geophysics, geothermal g., the ratio between the difference in temperature and the difference in depth of two points on the Earth's surface equals +3 °C per 100 m of descent. - Treccani Encyclopaedia.

density within the reference domain, obtained by recognizing different territorial areas in which the "sense of testimony" is recognizable and perceptible at different intensities.

The proposed method, therefore, is not only developed on a theoretical level in the spatial-temporal dilation of the concept of "testimonial value" but also allows the operational identification of territorial areas in which the cultural potential of the vestiges, material and intangible, is manifested at different intensities, through the calibration of some sub-parameters, as explained below.

The identification of areas with a different "testimonial gradient" also makes operative the conscious need to develop models of "network knowledge" able to adapt to varying scales of observation and interpret the systemic and reticular landscapes, such as the different warscapes, identifying new tools and codes to decode the complexity through the reading of the connotating signs, current and historical, stratified and sometimes buried, revealing, in particular, the interrelationships, the belonging to broader ecosystems and the semantic charge kept in them.

In this specific regard, for example, the ability to develop innovative and interdisciplinary analytical methods and operational tools to facilitate the unveiling and recognition of the heritage of "minor ruins"[434] present both in the emerged world of fragments of visible vestiges, albeit in different states of preservation, and in the latent world of "submerged signs" waiting to be "freed," can facilitate the identification of areas with different "testimonial gradient" within the contemporary landscape, to begin to set future practices of "care" and narration.

These are new possibilities of storytelling that are nourished by the awareness of the testimonial value of architecture as well as of a landscape, of an "*intentional monument*"[435] rather than a "minor ruin," it is as much in the presences as in the absences, but above all in their relationships. This awareness opens up and reinforces the capacity to relate to the condition of "fragment" of what remains, in this case, the vestiges, as a productive, positive, and helpful state, to allow even the most fragile heritage not to stay an "unloved child"[436], to use Pasolini's

434 CARBONE, 2010.

435 See note nr. 45.

436 "*Last night in my sleep, I had one of those illuminations (which in psychology are called "hypnagogic hallucinations") for which I then generally write verse: I translate it now instead of into prose. The monuments, the ancient things, made of stone or wood or other materials, the churches, the towers, the facades of the palaces, all this, made anthropomorphic and as if divinized in a single and conscious Figure, he realized he was no longer loved, that he was surviving. And so he decided to kill himself: a slow and quiet suicide, but unstoppable. And here is that everything that for centuries seemed "perennial", and indeed was until two or three years ago, suddenly begins to crumble simultaneously. As if traversed by a single will, a single*

words, but to be recognized and 'cared for' to continue to express its voice to future generations.

Ultimately, therefore, the possibility of recognizing these diversities within the complexity represents the necessary presupposition that allows us to set up, precisely based on these differences, the future practices of enhancement of this heritage, which in turn will have to be "graduated" about the local needs of the specific areas in question, declining different margins of planning concerning the various "testimonial gradients" identified.

6.3.3 The proposal of some indicators

In the face of the theoretical but also operational effectiveness of this method, as proven by the previous considerations, its practical operability is measured in the ability to identify and define the "variables of the system," those parameters that connote the function "testimonial value" and concerning whose variability the gradient itself develops and modifies. As mentioned above, these variables are nothing more than the set of all those variegated aspects of complexity that identify the different warscapes as a whole, from different "perspectives" and through distinct but complementary disciplinary approaches. These are all those cognitive aspects introduced in the previous chapters, which are developed at a multidisciplinary level. Thus, integrating the different elements of the multiform peculiarities of the "warscapes" represents complementary contributions to succeed in outlining the "cognitive skeleton" of this new paradigm. Not being able to be closed, static, and invariant parameters, as already explained, these variables to be investigated and deepened have been identified as "cognitive indicators," i.e., parameters that offer the broadest and most complete interpretation possible "best available knowledge" concerning certain characteristic aspects of the specific warscapes to be studied.

The use of 'indicators' is not new in analysis, particularly in the economic and socio-anthropological disciplines. It allows for the systematic and orderly investigation of the different variables involved

spirit. Venice is agonizing; the Sassi of Matera are full of rats and snakes and are collapsing, thousands of (beautiful) farmhouses in Lombardy, Tuscany, Sicily, are becoming ruins: frescoes, which seemed incorruptible until a few years ago, are beginning to show incurable damage. Things are absolute and rigorous like children, and what they decide is definitive and irreversible. If a child feels that he is not loved and desired - he feels "extra" - he unconsciously decides to get sick and die: and this happens. So are the things of the past, stones, woods, colors. And I in my dream saw it clearly, as in a vision." Pier Paolo PASOLINI, "Tempo," no. 14, April 5, 1969.

through effective management of complexity.[437] An indicator can be defined as a parameter, or a value derived from multiple sub-parameters, that provides information on a given phenomenon: it, therefore, has a meaning that goes beyond that of the single descriptors it derives from, as it systematizes and synthesizes their contents, also simplifying the communication processes practical to convey cognitive outputs. Without going into the merits of the multiple applications of such indicators in the different disciplinary fields, for which please refer to the extensive bibliography of reference,[438] a national level, should remember that the *BES (Equitable and Sustainable Well-being) Report has placed Italy in line with the Lisbon Memorandum on Indicators for decision making and monitoring*,[439] thus extending the application of "Well-being Indicators" also to the domain of "Landscape and Cultural Heritage," precisely because of the exceptional relevance of the issue in the national context and therefore the need to investigate its consistency, status, levels of perception, evolutionary trends and also protection and enhancement policies.[440]

It is precisely in this perspective of meaning, therefore, that the use of indicators is particularly suitable for dealing with the complexity of the cultural heritage represented by the various warscapes, albeit with the awareness of the intrinsic difficulty of cognitive indexing parameters (such as the degree of recognisability, the sense of belonging, the state of conservation, the degree of community involvement, structural safety, accessibility to places, to name but a few) that are difficult to quantify concerning physical, chemical, economic or anthropological

437 The use of indicators is wide and varied in many disciplinary fields and with different declinations and customs. In the early 1990s, the Organization for Economic Co-operation and Development (OECD), an intergovernmental organization of developed countries, conceived the idea of using indicators as a tool for monitoring and disseminating information. In essence, the indicator is intended to be a valuable tool to improve the effectiveness of the entire knowledge and decision-making process to provide a valid operational contribution to linking understanding to action and intervention.

438 The bibliography regarding the definition and use of indicators is vast and varied, especially distributed at an interdisciplinary level. Without any claim to exhaustiveness, below are just a few significant reference studies useful for further study of the topic: MEGA, PEDERSEN, 1998; EUROPEAN COMMISSION, 2008; MAMELI, LACE, 2009; VALLEGA, 2009; EUROPEAN ENVIRONMENTAL AGENCY, 2010; VOLPIANO, 2011; SWISS CONFEDERATION, 2012; EUROPEAN SPATIAL PLANNING OBSERVATION NETWORK, 2013; PHILLPIPS, STEIN, 2013; VALTENBERGS, GONZALEZ, PIZIKS, 2013; EUROPEAN ENVIRONMENTAL AGENCY, 2014; BOSCH, JONGENEEL, ROVERS, NEUMANN, AIRAKSINEN, HUOVILA, 2017.

439 DGINS 2015, Lisbon, 23-24 September 2015, Statistical session on "Indicators for decision making and monitoring" Lisbon memorandum As adopted by the ESSC on 25th September 2015.

440 Description of the domains and indicators of the Bes selected by the Scientific Committee and launched on June 22, 2012.

parameters. These are qualitative indicators that systematize the multiple and individual knowledge about a given aspect of heritage, defined through a series of sub-parameters, to outline an overall degree of expertise that allows us to grasp the differences and compare the different areas simply and effectively. The aggregation of the cognitive results obtained by the other indicators provides precisely the possibility of summarizing the overall level of knowledge acquired in a single summary indicator, thus defining a sort of "cognitive index," exactly what has been described as a "testimonial gradient."

After having identified the leading "cognitive indicators" concerning which to set up the analytical study of the various territorial areas under investigation, it is necessary to define more precisely also the sub-criteria defining them, i.e., the specific parameters through which it is possible both better to describe the critical content of the indicators themselves and to try to associate to them also an evaluation in quantitative terms through the setting up of multi-criteria analysis, as will be explained below.

From an operational perspective, it is qualitatively linked to each identified sub-criterion a specific evaluative descriptor graduated concerning the "cognitive level" reached about the reference context.

If, from a purely methodological point of view, this means associating these cognitive levels to qualitative evaluations of the type "null," "minimum," "good," "outstanding," in the proposal of multi-criteria analysis, it is a question of calibrating these qualifications by associating them with quantitative values, calibrated and "weighed" reciprocally about the various areas under study. However, before examining the leading "cognitive indicators" identified about the various "war heritage landscapes," should clarify. If, from a methodological point of view, the setting up of this paradigm, therefore of the relative "cognitive macro-indicators" and of the multi-criteria analysis subsequently proposed, constitute a new assumption which is valid and applicable concerning every "war landscape," the specific definition of the various sub-criteria as well as of the relative "evaluation grids" on which the Analytic Hieratical Processes[441] are based, are not the same as those of the "war landscape"cannot be considered in an absolute manner and valid indiscriminately always and everywhere. In fact, in the awareness already made explicit that it is not possible to achieve complete and closed knowledge precisely because of the intrinsically complex and dynamic nature of the various warscapes, it is evident how the precise definition of these sub-parameters finds its efficacy and internal coherence only if it is combined in the horizon

441 For a literature search with respect to the definition and different applications of Analytic Hieratical Analyses see SAATY, KEARNS, 1985; SHIM, 1989.

of meaning in which it was conceived, that is, in a holistic approach that is based on a profound and careful understanding of each reference context, preferring diversity to homologation, adapting the method "case by case," setting up a dialogical rather than impositional attitude with the various warscapes.[442]

Therefore, deepening the treatment of the different warscapes, the proposed method has ordered the "cognitive macro-indicators" in four leading families of investigation that essentially reflect the priority directions helpful to understand the semantic significance of these places, aware that these groupings, while representing a standard reading key to all warscapes, can be implemented and modified with the context of application and the boundary conditions.

In particular, this concerns the historical-anthropological components that define the historical biography of these warscapes; the parameters that allow us to understand the level of visibility and recognisability of the "tangible signs" linked to the war within the contemporary landscape; the aspects more related explicitly to the typological and technological sphere of the works built within them, with the relative innovations and experiments (see chapter 7); and finally, the methods of management and governance of this set of works, about the prospects for development and revitalization that can be triggered and reverberate from them at different scales.

Indicator 1: Historical and antropological Aspects

Going into more detail, as far as historical-anthropological aspects are concerned, they are an essential component for the recognition of the testimonial "temperature" of a specific territorial context, as they allow to build a "diachronic knowledge" of a given "war landscape" through the interdisciplinary contribution of historical sciences, the study of direct and indirect documentary sources, historiographic and political criticism, as well as studies concerning the socio-anthropological impact of the conflict on communities. Although they cannot recognize this aspect as totally invariant, they are less changeable than what is investigated by the other indicators since they cannot change history per se. Still, it can take on different significant connotations concerning the evolution of new studies and insights. As can be deduced by understanding the importance of these aspects, defining this indicator requires adopting an interdisciplinary approach that needs the contribution of multiple competencies, which are not the subject of this research. In this observatory, however, it should be remembered that,

442 Each different Warscape Class may, in fact, present different criteria for analysis that are not valid for the others. Therefore the requirements cannot be homologated in every warscape but must be derived from knowledge of them.

from an operational point of view, the possibility of knowing the dynamic evolution of the wartime events that have affected a given warscapes indeed represents a necessary condition, even if not sufficient, to begin to identify the areas most affected by the conformative imprinting of the conflict itself, even independently of the effective recognition of any permanences in the current landscape. In this sense, therefore, a fundamental contribution to the definition of this indicator can be provided by the implementation of increasingly accurate studies and research of documentary and archival sources, including both the militarisation projects drawn up by the various military Genii, as well as historical period photographs, but also all the intense production of diaries that are constantly implemented with new publications and elaborations at an international level. In addition, this indicator also includes all anthropological studies on the multiple effects that the conflict had on communities and how these consequences determined their evolution and development in social, cultural, philosophical, and even religious terms. It is clear that all these components have been, and still are, decisive in the construction of the "sense of identity" embodied in these places, which cannot ignore to "take care of them."

Ultimately, therefore, schematizing what has been prosaically described and without any claim to exhaustiveness, some of the main sub-criteria to be considered in defining and describing this first "cognitive indicator" is essential: the recognition of the actual active role of the context during the wartime, the presence of project documents concerning the construction of fortified works (projects and militarization plans), the existence of period iconographic and/or photographic apparatuses concerning the places under analysis, the fact of historical books concerning the events that took place in these contexts, the presence of diaristic sources preserved in archives or published, the realization of studies on the sense of belonging of the communities to these places, to name a few. This is precisely the same as the cognitive process of defining the "testimonial value" of an architectural monument, which combines the data obtained from historical sources with the information potential of material culture, in the same way, to begin to understand and describe the different "testimonial gradients" it is necessary to implement the documentary information summarised in the first indicator with a series of other cognitive data directly concerning the material evidence of the remains of the Great War, both concerning the typological-constructive aspects of the single works (indicator 2), and to the "state of conservation" of the fortified systems as such (indicator 3).

Indicator 2: Tipological and Tecnological Aspects

The second "cognitive indicator" aims to systemize the various aspects concerning the types and construction technologies of the fortified

systems, composed of the permanent works, the field, temporary fortifications, and the connecting infrastructural systems. Rather than precise and specific knowledge of the pieces designed in the specific territorial areas of investigation, for which the particular projects are not always available, it is a question of an overall and global awareness that makes it possible to identify the recurring construction types and therefore more likely to be found, developed concerning the different contexts and the different Warscape Classes previously identified. In this sense, for example, a precise knowledge of the construction typology adopted for permanent or field fortifications in lowland contexts compared to mountainous areas can allow us to open our eyes towards the setting of probability fields against which to filter observations to tackle the recognition of any permanences, knowing, at least conceptually, the construction typologies and technologies usually used in those specific areas. In addition to this, knowledge of the technological-constructive aspects is also an essential requirement for being able to recognize the state of conservation of a given artifact or fragment, whatever it may be, and consequently to be able to understand what the "care priorities" are must address that to prevent the risk of loss. This indicator, therefore, includes all the knowledge regarding the use of certain materials and the development of the same number of techniques, differentiated according to the context of reference (WS-Classes), the skills of the various military geniuses, and the economic resources made available by the different countries. These considerations involve permanent works as well as field and temporary fortifications and open the way to numerous other reviews, first and foremost the awareness that knowledge of the types and construction technologies of the remains is not only an essential requirement for future enhancement practices of these cultural assets but also constitutes a cultural heritage "in itself," insofar as it bears witness to the "material culture" expression of the "human making" of a specific era. Moreover, as has already been argued on several occasions, recognizing in the "signed material" the place where the "signs carrying meanings" are deposited, knowing the construction techniques and the structural behavior of the constituent materials becomes that "technical knowledge" that is necessary to prevent planning and practices that are not suitable for preserving that "poetic seeing" that allows us to grasp its essence.

In this perspective of sense, therefore, we understand the importance of this indicator, which can be described through some reference parameters: the specific building typologies of the reference context or, if not possible, of other similar contexts; the awareness of the materials used and their structural behavior; the ability to understand the accessibility/usability of the places in terms of safety; the existence of projects carried out in similar contexts is considered a critical reference

for comparing.

To be able to give an informed response to these cognitive questions, it is evident that new tools and methods must be developed that are capable of examining these aspects in depth at a general level (this question had, in fact, already emerged in the previous chapters and the SWOT matrix), creating a helpful knowledge base from which to express an assessment, albeit qualitative, and thus obtain a realistic value from this indicator.

In this regard, in the following chapter, we will address the issues related to the typological and technological-constructive development of permanent, temporary, and field fortifications to identify a comparative method that can help the analysis and, therefore, actively contribute to the identification of "testimonial gradients." By way of example only, one of the themes dealt with will concern the essential structural experiments that were carried out in the fortifications built in anticipation of the Great War by the various countries, and which after the First World War led to the widespread and universally recognized use of reinforced concrete structures.

Indicator3 : Recognizability of the "traces of war" as a system

Like the issues mentioned above, another cognitive-operational gap to be resolved with future enhancement practices is the ability to return to adopting a systemic view capable of grasping the fragments of the remains as parts of a whole that no longer physically exists but can potentially be recovered through what has been defined as a holistic approach. The relational nature of 'war landscapes' connotes their very character and therefore becomes fundamental when one wants to recognize their testimonial value. The third indicator refers precisely to this theme, that is, a sort of analysis of the "state of preservation" extended to the scale of the various warscapes to understand the current degree of recognizability of the permanence of the vestiges as fragments of a "system" made up of permanent, camp and temporary works connected by a dense network of physical and intangible infrastructures. Dilating the "state of preservation" analysis to the scale of the "war landscape" means studying its transformative/evolutionary dynamics over time. Therefore its stratifications, erasures, rewritings, and interferences, to understand how much these networks of intangible relations have weakened, compromising the recognisability of the vestiges, and how much of this heritage is currently latent, buried beneath the physical, but also intangible, the thickness of history.

In the face of the existence of a consistent value and memorial potential of a given "war landscape," for example, through the presence of written documents or period photographs that show its direct involvement

during the conflict, the ability to recognize the permanence of these "historical signs" becomes the essential requirement for their "care," and therefore for the possibility of preventing their loss. Thus, once again, a theme that has already been amply expressed returns, namely the need to focus attention not only on permanent fortifications but above all on that partially buried and hidden world of more fragile "material traces," present but latent in that threshold-space between the visible and the "submerged," which is recognized as the very soil of these warscapes: "signed matter" marked by the exact imprint of war, waiting to be unveiled so that it can once again express its voice.

It is precisely on the ability to unveil this "latent heritage" and consequently to build the future legacy of this Great War Heritage, that the effectiveness of recognizing the different "testimonial gradients" is also measured. It is in this perspective of meaning that the third "cognitive indicator" must be understood, entirely concerning the recognisability of the different "signs" within the area under analysis. The sub-parameters that define it refer essentially to the ease of identification of both permanent and field works and the ability to identify the networks of relations that connect these fragments, both physical and intangible.

Anticipating what will be better explained in the following paragraph, it is evident how the potential semantic significance of a given "war landscape" is inversely proportional to this indicator, which will be more consistent in areas where the recognisability of the remains is more evident and manifest. And it is precisely in this sense (i.e., low Indicator 3 against high Indicator 1) that this "recognisability index" will be able to direct future enhancement practices towards the search for new tools and methods to facilitate the recognition of that world of "submerged signs" waiting to be revealed. Precisely about this aspect, chapter 8 will present the elaboration of a new cognitive-operative method, the "stratigraphic telescope," which is non-invasive and has been developed by putting together interdisciplinary knowledge to facilitate the decoding of the language through which the contemporary landscape is written, and therefore the identification of the imprint still present of the Great War on the morphology of the modern territory.

Indicator 4: Managment Aspects and communities involvement

The last "cognitive indicator" outlining the recognition of the different "testimonial gradients" concerns aspects less related to the material evidence itself, but rather to the multiple practices of valorization/ narration, to the management, governance, and maintenance of these works, to the participatory aspects regarding the direct involvement of communities, and the widespread awareness among citizens of the cultural and memorial capital of this type of heritage as a "common

good." As in the case of the first indicator, an interdisciplinary contribution is needed to develop these sub-criteria further, especially to highlight the weaknesses of current practices and methods and to suggest new enhancement strategies that invest in renewed bottom-up approaches and interpret the concept of valorization in the sense already addressed in the previous chapter.

Although these aspects are not directly related to the observatory of reference of this research, it is pretty evident how they are mutually intertwined with all the considerations made previously, in particular regarding the recognition of this heritage as a "deposit of memories" handed down as an inheritance from generation to generation, and therefore to be known, preserved, listened to and put in the conditions to be able to "tell the story" of their experience in the future.

In this sense, the importance of the educational role that a responsible awareness of this heritage can stimulate in the communities seems clear, and it must be declined in a sort of ethical responsibility towards a palimpsest of "fragile and complex signs" that represent the history of Europe, and therefore the identity roots of today's communities. This responsibility must also take the form of openness to the many possibilities of reactivating these 'memorial deposits' through projects that do not betray their character but are aware of the potential that this heritage can play in cultural, social, and economic development territorial level.

The knowledge of all these aspects can contribute to a better definition of this indicator, which represents a significant contribution not only for recognizing the different gradations of the testimonial value of a given "war landscape," but it also identifies its future development orientations.

Like the previous indicator, this indicator's less solid aspects and sub-criteria constitute exactly those "weak links" identified in the last chapter, to be improved and strengthened precisely through future enhancement and management practices.

Ultimately, therefore, within these macro-categories of analysis, different modes of study and understanding are developed, which often highlight operational issues and fragilities, which require the elaboration of specific solutions to resolve such criticalities to guarantee the correct and smooth functioning of this cognitive process. In these terms, it is easy to understand how the process of defining the different "testimonial gradients" is a natural operational method based on knowledge, which is both inductive and deductive, and which combines the ability to analyze at a detailed scale with the necessary contextualization at a landscape level, using trans- and interdisciplinary

contributions which operate contextually to provide their assistance to the definition of the different "gradients." Precisely in this regard, these indicators essentially represent parameters of analysis against which to express a sort of "multiform cognitive degree" of the territorial sphere of interest, which as a whole makes it possible to qualitatively translate the identification of areas with a different "testimonial gradient" into maps of "semantic concentration," in which this density of meanings is given not only by a linear summation of the contribution of the four indicators but is amplified about the solidity of the reciprocal links and connections between them, which substantiate the sense as a "system."

6.4 Multicriteria approach: a proposed method for defining indicators

As previously mentioned, giving a quantitative assessment to parameters which by their nature are not purely objective and measurable, and above all whose understanding varies concerning the capacity of observation and critical interpretation of the reference context, is certainly not an automatic and invariable step, nor is it valid in absolute terms. In addition to this, as already stated, there is also the awareness that the specific identification of the "cognitive indicators" described above can be improved and updated concerning the particular fields of application.

In the light of these considerations, it is therefore clear that the operational validity of this new paradigm consists essentially in the innovative methodological approach proposed, to be adopted and developed to understand the expansion of the testimonial value at the scale of a fragile and widespread heritage such as that of the remains of the Great War, but potentially applicable also to other types of heritage similarly expanded at a territorial scale.

Therefore, in these terms, the proposal to operationally decline this new paradigm through an analytical method able to quantitatively translate the qualitative considerations expressed by the indicators and cognitive sub-criteria previously identified becomes significant.

To this end, the most suitable tool for dealing with this complexity is a multi-criteria analysis matrix[443] capable of simultaneously comparing the "different temperatures" expressed by the indicators concerning the different areas under study. The methodology is based on what is defined by the value analysis as *"an operational technique that allows to verify the validity of any entity and to compare several solutions in terms of utility (worth) with the global cost, compatibly with the*

443 With respect to the proposal of a multicriteria analysis for the evaluation of a restoration project, see also MICCOLI, 1997; CARBONARA, 1997.

resources available".[444]

Declining this approach to the method for recognizing "testimonial gradients" means first of all identifying the importance and "weight" of the individual indicators and relative sub-criteria concerning the definition of the general indicator of which they are a specification, and consequently associating them with "weighting factors" (Wf), subdivided in such a way that the total sum results in unity and against which to express and calibrate the specific values for each area under analysis.

In this specific case, for example, it was decided to provide further importance (Wf=0.3) to the indicator concerning the recognisability of the warscapes as fortified "systems," since it is precisely the ability to recover the "systemic view" that constitutes, as already mentioned, a fundamental point for reconstituting the very meaning of this heritage. Furthermore, as far as the typological and technological-constructive aspects are concerned and those concerning the enhancement strategies and community involvement, the same Wf=0.25 value was associated with them, thus acknowledging their great importance for the general definition of the semantic significance of a given context. Finally, the remaining Wf=0.2 was matched to Indicator 1, i.e., the one concerning the historical-anthropological aspects: the lower value compared to the other parameters must be understood not so much as lesser importance, but rather to the fact that these aspects are less variable compared to the different analysis criteria, and therefore more easily identifiable safely and objectively.

Once these reference values have been established, it is then a question of carrying out, for each of the various sub-criteria, the actual analytical-comparative evaluation using direct comparison of the associated values, constantly examining two areas at a time, and repeating the operation so that each room is compared with the others, thus obtaining asymmetrical comparison matrix.

The importance of this phase is particularly significant since it represents the valid "point of contact" between the qualitative interpretation of the various parameters and their quantification, which becomes possible precisely concerning the sensitivity and interpretative capacity of the operator carrying out the analysis. In other words, in connection with what has been stated above, the intrinsic complexity of this heritage cannot be "simplified" through the impersonal application of mathematical-analytical tools and parameters, which would lead to inconsistent semantic reductions. Still, it must accept this incompatibility given by the very nature of the heritage being analyzed,

444 UNI EN 1325-1:1998, UNI EN 1325-2:2005 Vocabolario della gestione del valore, dell'analisi del valore,dell'analisi funzionale - Parte 2: Gestione del valore.

which needs to be known, understood, and interpreted through precise scientific methods, but filtered through a "value judgment" given by a more direct, more personal, more "heartfelt" approach. In the light of these necessary considerations, it is, therefore, possible to elaborate an Index of Comparison (I) capable of expressing the "weight" of each parameter regarding the specific area under analysis concerning the other reference contexts. Finally, the whole approach is summarised in Tables 6.2-6.3.

Finally, by multiplying this index by the weight corresponding to the priority of the previously defined sub-criterion, it is immediate to obtain the value v concerning the "share" of this descriptor for the broad definition of the associated indicator. In the best case, these values will equal the maximum weighting coefficients previously established (I1=0.2; UI2=0.25; I3=0.3; I4=0.25), while in the other cases, they will represent a lower percentage of the same.

Lastly, as indicated in Table 6.3, the summation of the various "cognitive indices" concerning the specific areas understudy will therefore allow us to arrive at the determination of the "testimonial gradient" of the area under examination, that is, being able to associate a quantitative dimension with the testimonial value of a given site.

Through the reciprocal comparison between the different areas under examination, it will be possible to identify the rooms with a different "testimonial gradient," thus obtaining a sort of mapping of the semantic density of a given warscape.

Recalling once again how the different indicators and sub-criteria can be specified and adapted to the contexts of reference, the proposed methodology is an excellent proactive tool, valid for the concrete implementation of the new paradigm expressed and applicable both for the recognition of the potential and fragility of a given "warscape" and for the identification of areas with different "margin of designability."

TESTIMONIAL GRADIENTS

INDICATOR 1	w_F1
Historical and Antropological Aspects	0.2

Sub-criteria		w_F
1a	Active role in wartime	0.05
1b	Presence of militarization projects/plans	0.05
1c	Presence of historical photographs	0.05
1d	Existence of books/diaries	0.025
1e	Studies on the sense of belonging to these places	0.025
		0.2

INDICATOR 2	w_F2
Tipological and Tecnological Features	0.25

Sub-criteria		w_F
2a	Knowledge of the specific constructive typologies	0.08
2b	Knowledge of construction materials and related structural behavior	0.08
2c	Accessibility and structural safety of places	0.03
2d	Comparisons with projects carried out in similar contexts	0.06
		0.25

INDICATOR 3	w_F3
Recognizability of the fortified system	0.3

Sub-criteria		w_F
3a	Clear recognizability permanent fortifications	0.05
3b	Clear recognizability field fortifications	0.08
3c	Good recognizability of the signs engraved on the terrain	0.09
3d	Good recognizability of the vestigia as a "system"	0.08
		0.3

INDICATOR 4	w_F4
Enhancement perspectives, Management Aspects and Communities involvement	0.25

Sub-criteria		w_F
4a	Communities involvement (bottom-up strategies)	0.05
4b	Consciousness of the sense of testimoy of the places	0.05
4c	Active role to develop and revitalize the territories	0.05
4d	Integrated asset management	0.05
4e	Part of tourist circuits and museums (local induced)	0.05
		0.25

MULTI-CRITERIA ANALYSIS - for each sub-criteria, comparing different areas (see Tab.)

$I_1 = v_{1a} + v_{1b} + v_{1c} + v_{1d} + v_{1e}$

$I_2 = v_{2a} + v_{2b} + v_{2c} + v_{2d}$

$I_3 = v_{3a} + v_{3b} + v_{3c} + v_{3d}$

$I_4 = v_{4a} + v_{4b} + v_{4c} + v_{4d} + v_{4e}$

$I_1 + I_2 + I_3 + I_4 =$ ***TESTIMONIAL GRADIENT***

Tab. 6.2 | The definition of the "TESTIMONIAL GRADIENTS": indicators and sub-criteria

Tab. 6.3 | The definition of the sub-criteria: a multi-criterial approach

MULTI-CRITERIAL ANALYSIS

to develop for each Sub-criteria β,
comparing n different areas

Sub-criteria β	Area 1	Area 2	Area 3		Area n	Σp	$I_{\beta,1...n}$	$v_{\beta,1...n}$
Area 1	$p_{1,1}$	$p_{1,2}$	$p_{1,3}$	...	$p_{1,n}$	$\Sigma p_{1,1...n}$	$\Sigma p_{1,1...n} / (\Sigma p)_{1...n} = I_{\beta,1}$	$I_{\beta,1} \times w_{F\beta} = v_{\beta,1}$
Area 2	$p_{2,1}$	$p_{2,2}$	$p_{2,3}$	...	$p_{2,n}$	$\Sigma p_{2,1...n}$	$\Sigma p_{2,1...n} / (\Sigma p)_{1...n} = I_{\beta,2}$	$I_{\beta,2} \times w_{F\beta} = v_{\beta,2}$
Area 3	$p_{3,1}$	$p_{3,2}$	$p_{3,3}$	...	$p_{3,n}$	$\Sigma p_{3,1...n}$	$\Sigma p_{3,1...n} / (\Sigma p)_{1...n} = I_{\beta,3}$	$I_{\beta,3} \times w_{F\beta} = v_{\beta,3}$
	...	...	...	...	...	...	...	
Area n	$p_{n,1}$	$p_{n,2}$	$p_{n,3}$	...	$p_{n,n}$	$\Sigma p_{n,1...n}$	$\Sigma p_{n,1...n} / (\Sigma p)_{1...n} = I_{\beta,n}$	$I_{\beta,n} \times w_{F\beta} = v_{\beta,n}$
						$(\Sigma p)_{1...n}$		

Lastly, multiplying the index obtained by the total weighting coefficient assigned to each sub-criterium (see Table XX) one obtains the "temperature" of this criterium with respect to the area n under examination.

$$p_{1,2} = w_{F\beta,1} / w_{F\beta,2}$$

The analytical-comparative evaluation phase of the different sub-criteria is based on the qualitative comparison between a set n of territorial areas under study, always considering two scenarios at a time. With respect to the qualitative evaluation of the parameter under analysis referred to the area in question, calibrated on the maximum weight previouslyidentified wF, the "relative weights" are compared with each other by repeating the operation for each sub-criterium so that each area is compared with the others, obtaining a symmetrical matrix of comparison.

The evaluation of each individual sub-criteria with respect to a specific area of analysis n is expressed through an index $I_{\beta,1...n}$ which is given by the ratio between the "total relative weight" $\Sigma p_{1,1...n}$ to that parameter for area n and the sum $(\Sigma p)_{1...n}$ of the weights of that criterium for all areas.

The aggregation of the partial values therefore makes it possible to identify the overall value of the "knowledge indicator" declined with respect to the specific area under analysis.

$$I_{1\,tot} = \Sigma v_{\beta n}$$

$$I_1 + I_2 + I_3 + I_4 = \textit{TESTIMONIAL GRADIENT}$$

6.4.1 The "gradient" as a proactive method for "care"

In the light of the above considerations, it can be understood how the expansion of the concept of "testimonial value" to "testimonial gradient" is not only a linguistic clarification but constitutes a substantial paradigm shift that subverts the traditional linear and consequential approaches to propose a polycentric method that is undoubtedly more complex, but substantially more effective, to systemize the different components of complexity and to understand as widely as possible the cultural capital of these warscapes.

Suppose the "gradient of testimony" concept constitutes a spatial/temporal expansion of what is recognized as "testimonial value" on closer inspection. In that case, it becomes clear that the "cognitive indicators" described above actually propose the same categories of analysis that emerged in the comparison presented in the previous paragraph between the SWOT matrix already related and the semantic cores through which to define the very concept of "testimonial value" of a given asset. In other words, the "method of complexity" introduced with the new paradigm not only recognizes a fundamental analytical value to the cognitive process for the possibility of multidisciplinary and inter-scalar knowledge of the different warscapes, but also grasps its substantial importance on the operational level as "useful knowledge" to be able to understand precisely where it is necessary to intervene to "cure," improve, "enhance" or safeguard this vital heritage.

The identification of territorial areas with a different testimonial gradient does not only provide a mapping of the semantic density of a given warscape, but also defines a sort of "risk and fragility map," where risk means precisely the "risk of loss" of the cultural and memorial potential of these essential contexts, i.e., when the indicators identified return a lower semantic intensity of both their physical-material components ("materia signata") and intangible components (value-memorial charge). Thus, the four "cognitive indicators" are complementary aspects which, as a whole and thanks to the interrelationships generated between them, make it possible not only to bring out areas with similar characteristics but also to highlight the "weak points" and critical issues to be improved and strengthened concerning the objectives to be pursued in the future.

Precisely in this perspective of meaning, the setting up of this new paradigm for the recognition of "testimonial gradients" becomes an accurate, proactive tool towards future practices of "care" of this heritage, to identify the main prospects of development and enhancement, to be calibrated precisely according to the recognition of different "gradients".

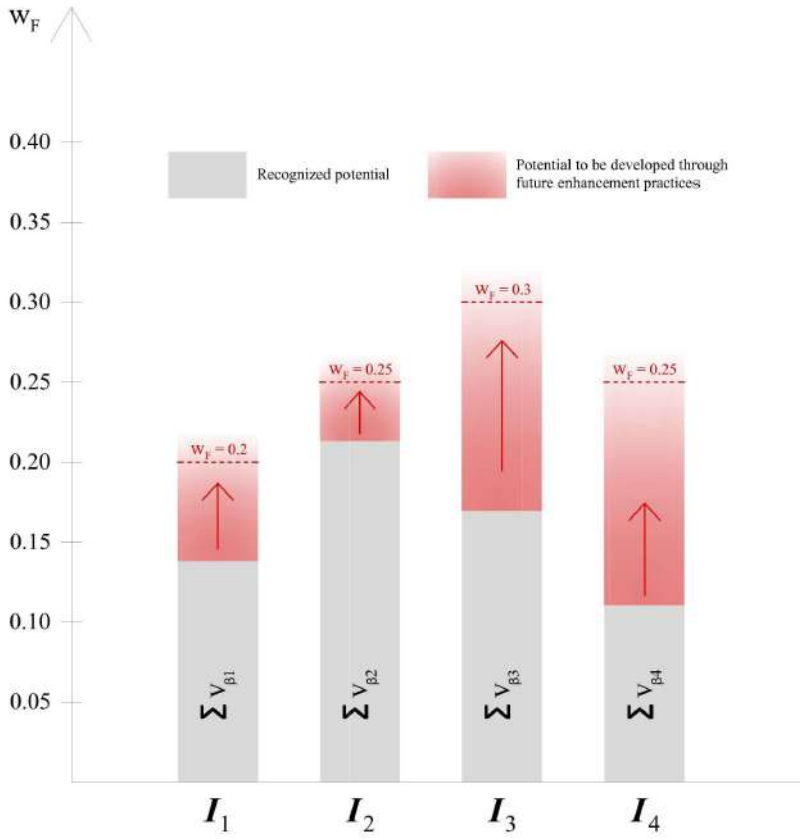
In other words, this mapping constitutes at the same time the analytical basis on which to develop future choices regarding the destiny of this

heritage through planning on a territorial scale graduated according to the needs that have emerged, or rather the need to strengthen and improve precisely the weakest aspects belonging to different indicators. It is, therefore, a question of metaphorically translating areas with a different "testimonial gradient" into regions with an additional "margin of designability," concerning which the planned interventions will have to be, at least conceptually, inversely concentrated concerning the semantic intensity identified precisely by these "gradients."

In other words, future enhancement practices will have to pay particular attention to those areas in which the semantic significance is not manifest and recognizable, and therefore with a high "testimonial gradient," but latent and waiting to be revealed and improved. In these cases, for example, in the face of a solid "Indicator 1" that recognizes the potential of a specific area as a historical space full of meanings, future projects will have to concentrate precisely on the improvement of those less solid sub-criteria, graduating interventions at different temperatures just as the degrees of weakness of this system are diversified: implementing the recognisability of the "traces in the landscape" if, for example, the weakest Indicator is the third one; or deepening the knowledge of typological and structural aspects, if Indicator 2 is not particularly substantial; or developing new participatory strategies of involvement and sharing to increase the awareness of communities towards this heritage, if instead Indicator 4 is the lowest one.

At the operational level, it is a matter of metaphorically reinterpreting "in the negative" the multi-criteria analysis previously carried out for the identification of the different "gradients," i.e., trying to highlight the "missing part" to reach a sort of significant unity that is not entirely present. Better than many words, the schematization in Fig.6.2 exemplifies the concept.

As it is well understood, the setting up of this new paradigm does not aim at defining precise "guidelines" and abacuses of pre-selected interventions to be chosen and applied indiscriminately at a general level, nor does it intend to indicate preferences towards specific orientations and design languages: in the light of the entire cognitive process carried out so far, it can be understood how the elaboration of dry and categorized "guidelines," although very useful from an operational point of view, would constitute a simplification that is neither consistent nor respectful towards such a complex and significant heritage as the different warscapes. The identification of "testimonial gradients," on the other hand, represents the right balance between knowledge and practice, i.e., a new analytical tool to be used to "compare" and contrast different "warscapes," in order not only to consciously set up future enhancement scenarios, at different temperatures and with other languages, but also to identify the main critical points concerning



the objectives, and consequently to be able to calibrate a sort of map of intervention priorities, against which to select the most "at-risk" contexts that require more urgent treatment interventions.

6.4.2 An experimentation of the multicriteria approach: the fortified system insisting on the Altopiano di Vezzena (TN) for the identification of gradients

To test the actual effectiveness of the multi-criteria analysis proposed above, it was decided to try its application on a specific warscape to bring out any areas with a different "testimonial gradient" and, through the interpretation of various indicators, to be able to recognize, within these areas, the weakest and most fragile aspects to be improved with future enhancement and management practices. The "war landscape" involved in this experimentation is located on the Vezzena Plateau, in Trentino, along the original front line between Italy and the Austro-Hungarian Empire in 1915. It includes explicitly the fortified system formed by the Austro-Hungarian forts Campo Luserna (Luserna Werk), Fort Busa Verle, and Fort Vezzena (Spitz Verle Werk).

These permanent works belong to the "Fourth Generation" of fortifications built by the Austro-Hungarian Empire, corresponding essentially to the "Armoured Forts," made of special concrete with different types of iron reinforcements and protective armor, as already explained in Chapters 2.1.4, to which reference is made for detailed specifications. Today, these 'war landscapes' are universally recognized as 'historic places of memory in that they were the scene of fierce bombardments in 1915, the day after Italy enters into the war since the front on the Vezzena Plateau was the focus of the first extremely harsh phase of the conflict. The entire system was repeatedly attacked by the Italian forts Verena and Campolongo, in one of the most dramatic events of the Great War along the Vezzena/Luserna/Lavarone fortified line. Folgaria Plateau called the "war of the forts." After three days of non-stop attack, the commander Emanuel Nebesar of Fort Luserna surrendered, fearing that the fuel depots would explode. The other Austrian forts rejected the decision. After the symbolic gesture of a volunteer who withdrew the white flag, Fort Luserna was reoccupied by the Austrians until the offensive of May 1916, when the front line shifted.[445] Fort Busa Verle, one of the strongholds of the Austro-Hungarian line built right on the Vezzena Pass and surrounded by a complex entrenched field made up of grids, obstacles, and entrenchments, was also involved in the brief but very intense "war of the forts." In the first weeks, it was bombarded with over 5. It was battered with more than 5,000 rounds of ammunition in the first few weeks, including 305 shells from the howitzers in the Verena woods. Still, with its four howitzers on the rotating steel domes and six cannons in the casemate, it was able to fire about 20,000 rounds. Numerous historical sources testify to the enormous impact of the First World War on the area, which was utterly transformed by constructing forts, trenches, barracks, and artillery emplacements and by the bursting of several thousand explosive charges[446].

The "signs of destruction" imprinted by the bombing on both the permanent fortifications and the surrounding context transformed the agricultural and pastoral landscape into a lunar landscape, "wounded in body and spirit," recognized today, precisely for this reason, as a "place of memory."

445 HENTZSCHEL, 2008

446 The Memoirs of Augusto Tommasini (1923), an official at the War Tribunal of Trento, speak of "no less than five thousand projectiles [...], in particular 280 pieces". The plaque on the memorial built in 1918 near Fort Luserna lists the main phases of the attack, as well as the type and number of bullets used. "Das Werk war in der Zeit von 23. Mai 1915 bis 20. Mai 1916 3 grossen Beschiessungen augesetzt. Beschiessung 23. Mai 1915 bis 19. Juni 1915. Beschiessung 15. Aug. 1915 bis 28. Aug. 1915. Beschiessung 9. April 1916 bis 20. Mai 1916. In Summe fielen auf das Werk 200 ± 30 cm, 8100 ± 28 cm und zirka 16000 ± 15 cm Geshosse', translated as 'from 23 May 1915 to 20 May 1916 the fort suffered 3 main attacks [...] and was hit with a total of 200 30cm shells, 8100 28cm shells and about 16000 15cm shells'. See MAGNINI, 2016.

After more than a century, the material permanence of the conflict persists in this landscape at "different temperatures." Suppose the permanent structures are perfectly recognizable and some of them (Campo Luserna fort and Vezzena fort) have also been the subject of exciting recovery/restoration work.[447] In that case, the landscape is still a place of memory, the "material traces" linked to both field and temporary fortifications (trenches, shelters, firing positions, caves) and the "signs of destruction" are equally unidentifiable and are found at various stages of the post-deposition and post-abandonment processes, implying an increasing loss of information potential. In this respect, the driving forces linked to natural and anthropic post-war landscape transformation dynamics (such as salvage operations, reforestation, the resumption of forestry and pastoral activities on which the local micro-economy is based, natural pedogenesis, to name but a few) very often prevent the correct recognition of war remains, which can often be confused with different natural or anthropic elements. In this perspective, it is easy to understand how this reference framework clearly expresses the concept of a threshold space between the visible and the "submerged" described above. The soil and its morphology fully constitute a deep and densely pregnant "archaeological layer" waiting to be revealed. In the light of these considerations, then, this 'war landscape' was chosen to test the proposed multi-criteria approach to bring out precisely the 'different temperatures' mentioned above, according to which the permanence of the remains continue to live within the contemporary landscape, identifying the areas that are potentially significant but more 'at risk of loss,' and therefore in need of priority protection interventions. In other words, it is precisely in this horizon of meaning that the operational potential of the introduction of this new paradigm is manifested, or rather in the proactive function of identifying, through the construction of the synthesis matrix and the consequent assignment of the different parameters and sub-criteria, all those weaker aspects and issues, the strengthening and improvement of which must feed future practices of "care" and enhancement.

Entering, therefore, into the details of the case mentioned above study, assigned each fortified system numerical parameter to all the sub-criteria previously described, about the information found during the

447 Project for the restoration of Fort Cima Campo - Collotti. Fort Cima Vezzena Broll. Fort Busa Verle, on the other hand, has not yet been the object of an intervention but of various studies. Recently, the external parts of Fort Verle have been modeled three-dimensionally through laser scanning and photogrammetry surveys, as part of the VAST project, promoted by the local authorities of the Autonomous Province of Trento to promote and enhance the cultural and exhibition offer of the museums present in the area of the "Altipiani" in Trentino, integrating the technical knowledge developed by FBK (Fondazione Bruno Kessler-TN) and the humanistic and historical skills of the other entities involved in the project.

cognitive phase, as seen in the tables on the following pages. Thanks to these values, the synthesis matrices were then elaborated concerning each sub-criterion as already presented in Tab.6.1 to derive the different "weighting factors" concerning the four leading indicators. Then, as shown in Tables 6.4-6.5-6.6-6.7, the values concerning the "cognitive indicators" referring to each of the areas under analysis were obtained from the summation of the other weighting factors. Finally, by adding up the four indicators, it was possible to define the specific value of the "testimonial gradient" associated with the three different fortified areas.

As can be seen from the tables and the eloquent graphs in Table 6.8, the most significant gradient is at Fort Campo Luserna (value of 0.36), while the lowest angle is at Fort Verle (weight of 0.22). The overall results reflect what could have been expected qualitatively since Fort Campo Luserna has undergone a significant restoration project, promoted as part of the Trentino "Great War" project. Since 2014 it has become an integral part of visiting museum routes and a tourist attraction where open-air musical and theatrical events are often organized. These aspects increase indicator four which is much higher than that of the other two fortified areas. Also, Fort Cima Vezzena has been subject to a safety intervention to make the area usable since the high landscape value of the insertion context has always made the fort a destination of important excursion and tourist circuits (Pizzo di Levico). These reasons also increase in this case, Indicator 4, and consequently the overall "testimonial gradient," for example, concerning Forte Busa Verle. Regarding the other aspects, the two fortified systems are not very dissimilar; as indicated by Indicators 2 and 3, both these fortifications present similar potentialities/criticalities concerning both technological-constructive aspects and issues concerning the very recognisability of the warscape as a "system." As far as Indicator 1 is concerned, on the other hand, the priority is undoubtedly acknowledged to Fort Busa Verle since it was precisely from the bombing of this work that the Italian-Austrian war began.

As already mentioned, the great potential of these analyses does not consist only in having identified the values relative to the "testimonial gradients" of the various fortified areas, which are essential to understand how to set up future memory practices in these areas with different "design margins," but also represents the primary way to understand in which directions to orientate precisely these future practices to safeguard this heritage.

In other words, the tables above show how the "weak points" on which to focus future attention coincide precisely with the "lower values" of the various indicators: For example, a possible and coherent valorization strategy for this warscape should invest precisely in the area insisting on Fort Busa Verle since, in the face of a high historical-memorial potential

(Indicator 1), the aspects linked to the construction technique (Indicator 2) and the recognisability of the “signs in the landscape” (Indicator 3) allow ample room for “improvement and enhancement,” the “enhancement” of which may also make it possible to increase the aspects linked to management, maintenance, and participation (Indicator 4).

By making operational what has already been shown in Fig.6.2, this methodological application allows us to understand the practical use of the identification of “testimonial gradients,” which is not limited to cognitive aspects but has direct, practical implications, and which is manifested through versatile tools which, depending on the objectives, can contribute to making interesting comparisons between fortified areas, helpful in acting consciously in terms of intervention or selection priorities.

Pic.6.3 **Fortified system around Vezzena Fort**

Indicator 1			
Sub-Criteria		***Wf***	***Wftot***
1a	Active role in wartime	0,02	0,05
1b	Presence of militarization projects/plans	0,03	0,05
1c	Presence of historical photographs	0,02	0,05
1d	Existence of books/diaries	0,01	0,025
1e	Studies on the sense of belonging to these places	0,01	0,025
		0,09	0,2

Indicator 2			
Sub-Criteria		***Wf***	***Wftot***
2a	Knowledge of the specific constructive typologies	0,06	0,08
2b	Knowledge of construction materials and related structural behavior	0,06	0,08
2c	Accessibility and structural safety of places	0,01	0,03
2d	Comparison with projects carried out in similar contexts	0,04	0,06
		0,17	0,25

Indicator 3			
Sub-Criteria		***Wf***	***Wftot***
3a	Clear recognizability permanent fortifications	0,05	0,05
3b	Clear recognizability temporary and field fortifications	0,06	0,08
3c	Good recognizability of the signs engraved on the terrain	0,03	0,09
3d	Good recognizability of the vestigia as a "system"	0,06	0,08
		0,2	0,3

Indicator 4			
Sub-Criteria		***Wf***	***Wftot***
4a	Communities involvement (bottom-up strategies)	0,03	0,05
4b	Consciousness of the sense of testimony of the places	0,03	0,05
4c	Active role to develop and revitalize the territories	0,04	0,05
4d	Integrated asset management	0,03	0,05
4e	Part of tourist circuits and museums (local induces)	0,03	0,05
		0,16	0,25

Pic.6.4 **Fortified system around Verle Fort**

Indicator 1			
Sub-Criteria		***Wf***	***Wftot***
1a	Active role in wartime	0,05	0,05
1b	Presence of militarization projects/plans	0,05	0,05
1c	Presence of historical photographs	0,05	0,05
1d	Existence of books/diaries	0,01	0,025
1e	Studies on the sense of belonging to these places	0,005	0,025
		0,165	0,2

Indicator 2			
Sub-Criteria		***Wf***	***Wftot***
2a	Knowledge of the specific constructive typologies	0,07	0,08
2b	Knowledge of construction materials and related structural behavior	0,04	0,08
2c	Accessibility and structural safety of places	0,01	0,03
2d	Comparison with projects carried out in similar contexts	0,03	0,06
		0,15	0,25

Indicator 3			
Sub-Criteria		***Wf***	***Wftot***
3a	Clear recognizability permanent fortifications	0,05	0,05
3b	Clear recognizability temporary and field fortifications	0,03	0,08
3c	Good recognizability of the signs engraved on the terrain	0,03	0,09
3d	Good recognizability of the vestigia as a "system"	0,03	0,08
		0,14	0,3

Indicator 4			
Sub-Criteria		***Wf***	***Wftot***
4a	Communities involvement (bottom-up strategies)	0,01	0,05
4b	Consciousness of the sense of testimony of the places	0,04	0,05
4c	Active role to develop and revitalize the territories	0,03	0,05
4d	Integrated asset management	0,01	0,05
4e	Part of tourist circuits and museums (local induces)	0,01	0,05
		0,1	0,25

Pic.6.5 **Fortified system around Campo Luserna Fort**

Indicator 1			
Sub-Criteria		***Wf***	***Wftot***
1a	Active role in wartime	0,05	0,05
1b	Presence of militarization projects/plans	0,05	0,05
1c	Presence of historical photographs	0,05	0,05
1d	Existence of books/diaries	0,02	0,025
1e	Studies on the sense of belonging to these places	0,015	0,025
		0,185	0,2

Indicator 2			
Sub-Criteria		***Wf***	***Wftot***
2a	Knowledge of the specific constructive typologies	0,06	0,08
2b	Knowledge of construction materials and related structural behavior	0,06	0,08
2c	Accessibility and structural safety of places	0,015	0,03
2d	Comparison with projects carried out in similar contexts	0,04	0,06
		0,175	0,25

Indicator 3			
Sub-Criteria		***Wf***	***Wftot***
3a	Clear recognizability permanent fortifications	0,05	0,05
3b	Clear recognizability temporary and field fortifications	0,05	0,08
3c	Good recognizability of the signs engraved on the terrain	0,06	0,09
3d	Good recognizability of the vestigia as a "system"	0,04	0,08
		0,2	0,3

Indicator 4			
Sub-Criteria		***Wf***	***Wftot***
4a	Communities involvement (bottom-up strategies)	0,04	0,05
4b	Consciousness of the sense of testimony of the places	0,04	0,05
4c	Active role to develop and revitalize the territories	0,04	0,05
4d	Integrated asset management	0,04	0,05
4e	Part of tourist circuits and museums (local induces)	0,05	0,05
		0,21	0,25

Indicator 1 Sub-Criterium	Forte Vezzena	Forte Verle	Forte Campo Luserna	∑ p	ISc,1-n	VSc,1-n
1a **0,05**						
Forte Vezzena	1,00	0,40	0,40	1,80	0,17	**0,01**
Forte Verle	2,50	1,00	1,00	4,50	0,42	**0,02**
Forte Campo Luserna	2,50	1,00	1,00	4,50	0,42	**0,02**
			tot.	10,80		
1b **0,05**						
Forte Vezzena	1,00	0,60	0,60	2,20	0,20	**0,01**
Forte Verle	1,67	1,00	1,00	3,67	0,34	**0,02**
Forte Campo Luserna	1,67	1,00	1,00	3,67	0,34	**0,02**
			tot.	9,53		
1c **0,05**						
Forte Vezzena	1,00	0,40	0,40	1,80	0,17	**0,01**
Forte Verle	2,50	1,00	1,00	4,50	0,42	**0,02**
Forte Campo Luserna	2,50	1,00	1,00	4,50	0,42	**0,02**
			tot.	10,80		
1d **0,025**						
Forte Vezzena	1,00	1,00	0,50	2,50	0,23	**0,01**
Forte Verle	1,00	1,00	0,50	2,50	0,23	**0,01**
Forte Campo Luserna	2,00	2,00	1,00	5,00	0,46	**0,02**
			tot.	10,00		
1e **0,025**						
Forte Vezzena	1,00	2,00	0,67	3,67	0,34	**0,02**
Forte Verle	0,50	1,00	0,33	1,83	0,17	**0,01**
Forte Campo Luserna	1,50	3,00	1,00	5,50	0,51	**0,03**
			tot.	11,00		

Tab. 6.4 | Weighting factors - INDICATOR 1

Tab. 6.5 | Weighting factors - INDICATOR 2

Indicator 2 Sub-Criterium		Forte Vezzena	Forte Verle	Forte Campo Luserna	∑ p	ISc,1-n	VSc,1-n
2a	**0,08**						
Forte Vezzena		1,00	0,86	1,00	2,86	0,26	**0,01**
Forte Verle		1,17	1,00	1,17	3,33	0,31	**0,02**
Forte Campo Luserna		1,00	0,86	1,00	2,86	0,26	**0,01**
				tot.	9,05		
2b	**0,08**						
Forte Vezzena		1,00	1,50	1,00	3,50	0,32	**0,02**
Forte Verle		0,67	1,00	0,67	2,33	0,22	**0,01**
Forte Campo Luserna		1,00	1,50	1,00	3,50	0,32	**0,02**
				tot.	9,33		
2c	**0,03**						
Forte Vezzena		1,00	1,00	0,67	2,67	0,25	**0,01**
Forte Verle		1,00	1,00	0,67	2,67	0,25	**0,01**
Forte Campo Luserna		1,50	1,50	1,00	4,00	0,37	**0,02**
				tot.	9,33		
2d	**0,06**						
Forte Vezzena		1,00	1,33	1,00	3,33	0,31	**0,02**
Forte Verle		0,75	1,00	0,75	2,50	0,23	**0,01**
Forte Campo Luserna		1,00	1,33	1,00	3,33	0,31	**0,02**
				tot.	9,17		

Indicator 3 Sub-Criterium	Forte Vezzena	Forte Verle	Forte Campo Luserna	∑ p	ISc,1-n	VSc,1-n
3a **0,05**						
Forte Vezzena	1,00	1,00	1,00	3,00	0,28	**0,01**
Forte Verle	0,60	1,00	1,00	2,60	0,24	**0,01**
Forte Campo Luserna	1,00	1,00	1,00	3,00	0,28	**0,01**
			tot.	8,60		
3b **0,08**						
Forte Vezzena	1,00	1,00	1,20	3,20	0,30	**0,01**
Forte Verle	0,50	1,00	0,60	2,10	0,19	**0,01**
Forte Campo Luserna	0,83	1,67	1,00	3,50	0,32	**0,02**
			tot.	8,80		
3c **0,09**						
Forte Vezzena	1,00	1,00	0,50	2,50	0,23	**0,01**
Forte Verle	1,00	1,00	0,50	2,50	0,23	**0,01**
Forte Campo Luserna	2,00	2,00	1,00	5,00	0,46	**0,02**
			tot.	10,00		
3d **0,08**						
Forte Vezzena	1,00	2,00	1,50	4,50	0,42	**0,02**
Forte Verle	0,50	1,00	0,75	2,25	0,21	**0,01**
Forte Campo Luserna	0,67	1,33	1,00	3,00	0,28	**0,01**
			tot.	9,75		

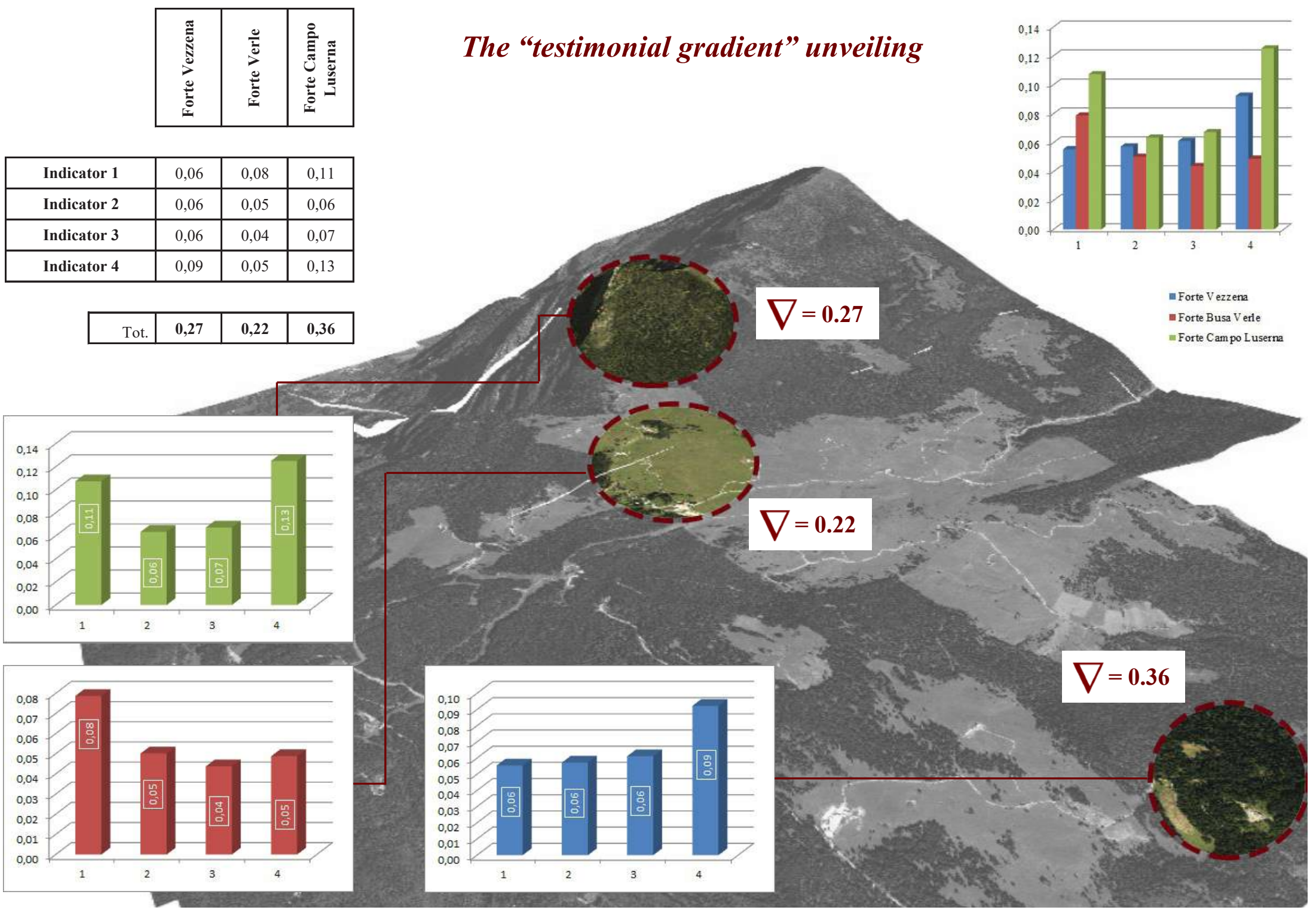
Tab. 6.6 | Weighting factors - INDICATOR 3

Tab. 6.7 | Weighting factors - INDICATOR 4

Indicator 4 Sub-Criterium		Forte Vezzena	Forte Verle	Forte Campo Luserna	∑ p	ISc,1-n	VSc,1-n
4a	**0,05**						
Forte Vezzena		1,00	3,00	0,75	4,75	0,44	**0,02**
Forte Verle		0,33	1,00	0,25	1,58	0,15	**0,01**
Forte Campo Luserna		1,33	4,00	1,00	6,33	0,59	**0,03**
				tot.	12,67		
4b	**0,05**						
Forte Vezzena		1,00	0,75	0,75	2,50	0,23	**0,01**
Forte Verle		1,33	1,00	1,00	3,33	0,31	**0,02**
Forte Campo Luserna		1,33	1,00	1,00	3,33	0,31	**0,02**
				tot.	9,17		
4c	**0,05**						
Forte Vezzena		1,00	1,33	1,00	3,33	0,31	**0,02**
Forte Verle		0,75	1,00	0,75	2,50	0,23	**0,01**
Forte Campo Luserna		1,00	1,33	1,00	3,33	0,31	**0,02**
				tot.	9,17		
4d	**0,05**						
Forte Vezzena		1,00	3,00	0,75	4,75	0,44	**0,02**
Forte Verle		0,33	1,00	0,25	1,58	0,15	**0,01**
Forte Campo Luserna		1,33	4,00	1,00	6,33	0,59	**0,03**
				tot.	12,67		
4e	**0,05**						
Forte Vezzena		1,00	3,00	0,60	4,60	0,43	**0,02**
Forte Verle		0,33	1,00	0,20	1,53	0,14	**0,01**
Forte Campo Luserna		1,67	5,00	1,00	7,67	0,71	**0,04**
				tot.	13,80		

	Forte Vezzena	Forte Verle	Forte Campo Luserna
Indicator 1	0,06	0,08	0,11
Indicator 2	0,06	0,05	0,06
Indicator 3	0,06	0,04	0,07
Indicator 4	0,09	0,05	0,13
Tot.	**0,27**	**0,22**	**0,36**

The "testimonial gradient" unveiling



Tab. 6.8 | The application of the "testimonial gradients" approach. _ The Vezzena Plateau study-case

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Chapter 7

Testimonial gradient: the contribution of military manuals for the recognition of the constructive features of permanences

"*La fortificazione è quel ramo dell'arte militare che insegna ad aumentare, mediante apposite costruzioni, il valore naturale delle posizioni, al doppio fine di favorire l'azione delle truppe e l'efficacia delle armi su di esse impiegate, e di provvedere alla conservazione di tutti i mezzi di difesa (uomini, armi, materiali, munizioni e viveri) sia mentre si prepara l'azione, sia in attesa dell'azione, sia durante l'azione.*"

Zanotti – manuale di fortificazione

Since ancient times, different peoples have felt the need to protect their territories from enemy incursions, giving rise to long processes of fortification that have evolved in conjunction with the development of different civilizations. Each civilization developed its type of fortification concerning its traditions, economic possibilities, and available means. Still, each fortification was also influenced by other classes and the environmental and natural conditions of the place where it was to be built, and the progress made in offensive and defensive armaments. Over time, these latter aspects became increasingly important in defining specific types of construction, in the experimentation of particularly resistant materials, and in the choice of precise locations naturally predisposed to be fortified. About the evolutionary history of the fortification techniques developed from prehistoric times to the present day, which is not the subject of this research, please refer to the extensive and detailed bibliography in the literature.[448]

448 The bibliography on fortified works is rich and varied, subdivided by building type and geographical area. In this regard, the new Daccò-Viganò collection in the Locarno Cantonal Library is a valuable resource for further study.

Here, on the other hand, it is advantageous to focus on the study of the fortification manuals drawn up from the second half of the 19th century by the various Military Geniuses to understand better the different types of construction, the technological characteristics, and the structural behavior of the works designed in anticipation of the Great War.

In the following chapters, a critical synthesis of the most crucial information obtained from the integrated study of the manuals used in the military schools of the various European countries will be presented. These considerations can contribute to building a wide and documented knowledge base concerning the different types and construction technologies used by the different military Geniuses and about the different Warscape Classes in order to be able to recognize the same technical and constructive characteristics also in the current permanence of the remains.

In relation also to the issues that emerged from the SWOT analysis presented in the previous chapters, as far as permanent structures are concerned, the study of these manuals can provide an interesting contribution to understanding the evolution of the construction types adopted concerning the strengthening of artillery, and in particular concerning the introduction of concrete cement and the relative experiments. In addition to this, these guidelines propose various model projects for each constituent element of the fortified systems, both as regards permanent fortifications and field works, which were then adapted from time to time to the specific contexts of reference and the morphological conditions of the construction sites. Thus, from studies of isolated forts to strongholds, from the methods of constructing trenches to grenade shelters, from infantry positions to possible ways of building grids and camouflages, these manuals propose multiple formal and structural solutions, as well as technical and technological details, diversified according to the size, context, and ease of finding the different construction materials.

In this sense, therefore, the rich information obtained from the manuals, also integrated with historical photographic documentation, constitutes indispensable knowledge for drawing up specific “abacus of comparison,” operationally helpful as a support for recognizing and tracing the current permanences within certain types of fortifications, even when their state of abandonment and/or physical-structural degradation compromise their clear identification.

The contribution of this in-depth study is not a historiographical analysis of the documentary sources in the strict sense, but rather a critical synthesis of the essential information to define a body of valuable knowledge for recognizing certain types of construction within the set of contemporary fortifications, both permanent and temporary. This method is based on the integrated and comparative study of the

documentary sources both horizontally, with the identification of similarities and differences between the various fortification schools concerning specific themes, and vertically, with the comparison of bases belonging to different temporal strata (e.g., the comparison between period photographs and the current state of places and artifacts).

An applied knowledge, therefore, that identifies in these manuals an indispensable informative basin to facilitate the recognition of the permanence of the vestiges within the contemporary landscape, thus contributing to a better identification of Indicator 2 previously presented, and consequently of the different testimonial gradients against which to set future choices in terms of conservation, protection, and valorization.

7.1 Types and construction technologies of fortified works from the second half of the 19th century to the Great War

7.1.1 The permanent fortification

At the beginning of the 19th century, fortifications developed with different routes and profiles[449] depending on their location. In mountainous contexts, for example, they were usually small and mainly built of masonry; similarly, coastal works consisted of punctual fortifications, such as towers, castles, or forts, placed in elevated positions but slightly set back from the coast, so as not to be exposed to the fire of enemy ships. On the other hand, as far as plains were concerned, fortified systems were usually more extensive and developed around a central nucleus surrounded by continuous defensive walls that followed the two main trends: a bastioned front or a polygonal front. The first system, conceived by Francesco di Giorgio Martini and developed by the Sangallo brothers as early as the end of the 15th century,[450] had already found wide diffusion, especially in France, thanks

449 Each fortification is usually described by using its two main constituent elements: their layout (plan) and their profile (section). One or more barriers are built over the natural terrain using fortifications, walls, or fences; one or more ditches; and the combination of both embankments and ditches. The layout is almost always bound to geometric forms for the best development of defense or offensive actions. The primary forms of design in fortifications are the rectilinear or polygonal layout, the rampart layout, the pincer layout. As far as the profile is concerned, directly linked to the form, the various fortification manuals propose many architectural and territorial sections that highlight the special relationship between the "shape" of the fortifications and the morphology of the territory, which in part determined it. For further details on this subject, see in particular ZANOTTI, 1891.

450 In Europe, around the middle of the 15th century, a process of modification of the fortifications built during the Middle Ages began, as a result of the need to adapt the existing defensive systems to the changed strategies of warfare which, with the advent of the guns, made the high watchtowers and walls useless. The end of the fifteenth century and the beginning of the sixteenth were characterized by a search for technical solutions that would guarantee an adaptation of the defenses, proposing changes both

to the famous military engineer Sebastiene Vauban[451] and envisaged the use of large angular bastions, curtains, and ancillary works. This system, however, had not proved up to the new defensive requirements made necessary by the development of firearms. So, from the end of the 18th century, a new system was gradually introduced, the polygonal front, developed on the theories enunciated by Montalembert[452] Carnot e Roginat.[453]

This new solution was characterized by the abandonment of bastioned fronts in favor of greater use of Carnot-style walls, the introduction of

in the layout and in the profile of the existing fortified works. In addition to reducing the height of the buildings and introducing cylindrical surfaces, the thickness of the walls was increased through the construction of dams, shoes, and counter shoes. In this climate of ferment, the Sienese Francesco di Giorgio Martini developed a new system of defense based on the introduction of the pentagonal bastion. Between 1481 and 1484, during his stay in Urbino at the court of Federico da Montefeltro, he drew up the Ashburnham Codex, a treatise (in which he already recommended circular fortresses) that provided detailed indications on a large number of design elements including, to name but a few, the height of the scarped wall surface, the dimensions of the moat (with an intermediate wall) or the angle of projection of the shoe, and shows numerous examples of fortresses and machines. To these already innovative solutions, the Sangallo brothers gave a decisive twist with the adoption of bastions with rounded ears to ensure a wider opening for firing and better resistance to artillery, as well as a perfect flanking system that eliminates the so-called "dead zones" and allows the curtain to be defended with enfilade fire on its right and left, as far as the adjacent bastions, and to be in turn guarded by the latter. For more details, see also PIRINU, 2011.

451 For a more detailed discussion of Vauban, see footnote 4 in Chapter 2. See also BAIOCCHI, 2019.

452 Between 1761 and 1796, Montalbert published important work on Perpendicular Fortification (or Tenaglia). After severely criticizing the bastion system, he described the solutions he had devised to resolve its characteristic shortcomings. He wrote: "the bastions are nests of bullets because no shot aimed at them is lost, their faces are subjected to piercing shots and sometimes to reverse shots; the flanks are defective because they cross their fires on the capital of the front and therefore the outer side is relatively short compared to the line of defense, and they are always pierceable; the curtain and the gully are almost useless because of the existence of the ravelin in front of them which masks their fires; the front lacks shelters; a front is not safe from a strong attack because, once the flanks have been damaged, the flanking of the ditches is lacking; the magisterial line is too developed concerning the front it occupies." He responded to these weaknesses by proposing to replace the bastioned lines with polygonal and tanagliati systems; to build solid internal entrenchments; to employ numerous well-built casemates capable of acting both in the far and near attack; to insert caponiere in the ditches, numerous lunette-shaped external works, and numerous Carnot-style walls. See also ZANOTTI, 1891.

453 The polygonal system was based on the theory of Rogniat's entrenched camp in which the front was composed of a large central embankment (root or noyau) surrounded by four outer forts, placed at a distance of about 4-6km from each other and most 2-3km from the center. This considerable enlargement responded to the need to concentrate a large garrison inside the fortress and make a square siege almost impossible. See also BOGDANOWSKI, 2004.

caponieres in the ditches, and the presence of external accessory works in the shape of lunettes: this guaranteed the possibility of simultaneous defense from close range but also in actions at a greater distance. In France, however, these innovative choices were not greeted with great enthusiasm by the older generation of soldiers who preferred to "stick to the previous system" and continue to apply the bastioned front making little use of casemates, at least until the disastrous Franco-Prussian war of 1870-71 made them change their minds. On the contrary, the theories and principles proposed by Rogniat, Carnot, and above all Montalembert immediately met with great favor in Germany, where the Confederation decided to apply them to improve and reinforce defensive positions as early as 1815 to oppose new invasion attempts by France. Later, the Russian school also increasingly adopted the polygonal system over the previous one. On the other hand, the Austrian school has numerous connections both with the polygonal system and with the French school, which was closer to the concept of bastionate fronts.[454]

In short, the supremacy of the art of fortification, which in 1600 had passed from the Italian school to the French school, passed to the German school at the beginning of the 19th century, which took the name of the Neo-Prussian school.

Without going into further detail, these considerations represent the necessary premise for framing the orientations according to which the different schools of fortification developed, elaborating different ways of militarizing the territories from the 19th century until the dawn of the Great War.

Concerning the overall shape of the fortifications in the plains, the common denominator at a European level in this period was the gradual implementation of continuous walls with an increasing number of medium-large detached works, placed at a distance of at least 2.5 km from the central nucleus to protect it from possible bombardment. Together, these fortifications formed a solid defensive line called the line of detached works, which became the primary defense in many cases, with pieces arranged in two or three progressive lines. This new fortification model, known as the "entrenched field stronghold."[455], it began to spread in the different countries and was gradually perfected and adapted by the various military Geniuses about the specific orographic conditions of the territory and the army strategies until it became the primary reference model for militarisation projects in lowland contexts.

454 In this respect, the fortification of the strongholds of Krakow and Przemysl are exemplary. For details see chapter 2 part on Austro-Hungarian Empire..

455 In this first phase, this model is usually referred to as a "small entrenched field stronghold" to distinguish it from the strongholds of the later period in which the lines of detached works became increasingly comprehensive and articulated. See ZANOTTI, 1891; BOGDANOWSKI, 2004; ISGRO',2019.

The Prussian fortifications built under General Ernst Ludwig von Aster and his assistant von Rauch date back to this period: the strongholds of Wesel, Julich, Koln and Koblenz in the west of the country; Minden, Erfurt, Wittenberg Torgau in the centre; and Posen, Koninsberg and Thorn on the eastern border.[456] In the French context, however, around 1842, the government decided to fortify the city of Paris with a mighty rampart wall and 16 detached buildings arranged in a radial pattern around the nucleus, making it one of the best strongholds of the time.[457] The Austrian school followed these principles in the construction of the Galician strongholds of Cracow and Przemysl, but also in the reinforcement of the fortified walls of Verona.[458] Important changes in the construction technology of fortified architecture began to develop following the introduction of rifled artillery during the Italian campaigns of 1859 and 1860. The application of rifling to the guns made it possible to increase the precision and range of artillery shots, using new cylindrical or cylindrical-ogival projectiles.[459]

Later, they further enhanced their explosive charge by introducing bursting shells, which acted like real mines in the wall masses in which they explode. Shrapnels later joined these ordinary bursting projectiles, and the bursting generated a further devastating shower of bullets (Pic.7.1).

These technological refinements in the field of armaments increased the vulnerability of the fortifications, which found themselves exposed to the real risk of being damaged by artillery placed at much greater distances than those considered in the design phase and therefore to the real possibility of being hit in the nerve centers of operation with greater precision and probability. In addition, the increasing size of the armies made it increasingly necessary to expand the small entrenched camp strongholds in favor of systems with larger and larger extensions to be less believable and, at the same time, provide more space for shelter or support to the soldiers.

These changed conditions created a climate of general uncertainty, during which all the main European countries began the structural and strategic reinforcement of their existing fortifications in the various

456 For a specific discussion see chapter 2, section on Prussia.

457 For a specific discussion, see chapter 2, the section on France.

458 For more details, see chapter 2, the section on the Austro-Hungarian Empire.

459 The greater length or range derives from the increase in initial live force and the decrease in air resistance to the motion of the projectile; the greater accuracy derives from the suppression of the wind so that the projectile exits the weapon in a direction that deviates little from the tip of its axis; the greater effectiveness or power derives from, the greater weight of the projectile, its more incredible initial velocity and the lower air resistance, i.e., the greater residual live force at a given distance.

territorial areas in which they were located. However, they did not follow a precise orientation and proceeded by trial and error and based on experience.

Concerning the plains contexts previously analyzed, common to all the different schools of fortification was the need to resort to casemate order to protect the dams from inclined shots and protect the roofs of the existing works with earth covering masses over two meters thick. In this way, they also tried to make the walls of the forts, usually built in stone, more defiladed from the arcing artillery fire. Concerning the planimetric layout, the fortifications of this period were made almost exclusively using the polygonal system and constructing lines of forts detached at greater and greater distances from the central nucleus to save it from possible bombardment, interspersed with a series of relatively small intermediate works in which the artillery was positioned.[460]

This led to the development of known as 'large entrenched camp' or 'entrenched camp' strongholds. The detached structures became increasingly essential and became like natural isolated, fortified systems but linked by a deep relationship of mutual coherence and functionality.[461]

In this respect, the creation of the Antwerp fortification system, designed and repeatedly perfected by the Belgian general and engineer Henri Brialmont, certainly set the standard.[462] According to his project, the walls of the old city wall and the pre-existing bastion fronts built of bricks and earth were dismantled and redesigned following only the polygonal tracks, while the first ring of eight detached forts was made at a distance of about 4 km from them. Semi-caponiers characterized these belt forts at the corners and a double caponier in a central position concerning the front wall. In addition, in each defense, a sizeable three-story brick defensive redoubt was built at the rear near the entrance,

460 Considering that the maximum range of the siege batteries of the time against strongholds of this size was about 9500 meters and that the proper scope of the forts' armaments about the earthworks was 3000 meters, we can deduce that the detached wall of defenses must have been located at about 6.5 km from the central core. For more on this subject, see also FAQUE, 1987; KAUFMANN, 2014; ISGRO', 2019.

461 The distance between the different detached works was established so that the ground between two adjacent forts was "covered" with helpful shots against "the earthworks of the attacker, either from one of the other fort. " Now, the good shots of the medium caliber artillery, which constitute the armament of the land fortifications, being of 3000 meters, this maximum interval will be 6000 meters. In general, however, this maximum limit is not adopted since it is agreed that the entire range, or at least the central zone, should be beaten by the crossed useful fires of the two forts. For the entire range to be covered by crossfire, it must naturally not be greater than 3,000 meters. The average value, generally adopted, of this interval is 4000 meters", in ZANOTTI, 1891, p.185.

462 For more details on the figure of Brialmont, see Chapter 2.

SPECCHIO

indicante la gittata massima effettiva (dedotta dalle tavole di tiro) e i dati di penetrazione delle principali armi da fuoco in uso presso l'esercito e l'armata d'Italia.

CATEGORIA	SPECIE della bocca a fuoco e calibro in cm.	GITTATA massima effettiva m.	PENETRAZIONE NEL- la terra argillosa m.	la sabbia m.	legno m.	la muratura m.	le piastre di ferro laminato m.	alla distanza di m.	ANNOTAZIONI
Bocche a fuoco da campagna e da montagna	Cannone da 9 BR	5800	2,50	0,40	0,85	0,50	—	1000	*NB.* Se non è espressamente indicato, il tiro delle bocche a fuoco s'intende fatto a granata
	Id. » 7 BR (da campagna)	5400	1,80	0,30	0,40	0,30	—	1000	
	Cannone da 7 BR (da montagna)	3850	0,90	—	0,20	—	—	1000	
	Cannone da 15 su affusto d'assedio o da difesa	2000	—	—	—	—	0,15	1500	Tiro a palla
		8000	4,90	2,70	—	1,90	—	2000	Tiro di lancio
		4000	—	—	—	—	—	—	Tiro di lancio di demolizione
		3000	—	—	—	—	—	—	Tiro indiretto
		2000	—	—	—	—	—	—	Tiro di smonto
	Cannone da 12 su affusto d'assedio o da difesa	7300	3,30	2,20	—	1,40	—	2000	Tiro di lancio
		3000	—	—	—	—	—	—	Tiro di lancio di demolizione
		3300	—	—	—	—	—	—	Tiro indiretto
		1500	—	—	—	—	—	—	Tiro di smonto
Bocche a fuoco d'assedio e da difesa	Obice da 21 su affusto d'assedio o da difesa	5400	2,00	1,70	—	1,10	—	2000	Tiro di lancio
		4800	—	—	—	—	—	—	Tiro indiretto
		1600	—	—	—	—	—	—	Tiro ind. in breccia
	Id. da 15 id. id.	4500	1,60	—	—	0,90	—	2000	Tiro di lancio
		1400	—	—	—	—	—	—	Tiro ind. in breccia, di demolizione
	Mortaio da 24	4050	3,20	1,90	—	—	—	4050	Tiro arcato di sfondo La granata mina del mortaio da 24 cm., la quale pesa kg. 122,500, compresa una carica interna di polvere di kg. 8, produce nella sabbia un imbuto largo alla bocca m. 4,00 e profondo m. 1,50 circa.
	Id. » 15	3500	1,60	—	—	0,30	—	3500	Tiro arc. di scoppio
	Id. » 9	2800	—	—	—	—	—	—	Tiro arc. di scoppio
Bocche a fuoco da costa	Cannone da 45	8000	—	—	—	—	0,54	1500	Tiro a palla
	Id. » 40	10000	—	—	—	—	0,70	1500	
	Id. » 32	8000	—	—	—	—	0,35	1500	
	Id. » 24	9000	—	—	—	—	0,24	1500	
	Obice » 28	7650	—	—	—	—	0,15	6500	
	Id. » 24	4600	—	—	—	—	0,07	4600	
Bocche a fuoco delle navi	Cannone da 43,1	9480 (1)	—	9,25	—	—	—	2000	
			—	—	—	—	0,72	0000	(1) Colla elevazione di 15°
	Id. » 25,4	7320 (2)	—	6,40	—	—	—	2000	(2) Id. di 10°
	Id. » 15,2	—	—	—	—	—	—	—	
	Id. 44,9 m. I	6450 (1)	—	2,65	—	—	—	2000	
	Id. 44,9 m. II	7250 (1)	—	2,95	—	—	—	2000	
	Cannone da 12,0	—	—	—	—	—	—	—	*NB.* Le artiglierie installate a bordo non possono usufruire di tutta la loro gittata, essendo il settore verticale di tiro limitato. Ordinariamente questo non supera i 15° o 16°.
	Id. da 45 (avan.)	8170 (1)	—	8,35	—	—	—	2000	
			—	—	—	—	0,65	0000	
	Id. da 27,9 (id.)	5760 (1)	—	4,90	—	—	—	2000	
			—	—	—	—	0,32	0000	
	Id. da 25,4 (id.)	6260 (1)	8,00	6,00	—	—	—	1000	
			—	—	—	—	0,31	0000	
	Id. da 22,8 (id.)	5840 (1)	—	4,35	—	—	—	2000	
			—	—	—	—	0,29	0000	
	Id. da 20,3 (id.)	5510 (1)	—	3,20	—	—	—	2000	
Armi portatili e mitragliatrici	Fucile Vetterli modello 1870	2700	—	—	—	—	—	—	A 100 m. perfora una lamiera di acciaio di 5 mm. e a 150 m. una di ferro di 7 mm.
			0,30	—	—	—	—	1000	
			0,24	0,20	0,15	—	—	200	
	Mitragliatrice a 2 canne da 10,35	1200	—	—	—	—	—	—	Lancia le pallottole del fucile Vetterli.

while the moats were filled with water. The plan proposed by the Belgian engineer became a clear reference point to which all European fortification schools looked when building their fortresses. Examples include the extension of the Galician strongholds of Cracow and Przemysl and the many French forts of the Serè de Riviers line, which began in the aftermath of the Franco-Prussian war.[463]

The development of the piazzeforti typology thus marked the evolution of permanent fortified systems in lowland areas. Still, the progress in the technology of armaments made it necessary to transform and reinforce the fortified systems situated in the mountain and alpine contexts.

In these cases, the different orographic conditions had stimulated different types of fortifications since the first half of the 19th century, designed and built to maximize the defensive potential of the mountains themselves, exploiting every possible natural obstacle as a potential defensive garrison. To control the main communication routes in the valley bottoms, for example, numerous valley and road barriers were built, such as the famous first-generation cut-offs constructed by the Austrian Corps of Engineers in the Trentino-Tyrol Saliente, whose purpose was to impede regular routes with mighty walls physically, to allow crossings only at specific controlled points. The great fortresses set into the mountains and connected by dense networks of underground tunnels, such as those built in Switzerland to protect the National Redoubt, were also designed in the same way.[464]

To protect these positions, fortifications were often built in the valley bottoms and on the adjacent mountain slopes at different altitudes, taking advantage of the morphological conformation of the territory, connected by an organized network of infrastructures for the rapid and safe transfer of weapons and provisions.[465] Thanks to the comparison and integrated study of documentary sources from different periods, it is possible to confirm that, from a technological-constructive point of view, mountain forts, at least until the 1880s, were usually compact and massive volumes with thick load-bearing walls of stone and lime mortar, built using materials found on site.[466]

The intermediate floors, commonly made of wood, alternated with vaulted masonry roofs, which often clung better to the vertical

463 For a specific discussion see chapter 2, section on France.

464 For a specific discussion see chapter 2, section on Switzerland.

465 GATTI, 2015.

466 In this regard, for example, in the Saliente Trentino-Tyrolese, different types of local stones were used depending on the context: near Trento, white or pink limestone was used, in the granite of the Giudicarie valley, in the Travignolo valley porphyry, in the Riva area again granite. See also TABARELLI , 1991; GATTI, 2013,2015; FONTANA, 2016.

Pic.7.2
Fort Strino, detail of cladding in worked blocks and core with sharp-edged stones.

structures, giving greater strength to the entire building. On the outside, the tops could be made of terracotta tiles but were often covered with a thick layer of compacted soil, in line with the recognized capacity of loose soil to dampen the explosive energy of bullets.[467]

A common feature of the fortifications of this period, in the various contexts in which they were built, was the attempt to integrate the structural need for resistance with a research of an essentially formal and decorative nature. Reflected this desire in the attention paid to specific details such as, for example, the inclusion of stone facing made up of square blocks and ashlars laid in place following a regular texture with horizontal courses,[468] the construction of monumental entrance portals marked by squared and often ashlar-worked ashlars, the presence of platbands above the door and window openings made of specially shaped ashlars, the use of different lithotypes to distinguish

467 In mountainous contexts, it was easier for fortresses to be attacked from higher positions. So the cover was not only vulnerable to frontal artillery fire but also potential attacks from higher places.

468 The search for formal harmony on the outside of the facing often corresponded to the presence of a sharp-edged natural stone masonry core, as can be seen, for example, at Forte String (Austro-Hungarian Fort, Trentino, Italy), shown in Pic.7.2.

and somehow embellish embrasures and cannon holes.[469]

While the increase in the range of the weapons and their improved accuracy, even in curved shots, had made the inner core of the strongholds on the plains more vulnerable, making it necessary to build new lines of defense further out, in the mountains, the natural orography of the territories did not allow offensive actions to be organized from great distances. Despite this, the traditional walls did not guarantee sufficient structural resistance not to collapse under the fire of the new, improved artillery.[470]

In particular, after the real revolution in armaments between 1883 and 1885, all existing fortifications proved to be obsolete, both mountain forts and plain strongholds, and the various military geniuses had to start elaborating not only new military strategies but, above all, new technological solutions to strengthen existing structures. With the improvement of rifled howitzers and mortars, the adoption of smokeless powder, and the introduction of new explosive substances, the destructive power of armaments increased considerably. In this respect, among the various experiments conducted, two meanings, in particular, were used on a large scale: melinite, adopted mainly in France, and fulmicotone (or pyroxylin) used in Germany and Italy. Used these substances to prepare torpedo grenades, particular types of grenades lengthened to 5 or 6 calibers to contain more of these explosives, which then used on a large scale on all fronts[471].

In response to this unstoppable technological progress, the various fortification schools began to conduct firing experiments on several 'expendable' forts to better understand in detail the structural behavior of the walls on impact with these new weapons.[472]

469 In the early years of the second half of the nineteenth century, there was a strong desire to give everything a 'beautiful' form. should not forget that this was the era of ornamentation in architecture. Since, in later periods, "function prevailed over form," the recognition of such peculiarities indeed represents an essential contribution to the possibility of placing a given fortified work in time and thus being able to recognize constructional and technological features common to other contemporary constructions.

470 In the Austro-Hungarian context, for example, one is reminded of what Lieutenant General Rudolf Schneider described in his 1942 study of the fortifications of the Habsburg monarchy: Although he describes the barrages erected up to 1860-61 as a great step in the creation of a permanent system of border fortifications in South Tyrol, built the forts in the form of solid stone constructions with walls that could be directly hit and weakened by large cannon embrasures, so they were condemned to rapid aging all the more so since the principle of maximum economy prevailed in their construction." See SCHNEIDER, 1942.

471 Si veda ZANOTTEI, 1891; ROCCHI, 1892; FAQUE, 1987; KAUFMANN, 2014; FONTANA, 2016; ISGRO', 2019.

472 In this connection, mention should be made of Wiener-Neustadt (1865) for the first experiments with lightning bursts on masonry structures; Cosel (1883) for the

The results obtained showed how the effects caused by the renewed artillery were shocking, imposing on military engineers the need to find adequate countermeasures as soon as possible, so much so that General Brialmont himself, after only three years from the publication of the manual 'La fortification du temps present' (1885), found himself forced to entirely rework the technological solutions he had previously proposed by writing another volume, 'L'influence du tir plongeant et des obus-torpilles Sur la fortification' (1888).

This climate of total uncertainty brought new interesting perspectives by introducing cement concrete and steel as innovative materials able to resist the new artillery impacts better.[473] In particular, the combination of the two led to the definition of new composite material with high structural performance in terms of load-bearing capacity and strength, the unique or reinforced concrete, from the evolution of which, in subsequent years, developed reinforced concrete as it is currently understood.

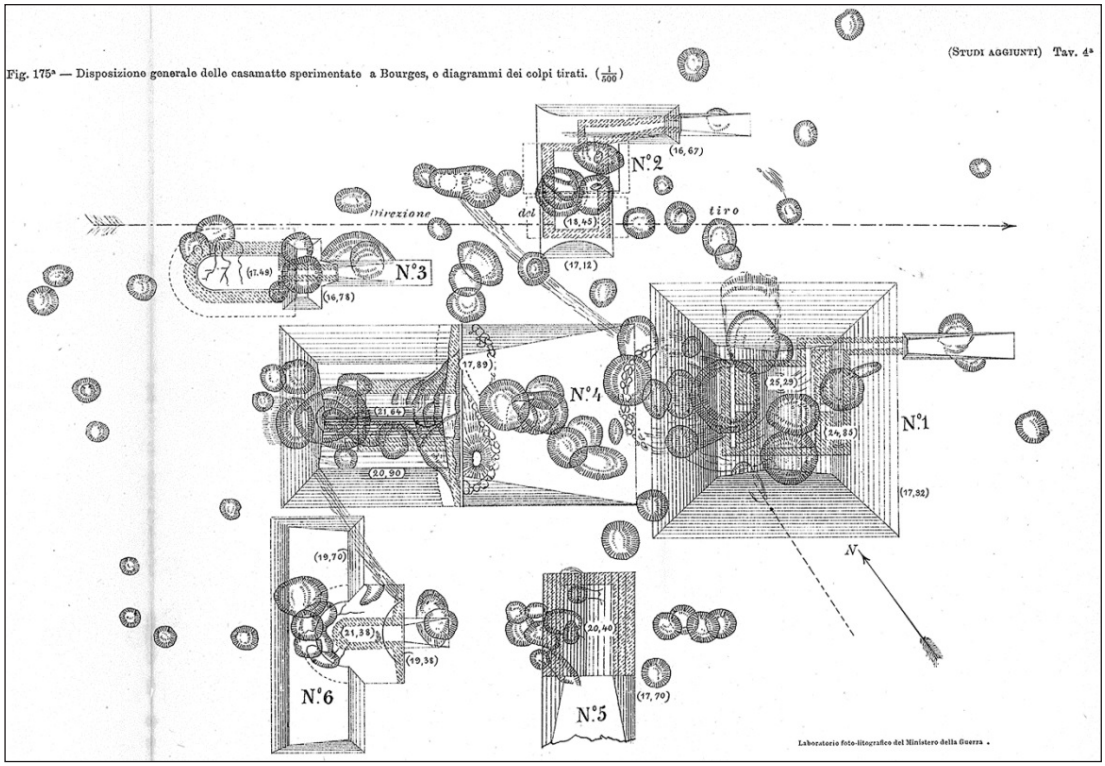
In the second half of the 1880s, however, knowledge of the structural behavior of concrete and steel, taken individually and even more so in their combination, was almost unknown, and it was precisely the experiments promoted by the military engineering of the time that made indispensable contributions to the technological-structural characterization of these materials.

As demonstrated in the experiments conducted at the European level, the excellent resistance of concrete to the impact of powerful projectiles and the bursting of significant explosive charges was based on its ability to develop a considerable amount of resistant elastic work capable of absorbing almost all the life force of the impact to considerably reduce the dissipation of the energy produced by the effects on the rest of the structure, thus creating minor localised damage (Pic.7.3).[474] The use of

study of the first effects of torpedo grenades on masonry vaults; Kummersdorf (1884) again for large torpedo grenades; at Palmanova (1885) to check the impact of lightning on brick vaults; at Bourges (1887) where shots were fired with a short cannon; at Brasschaet (1888) carried out to determine the thickness to be given to the vaults of rooms at the Meuse fort test; at Schoorl (1892) carried out with a rifled steel mortar. It is also worth mentioning the firing experiment carried out by Chavignon on Fort Malmaison in 1886, which is discussed in detail in SchedaXX. For further information on these experiments, please refer to the literature, particularly ROCCHI, 1892; VON LEITHNER, 1895; KAUFMANN, 2014; ISGRO', 2019.

473 Should remember that iron and cement were the absolute protagonists of European economic development in the second half of the 19th century, concerning the progress brought about by the industrial revolution. Starting with the first experiments at the Universal Exhibitions of 1851 (London - Paxton, Crystal Palace) and 1889 (Paris - Eiffel, Tower), iron, cast iron, and steel became the primary construction materials in the field of architecture and engineering.

474 As emerged from the experiments conducted in Kummersdorf, a superficial



Pic.7.3
Mappatura degli effetti distruttivi degli esperimenti condotti su casematte a Bourges

ferrous materials such as cast iron, iron, and steel, on the other hand, made an essential contribution to the pressing need to ensure protection for the fire mouths, with the construction of real metal armoring both for the vertical structures and for domes where the artillery was positioned, hence the armored name domes.

In the light of these considerations, all over Europe, the various fortification schools began an intense research activity to elaborate proposals and structural modifications to the existing works of several types to make them effective against the new artillery. In this race to find different ammunition methods, the various military engineers developed very different strategies and technological solutions, many of which remained only theoretical and did not find practical application 'in the field'.[475]

layer of concrete about 3 meters thick, not covered by layers of compacted soil, could withstand the action of 21 cm torpedo grenades loaded with 22 kg of lightning. For more on this subject, see ZANOTTI, 1891; ISGRO', 2019.

475 About the objectives pursued and the number of intermediate batteries involved, drew up the various proposals in this period can be grouped into three different defensive orders: the order of the armored forts, with the recommendations of General von Sauer, German Major Schubert, Russian Captain Boninitski, Swiss Captain Mayer,

An in-depth study of these multiple orientations is not among the objectives of this study. Instead, as already introduced, it aims to build a knowledge base of documentary sources to recognize specific construction techniques and technologies in contemporary fortifications. For this reason, I will present only the leading solutions concretely adopted by the various military geniuses in the last twenty years of the 19th century for the modernization of fortifications in the mountain and plain contexts below. However, we are aware that these solutions resulted from a long process promoted by those other orientations as well, for further details of which we refer you to the rich bibliography of reference. In this perspective, the type of fortress developed by the school of armored forts promoted by the Belgian general Henri Brialmont was undoubtedly the fortification model that had the most comprehensive application on a large scale, albeit with specific adaptations relative to the different contexts of insertion. In determining the technological-constructive choices he proposed, it is worth highlighting the importance of the experience Brialmont himself conducted in Bucharest for the design of the city's new defense system, where he conducted numerous experiments on concrete and the use of different types of armored domes (Gruson and Mougin).[476]

Concerning the plain areas, the organization of the defense system by strongholds with a sizeable entrenched field was confirmed, also envisaging the possibility of connecting adjacent bastions to form fortified regions. A general reinforcement of all existing works was organized using concrete, with counter walls up to 2.5 m thick or new constructions, and steel, with various metal protective coverings and armored domes.

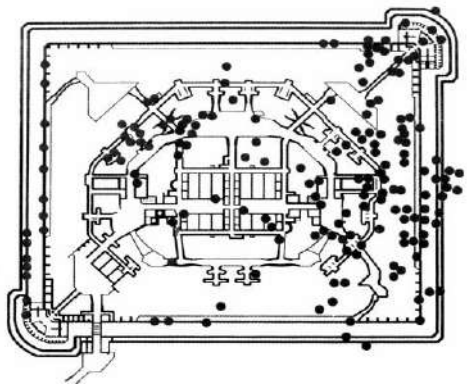
The artillery for the far-flung defense was placed in mobile metal casemates while putting that for the near-flanked protection in retractable towers; the existing masonry caponieres, considered too fragile and exposed, were replaced by concrete caponieres of similar shape but more resistant and, where possible, equipped with metal armor so that they could protrude from the shoe without being too vulnerable. The flanking of the moat was ensured by the insertion of rifle galleries located directly in the counterscarp and often connected

and German Colonel Schumann; the order of the armored fronts, supported essentially by Belgian General Brialmont and then developed by the Italian commander. E. Rocchi; order of the complete separation of the organs of the far defense from the near one, promoted by the French colonel Laurent, the Dutch lieutenant-colonel Woorduin, the Russian general Welitschko, the Prussian general Schott, the Romanian colonel Crainicianu, the Italian colonel's Lo Forte and Borgatti, the French captain's Sandier and Vallermand, the Russian ones Minkowski and Boninitzki and the Dutch Cool and the Austro-Hungarian von Brunner. In GUIDETTI, 1913.

476 Please refer to what has already been discussed in Chapter 2.

Fort Malmaison: firing experimentation to verify structural behaviour

Firing experiments on Fort Malmaison, conducted from August 11 to October 25, 1886, were organized and supervised by a delegation from the technical sections of artillery and engineering. The fort was bombarded with 167 155 mm cannon shells and 75 220 mm mortar shells, for 242 rounds fired. The purpose of the experiments was to quickly study the effects that the new projectiles brought to the fortifications of the time, studying the depths of penetration of the projectiles and the distance of falling shrapnel. The effects of projectile penetration on the ground were also studied, and the explosive effects at rest showed that except for some very rare shrapnel that fell hundreds of meters away, almost all shrapnel fell in a relatively small area. We also saw the high velocity of the fragments by measuring their penetration into the masonry following the bursting of a shell in the courtyard of the fort's barracks; at the time of this explosion, a window, screened with railroad tracks, 5 meters from the point of explosion, reported a clean-cut and 11 other minor perforations. The action on the masonry was studied according to the same principles. The effects of the fired bullets were superior to those of the firecrackers containing the same charge: a volley of 155 gunshots destroyed an 80cm thick vault, protected by a 1.70m thickness of earth; an 80cm wall became vulnerable despite a protective thickness of 5m. By pushing into the void, i.e., blasting the shell near the inner face of the facing wall, a single shell of 155 was able to create a breach 4m 50 wide and a shell of 220, a distance of 7m. Of course, the effects of 220 were even greater: 1m thick vaults did not hold up, even with a 1m 50 thick layer of protection.



The experiments on Fort Malmaison were confirmed and completed by the following experiments, carried out at Bourges. From December 13, 1886, to May 4, 1887, these experiments were conducted by a "Special Commission," organized in October 1886. They focused on six fortification shelters, some in concrete, some in masonry, built on the Bourges polygon, following the proposals of the "Commission for the Revision of the Instruction of May 9, 1874." Nearly a thousand rounds of various calibers, one-third ordinary and two-thirds elongated bullets, were fired. The Special Commission concluded that shelters should no longer be built of masonry but concrete, and earth should be replaced by sand. In conclusion, not only in France but also in Germany, Italy, and Holland, various experiments were made to understand the strength of existing fortifications, and the damage observed was appalling: bullets had penetrated through stone vaults, open-air batteries had been blown away, and ditches filled in by the explosion of charges.

to the central core, now entirely made of concrete, by underground passages under the moat[477]. Wherever possible, the roofs of the central cores were covered with two layers of compacted soil about 2 meters thick, interspersed with a layer of concrete *burster layer*:[478] this layering made it possible to dissipate the destructive power of torpedo grenades within it by avoiding direct impact with the actual structures, which thus remained protected[479] only the domes of the towers and armored observers emerged from these "earth parapets".

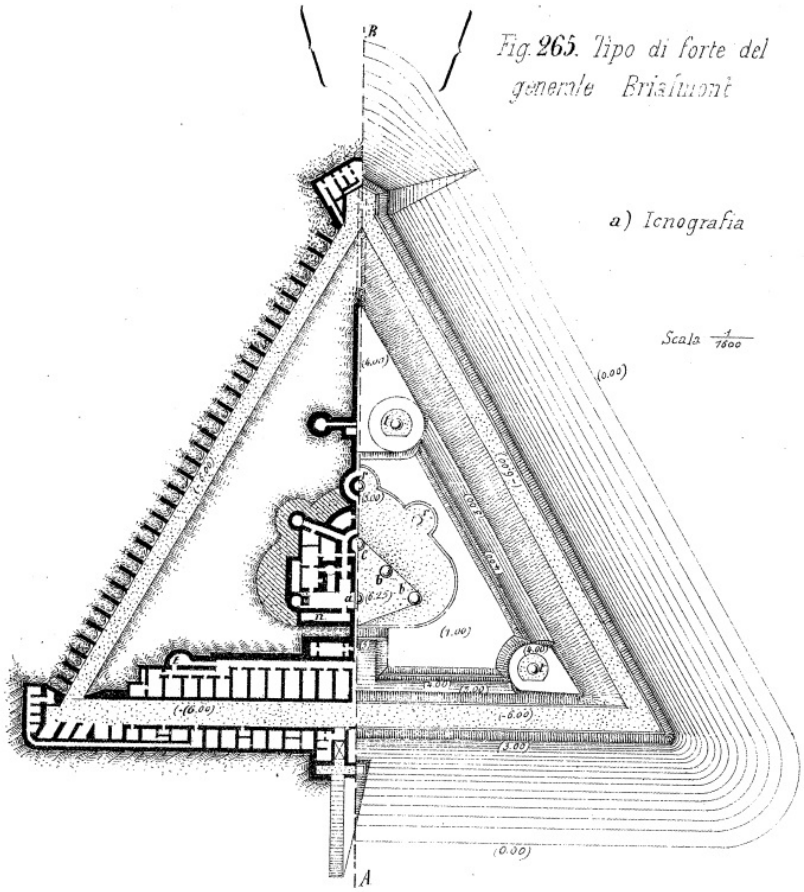
Concerning these general characteristics, in his book *Influence du tir polygonal et des obus-torpilles sur la fortification* Brialmont identified ten specific types of fortification, which became the leading European reference models for the fortification of lowland areas until the beginning of the Great War (Pic.7.4). Concerning these typologies, the different proposals elaborated by the Austro-Hungarian school are worthy of note, specifically with the criteria proposed by von Brunner and Leithner for the Galician strongholds.

In contrast to Brialmont, the generals of the Habsburg Empire, von Brunner, and Leithner were convinced advocates of the necessary tactical separation between the organs of far-flung defense (*Fernkampfbatterien*) and those of near-flanked protection (*Nahkampfwerke*). In this system, the fundamental concept was to use the works for near-flanked combat like an excellent defensive line and entrust the far-flung security to batteries placed in the intervals, designed as permanent armored batteries or open-air batteries. This model was used and applied to construct the outer walls of the fortresses in Krakow and Przemysl. The belt forts were designed according to a "unitary fort" model in which howitzer and mortar batteries were arranged on a multi-story casemate body. At the same time, armored guns were placed in specific abutment complexes. A significant pothole connected the various bodies of the building. The presence of deep ditches, counter-scarp caponieres, and throat bonnets declared the apparent influence of the Brialmont model. Still, the company of Traditor batteries represented a peculiarity entirely

477 For technical specifications, see the Manual written by ZANOTTI, 1891. It must be remembered that these are general guidelines that were adapted from time to time depending on the morphological context of insertion, as well as specific choices adopted by different military schools. In France, for example, this orientation was widely adopted for the modernization of the strongholds built along the Serè de Riviers Line.

478 KAUFMANN, 2014.

479 In fact, towards the end of the 1880s, it became clear that the destructive effects caused by torpedo grenades combined with the widespread use of curved firing with rifled mortars with long ranges rendered thick and strong covering masses ineffective. They 'would not be able to offer any margin of guarantee to the men and the curved firing equipment, which makes any deflection impossible'. The supporters of iron and armour based their arguments on these. In ISGRO', 2019.



Pic.7.4
Pianta di uno dei modelli elaborati dal generale Brialmont, forma triangolare

attributable to Brunner. These batteries were used to "*beat the fields in front of neighboring works, treacherously and lightning-fast opening crossfire at the last moment"*[480]. Another difference from the Belgian model was in the layout of the so-called forts for close defense, called *Zwischenwerke* (intermediate works), where there was no artillery with curved firing. In contrast, instead, the layout presented more irregular shapes concerning the conformation of the territory.

Concerning the main characteristics of the permanent mountain fortifications after the appearance of torpedo grenades, from 1883/84 onwards, the reference model of a compact and unitary fort (*Einheitswerk* type) was set up and constituted the basic typology for every Alpine fortress until the dawn of the Great War. The Austro-Hungarian and Prussian schools mainly developed this type of construction, it was characterized by the concentration of fighting positions and service rooms within a single block. The roofs of these forts were usually made

480 ROSNER, Fortificazione e Operazione, …p.234

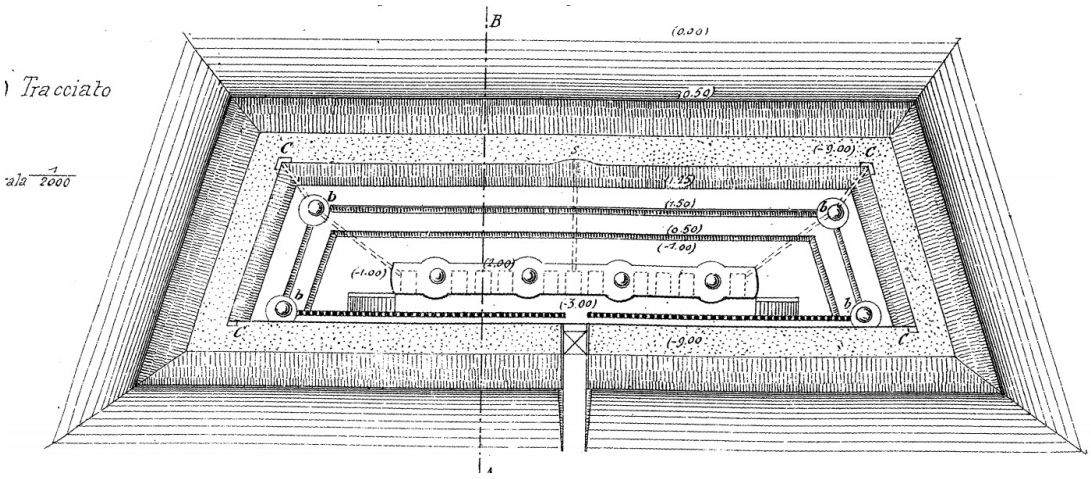
of concrete but without the use of iron beams, as was introduced in later years[481]. To protect the fronts most exposed to enemy artillery fire, such as the casemate fronts of the batteries, granite ashlar cladding was used, later replaced by metal armoring, while caponieres, often equipped with Traditor posts, were positioned in the gorge moat. Steel casemates for cannons and machine guns were also introduced, as well as revolving domes.

In the following years, the fortification typology of the mountain works was not substantially changed, except for the technological improvements brought about by the increased use of cement concrete in which large iron girders were embedded (Eisenbeton, reinforced concrete), the use of armored rotating domes to house the artillery and the covering of the uncovered parts of the roofs (usually made of concrete no less than 2.5 meters thick) with thick protective zinc sheets. These works were designed by Lieutenant Field Marshal Franz Conrad von Hoetzendorf and led to the definition of the so-called "armored forts," including the Austro-Hungarian forts built on the Folgaria, Lavarone, and Luserna plateaus (Altopiano dei 7 forti)[482].

In reality, the experiments carried out by the Austro-Hungarian military engineers to perfect the resistance capacities of "reinforced concrete" were numerous. Still, the results obtained, although highlighting important questions and possible solutions, were not always directly applied. Without going into detail, should remember that the Eisenbeton technique, already in the vanguard concerning many other fortification schools, was implemented in the years immediately before the war with the insertion of intermediate resistant layers, realized with further beams interposed between the large thicknesses of concrete to form a sort of three-dimensional latticework. If from a structural point of view this solution seemed potentially optimal, from an operational point of view, it was not functional because it facilitated the stratification of the concrete, hindering its homogeneous compaction. Further experiments, not always officially approved, also led to constructing structures very similar to the Monier technique. Still, the last of the solutions adopted turned out to be a roof with a thickness of between 2.5 and 3 meters, composed of a double framework of iron beams (I-shaped profiles, no. 50 - 35 cm center-to-center the main one, no. 16 - 50 cm center-to-

481 Examples include the forts Mattarello, Dossaccio, Mitterberg, Haideck, and Romagnano.

482 In this regard, the "Design Aids" drawn up by the Austro-Hungarian Empire deal in detail with the different construction technologies concerning grenade-resistant roofs and also present necessary reference tables concerning the types of iron girders used and the relative span widths, the thicknesses of the overlying concrete about the different permissible loads, and the different types of support. For further details on this subject, see the tables attached to this chapter. See also ROSNER, 2016.



Pic.7.5
Pianta del modello di fortificazione italiano elaborato dal generale Enrico Rocchi.

center the secondary one), inclined at 30° towards the ravine.[483]

Despite these continuous experiments, in the years immediately preceding the outbreak of war, the development of artillery was rapid and unstoppable, and soon even armored domes and large concrete and ironclad roofs were unable to 'keep up and continue to provide adequate resistance. Having already partially experimented with this technique,[484] this opened the way to the underground with the construction of "underground forts": veritable "war machines" dug into the mountains, creating caves, tunnels, burrows, lookout posts, and all the other elements typically found in any additional fortification. The Austro-Hungarian fort of Pozzacchio is an excellent example of this.

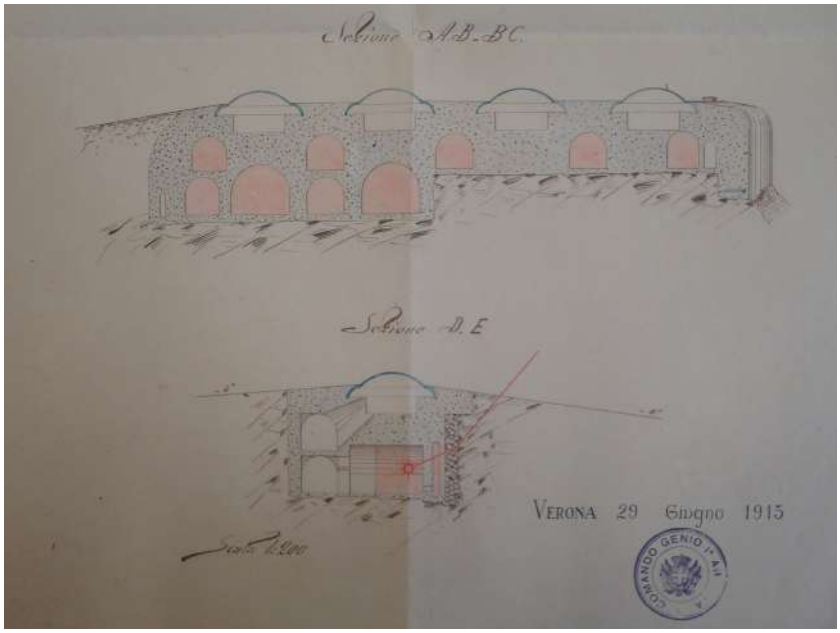
In the final analysis, the fortification model developed by General Enrico Rocchi in Italy is almost a "simplified variant" halfway between the typology proposed by the Belgian General Brialmont (applied in a mountain context) and the solutions of the armored forts built by the Austro-Hungarian school. To limit the number, size, armaments, and equipment of the individual works to minimize the extremely high construction costs, the Italian general conceived his interpretation of the Belgian model no longer as a solo work but as a group of jobs located in the mountainous area at regular intervals (of about 4 km) and capable of supporting each other in the defense action. With the

483 Although this structural modeling was very advanced, it did not widely apply due to lack of time. In the Saliente Trentino-Tyrol, realized only the roofs of Fort Serrada and Fore Sommo in this way. See also ROSNER, 2016.

484 In this regard, reference is made to the various works built in caves, such as the Italian Cadorna Line or in the French Vosges Mountains. On the other hand, in the Austro-Hungarian sphere, reference is made to the case of Fort Spitz Verle, or Vezzena, and the system of caves underneath it, connected by excavations within the rocky spur. Reference is also made to the connecting tunnels between the different elements of the fortified system of Forte Sommo Alto. See ROSNER, 2016; FONTANA, 2016.

same objective in mind, the existing works were intensively adapted to the new requirements. The addition of front and top covers in cement concrete and the insertion of cast iron and steel armor covered by other protective concrete and earth castings (Pic.7.5). As in other countries, in fact, in young Italy, the existing fortifications, built only a few years earlier according to the Ferrero plan, did not present structural characteristics capable of resisting the renewed artillery. Still, their demolition seemed to the Italian government an intolerable waste. In the same perspective of saving and optimizing resources, materials, and energy, General Rocchi elaborated a simplified model of armored battery, the armored mountain fort, which he described in the volume "*Fonti storiche dell Architettura Militare*" (Historical sources of military architecture) published in 1908.

The central part of the fortification consisted of a single concrete block in the shape of a quay, placed in a semi-underground position (only 2 meters above ground) and between 10 and 12 meters wide, in which there was no metal armor because it was considered too expensive, unlike the Austro-Hungarian powerfully armored roofs. It housed the armaments destined for far-flung defense on armored shafts and, alternating with these, the rehearsal rooms that served "*for the disengagement of the most indispensable services, i.e., for the accommodation of that part of the garrison that must never abandon the work, and to keep safe, during the bombardment, the light artillery with the relative ammunition and*



Pic.7.6
Forte Verena. Esempio di fortificazione italiana con orizzontamenti prevalentemente voltati, quindi con materiali sollecitati solo a compressione.

the infantry troops destined to repel attacks of the strong force."[485]

Around the concrete quay was an earthwork entrenchment with a layout dictated by the terrain's orography, which in the ravine front was replaced by a sheet metal parapet. Towards the outside, a low barrier of about 7 meters also formed the outer yard. The structure was surrounded by a 9-meter deep and about 20-meter wide moat, flanked by concrete caponieres and protected by armor plating. This type of construction was adopted in almost all the Alpine barrages on the north-eastern frontier, from the Lessinia forts to the Tagliamento, passing through the Val d'Assa with the Verena, Interrotto, Campolongo, and Campomolon forts, to name but a few.

In conclusion, a comparative analysis of the construction types of the Italian armored forts of the Rocchi model and the Austro-Hungarian forts of the Conrad era reveals some substantial differences, essentially concerning the structural behavior of the works. At the same time, the Austro-Hungarian regiments had vertical closures and roofs made of thick concrete (up to 4-5 meters wide) reinforced with wire mesh and iron and steel beams, almost entirely built the Italian fortifications of thick layers of concrete made of very coarse gravel but lacking in iron reinforcement. Comparing the architectural sections of the fortifications belonging to the two different schools, it is clear that these technological differences, due essentially to economic reasons, were also reflected in the typological choices of the other structures. In fact, in the Italian simple concrete structures, the horizons were almost always built with vaulted systems and not flat ones, to stress the material only by compression, as in masonry structures (Pic.7.6). This different construction technology proved to be decisive during the destructive effects of the bombardments, which broke the mighty concrete masses of the Italian forts into large blocks since they did not reinforce them with metal nets and beams like their Austro-Hungarian cousins.

7.1.2. Field fortification

After the 'Battle of the Marne' and the 'rush to the sea' in 1914, the Great War lost all character of movement and became a war of positions. In this context, the permanent fortifications that had been planned, built, and modernized up to a few months earlier were flanked by and often replaced by articulated entrenched systems built exceptionally quickly by the infantry by digging up the ground to obtain temporary shelters and escape the enemy fire as soon as possible. The unique conditions that emerged in the autumn of 1914 made the construction of covers for the troops necessary. The probability of being killed on the battlefield

485 ZANOTTI, p.222

had increased exponentially concerning the development of new firearms[486].

On the Western Front, the German army was the first to start digging operations. For this reason, it was able to establish itself in the best positions, i.e., those in relief, on hills or raised plateaus, forcing the Allies (mainly British and French) to entrench themselves in unfavorable areas. From the beginning of the conflict, the most significant difficulty that the various armies faced during the 'trench warfare' on the Western Front was constructing trenches and underground shelters in areas located almost entirely below sea level. In other words, as soon as the excavation work began, the military engineers had to deal with the presence of water at a depth that often did not even reach one meter. Therefore those who managed to establish their lines of attack/defense in raised positions had a great advantage, both for constructing the trenches themselves and for the better living conditions inside them.

On the eastern front, on the other hand, the construction of entrenched systems was not so widely developed, essentially because of the much greater distances involved and the lesser availability of workforce to be employed in their construction; in the east, therefore, field defense was mainly organized by crucial points, which were also reinforced and fortified with temporary and field works.

According to the field fortification manual '*Feld-Pionierdienst aller Waffen'* drawn up by the German Corps of Engineers in 1911, it was undoubtedly the Prussian army that 'set the example' during the first months of the war. In reality, as already mentioned, the manuals belonging to the other military forces also proposed very similar typological and architectural solutions, at times differing only in the adaptations to the different types of terrain considered.

The Prussian compendium, however, as well as the Instruction on Battlefield Works (1913) and the Complementary Norms (1915)[487] Compiled by the Italian Engineer Corps, and like any other fortification manual, they laid down the rules for constructing a 'state of the art' entrenched system, built-in peacetime following the typical necessary construction timeframes, the prescribed materials, and due attention to construction details. However, this advantageous condition was unrealistic during the conflict, when soldiers found themselves having to apply previously

486 In 1814 a soldier would have been lucky to get three musket shots per minute with an effective range of about 100m: in 1914 the bolt-action rifle made ten shots per minute perfectly feasible at 500m. In addition, nineteenth-century weapons involved long reloading times and of the shots fired only a few were of much effect at a range of one kilometre. By 1914 the situation had changed completely, rapid-firing field guns made it possible to fire more than 10 shrapnel per minute at distances of over 5 kilometres.

487 See *Atlante di Fortificazione Campale*, Regia Accademia Militare, Torino 1902.

learned notions quickly and driven by survival instincts. Even more so than for permanent works, the model types proposed in these manuals for field and temporary fortifications were adapted and modified from time to time concerning the type of soil present, the speed of construction, the number of soldiers employed, and the availability of materials. In this regard, it is worth remembering that the very essence of temporary and field fortifications made them intrinsically dynamic and prone to being modified, adapted, and transformed: they were temporary works, designed more to resist than to last, "fragile" by nature, models repeated and varied without "any exceptional character nor any architectural value of value"[488] Despite this, they constituted the backbone of the organization of the fortified landscape, the connective and pervasive fabric that substantiated its operation. If the forts represented the critical positions in the complex mosaic of the remains of the Great War, the temporary and field fortifications constituted the arterial system[489].

They were a permanent building site in continuous evolution, the result of the constant movement of the front line in the various phases of the conflict, in which the design choices were studied directly "in the field" and in close relation to the different orthographies of the territories to optimize the actions linked to the offense and defense, also developing and experimenting with new construction technologies, for which specific design documentation was often not produced for the fear that it might fall into enemy hands. All this in the knowledge that the adversaries could conquer such works after only a few hours.

At the end of the conflict, these field works, already "fragile" by nature, were repeatedly modified and in part even canceled by the post-war dynamics of transformation. Yet, details of them remain in the contemporary landscape to varying degrees of visibility. Irregularities in the soil, accumulations of mud, depressions, remains of small constructions, the presence of barbed wire: these are just some of the traces of this minute, but a pervasive fabric that has recorded on itself the "signs" of history and human events, and which for this very reason can have testimonial value, and thus be the basis for saving a possibility of "memory."

A necessary condition for this objective is undoubtedly the ability to identify these vestiges in the contemporary landscape, even in contexts where abandonment and the degraded state of conservation do not allow

488 RAVENNA, SEVERINI, 2001.

489 Temporary fortifications are usually those fortifications designed and built in anticipation of the conflict, designed to resist rather than last (temporary character). At the same time, the same works are defined as "field" but built quickly on the battlefield during the same wartime.

them to be easily recognized[490]. Precisely for this purpose, as already mentioned, the study of military manuals can provide a significant contribution, but before proceeding, it is appropriate to make a further clarification.

In the light of the preceding considerations, and in contrast to what has been presented concerning permanent fortifications, it is understandable that it is not possible to identify a precise and univocal typological evolution of the different temporary/campal works and the relative construction technologies, nor even a substantial differentiation between the proposals drawn up by the various fortification schools. The relative ease with which the enemy could have conquered these works did not make it convenient to elaborate too specific and diversified construction methods, which would have been potentially advantageous to the adversaries. On the other hand, some peculiarities can be found in the (at least theoretical) definition of specific technological systems differently conceived by the military schools concerning issues related to the healthiness of the air (ventilation systems), the degree of internal humidity, the presence of water infiltration in the walls/coverings against the ground, the predominant use of different cladding materials depending on the context of insertion concerning the need for masking.

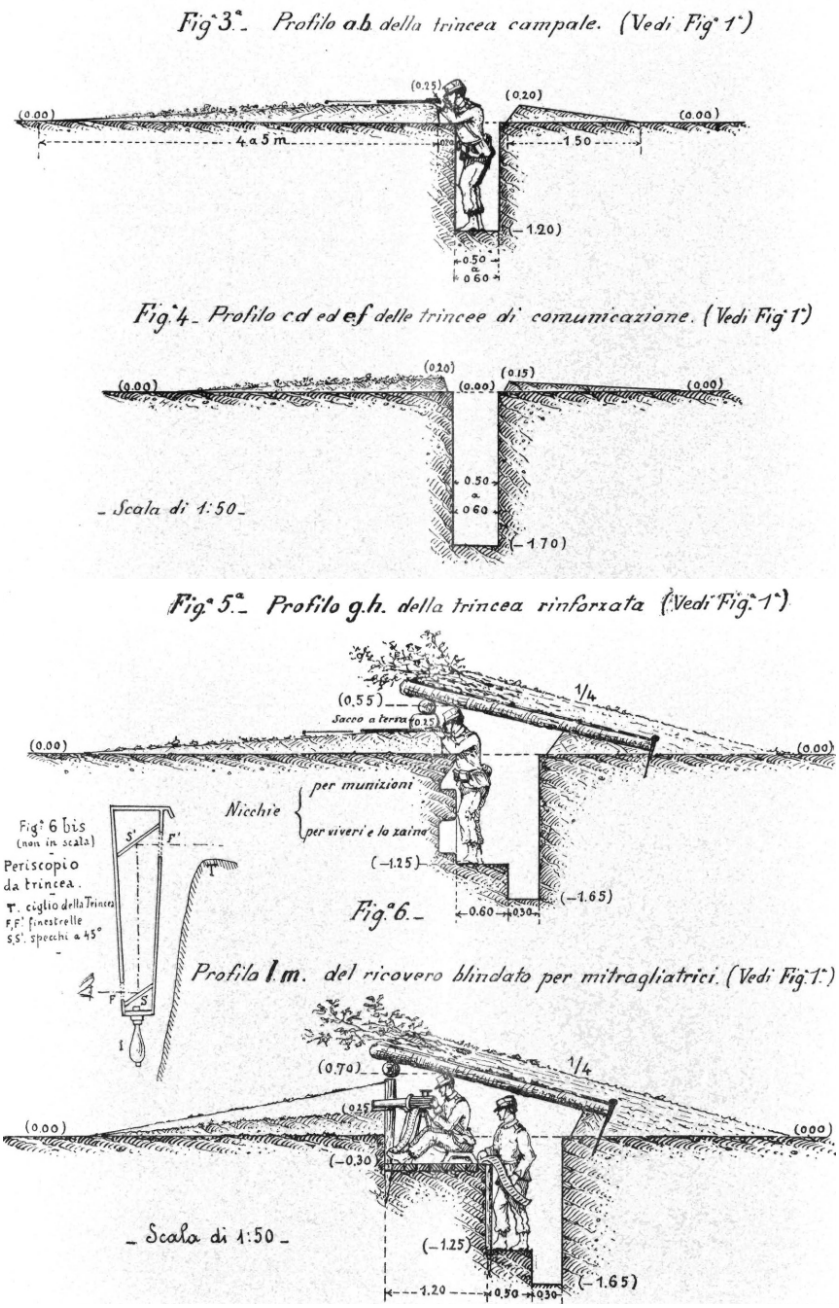
These considerations are confirmed by comparing the compendiums used in the various military schools, which present very similar theoretical-operational contents and exemplifying design models, as highlighted in the in-depth sheets attached to this chapter.

However, from the moment that war of movement turned into a 'war of position,' the tremendous military strategies gave way to tactics. The different armies found themselves facing a new way of fighting: "*war sank into a fourth dimension - beyond width, length, height - it became subterranean, and was among all forms of fighting, the most scientific, the most engineering, the most technological, the most visionary, the most powerful, the most bombastic, the most primordial, the grimmest, the most costly, the most disproportionate*"[491].

Starting from the Western Front, but also on all the other "front lines," from this moment onwards, every natural obstacle and unevenness in the terrain was used and adapted by the soldiers for defensive purposes to create temporary shelters: the existence of a ditch, a stream, an escarpment, a small bank, a rocky spur, a cave or a hedge, for example, made it possible to build firing positions, shelters and field artillery positions partially hidden from the enemy's view. While in mountainous contexts, the presence of natural obstacles easily adaptable to fortified

490 Please refer to the previous chapters for issues related to the problematic recognisability of these 'fragile signs' within the contemporary multi-layered landscape.

491 LEONI, 2015.



Pic.7.7a
Profili trinceramenti campali, Genio Militare Italiano, *Norme Complementari*, 1915

Pic.7.7b
Profili trinceramenti rinforzati, Genio Militare Italiano, *Norme Complementari*, 1915

positions was substantial, in lowland areas, it was necessary to '*imitate nature*[492] to create artificial shelters and firing positions, making the most natural element available: the ground. Equipped with shovels, spades,

492 ROCCHI, 1905.

and other simple tools, the soldiers began to dig the foundation to build first rudimentary "foxholes" at least 30 cm deep to find shelter, and then increasingly deep and articulated entrenched systems according to the different needs.

In this way, he artfully modified the original morphology of the territories to recreate the best conditions necessary to place the troops in the correct position and thus keep the enemy in a position exposed to defensive fire, while at the same time making it difficult for him to move through complex and appropriately designed obstacle fields.

Generally speaking, trenches built on flat land were usually composed of three elements that were functionally and reciprocally connected: An action/offense element consisting of a parapet bluff at the top of the firing positions. A protection element, i.e., the space inside the trench itself in which the soldiers could shelter from enemy fire. Some accessory defense elements such as ditches and obstacle fields slow down the advance of the enemy. The models of entrenchments proposed as examples in military manuals provided for a depth of about 1.8 meters for the protective element, to guarantee sufficient height for standing riflemen, who could lean on the inner side of the parapet, which was purposely organized with steps about 40 cm wide and with grooves a few centimeters deep at the top to facilitate the support of the rifle (these levels had to be specified and adapted about the height of the water table). On the opposite side, wooden seats were inserted, usually 80 cm wide, which also served as a temporary resting place for the soldiers. The excavated ground was used to construct the covering masses in front of the firing parapets, made at different angles towards the "no man's land."

The course of the front line was never to be rigidly straight to avoid the enfilade shots that would have put the entire system out of action with a single bombardment[493]. Field entrenchments were usually uncovered, but as regards temporary fortified systems built in anticipation of the conflict and those having mainly the function of passive defense, different roofing solutions were envisaged, from the simplest in wooden planks to the structurally stronger ones in concrete and steel profiles (armored roofs). When designing the possible covers, regardless of the material used, it was necessary to consider the type of projectiles that the protection had to resist, the construction time, and the expected duration of the possible attack. Furthermore, it is worth remembering that often covered the potential covers with branches, foliage, and other natural elements to achieve better masking from both the opposing lines

493 Gave particular importance to the design of the flanking of all the entrenched lines, carried out by arranging the stretches of terrain of greatest tactical importance, i.e. by building strongholds that, with flanking fire, were able to protect the intervals between the trenches, filled with dense nets of reticulate.

and from enemy military reconnaissance from above[494].

As far as the primary construction materials used are concerned, the soil was the common denominator for all temporary and field fortifications. It was quickly mouldable and, appropriately layered and compacted, represented the best solution for dissipating almost the entire explosive charge of the projectiles[495]: for this reason, they often used it to make parapets and roofs, as already described concerning permanent structures. In addition to this, the soil lent itself well to being combined with the other construction materials usually used in these works: wood, iron, cement concrete, and, although more rarely, with stone or brick masonry. Wood was undoubtedly the most versatile and easily used element, even in precarious conditions. In contrast, iron, due to working it, was only used if already present on-site in a convenient form. In this regard, one of the recurrent construction technologies used by the various fortification schools was the use of railway tracks as load-bearing elements for the roofs of semi-permanent works, suitably integrated into specific layers of cement concrete and resting on wooden dormers.

Another essential characteristic concerned the profile of the walking surface of trenches and walkways, whose coverings were often realized using mainly wooden boards or, where possible, concrete blocks. The shape of the walking surface had to be slightly inclined towards the rear to channel water into specific pipes connected to drainage wells. In impermeable soils, boreholes were drilled during construction until they reached a porous layer that could drain the water.

Very often, built underground shelters and dugouts made of reinforced concrete below the floor level of the trenches, accessible using stairs and connecting ramps: these underground rooms were intended to protect from artillery attacks, safe sleeping quarters, spaces for storing food and weapons, rooms for medical treatment and, last but not least, protected areas for command posts. Each underground shelter had to be connected by a speaking tube to a sentry post positioned to guard the line itself and be provided with at least two separate entrances.

As already mentioned, during the war, the development of entrenched systems on all fronts had pretty similar characteristics. Still, the different geological features of the terrain imposed the need to develop specific and differentiated devices.

494 Masking and camouflage were of particular importance, also given the increase in enemy military aerial reconnaissance. In this regard, we refer to the studies conducted by S. Isgrò summarised in ISGRO', 2018.

495 For details, please refer to the in-depth study on grain-resistant roofing and the sandwich layers of cement concrete and soil set out in the Fact Sheets attached to this chapter.

Pic.7.8
Bayerwald Trenches, nei pressi di Ypres. Graticci in legno per contenimento terreno e assi lignee per pavimentazione.

As regards the construction of the inner slopes of the entrenched systems, for example, if in compact or rocky terrain there was no need for containment because the cohesion of those soils was such that it did not cause collapses or landslides, could not guarantee the same in clayey and humid terrain, such as much of the territory of the Western Front. In these cases, over time, the sidewalls of the trenches used to detach, causing partial collapses of the firing lines and causing dangerous obstructions in the walkways, making them muddy in case of rain. Motivated by the same objective, therefore, the different armies developed different types of internal linings to contain such possible slope collapses through the combined use of wooden posts, planks, wickerwork, corrugated metal sheets, wire mesh, sandbags, and, particularly in areas near cement works, cement blocks or pours (Pic.7.8). Depending on the different contexts, different technologies were developed: while British and German troops, for example, favored the massive use of sandbags as an internal lining for their entrenched systems, the use of sandbags in the trenches was not the same as the use of concrete[496] , the French instructions made limited reference to

496 York Shire Trenches near Ypres, is an example of this use of stone sacks. The

Pic.7.9
Yorkshire Trenches,
nei pressi di Ypres.

this practice and, on the contrary, focused on the use of earth, planks, wooden logs, and metal gabions (cages, cylinders, or boxes filled with dirt or sand). Similarly, in the Italian army's '*Elementary notions of fortification carried out according to the program of instruction for the examination of suitability for the rank of Second Lieutenant of Completely*,' the different types of cladding to be used in Italian entrenchments were presented, made from fascines, barrel gabions, trellises, earth sacks, dry bricks or stones, poplars or clods, and wooden planks.

Usually, the general order of the fighting front was organized in successive entrenched lines, built at a distance of about 100 meters, almost parallel to each other, and connected using connecting tracks and zig-zag walkways which, in the end, led to a reinforced resistance trench equipped with machine guns. The connecting tracks behind the line of fire were at least 60 cm wide and developed in an irregular pattern for the same reasons mentioned above. In the most organized systems, these linking traverses also led to secondary positions, shelters, communications rooms, and underground shelters arranged in such a way as to allow the troops the necessary rest.

restoration work employed the use of sacks but cemented together (Pic.7.9).

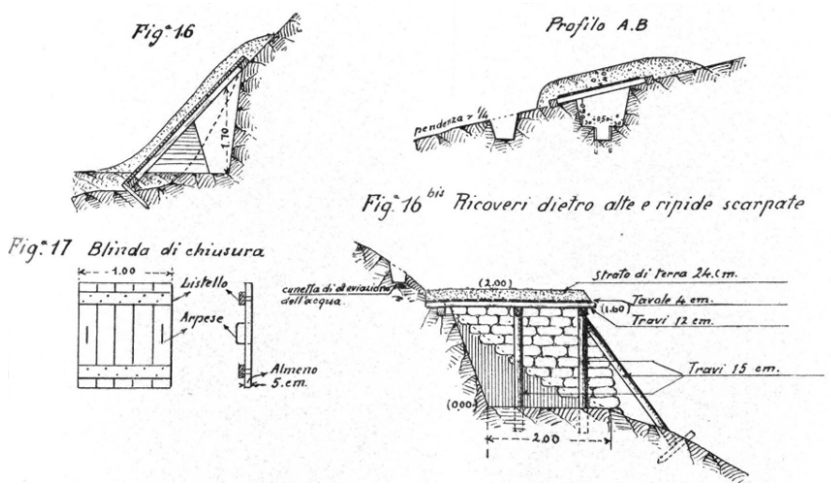
This organization established an honest fortified group, consisting of a dense web of trenches and shelters, barracks, obstacle courses, and underground caves, connected like a labyrinthine vein system designed to block the enemy's advance and force them to retreat. The words of Field Marshal von Hindenburg are significant: "*our defensive positions were no longer to consist of single lines and solid points but a network of pipes and groups of concrete facts. In the deep zones thus formes, we did not intend to dispose our troops on a rigid and continuous front but in a complex system distributed in-depth and breadth [...]*.[497]

During the conflict, modified the techniques for constructing field fortifications based on experience gained in the fighting. In particular, following the 9th battle of the Isonzo, both the Austro-Hungarian army and the Royal soldiers made some essential changes to the layout of the entrenched systems, which gradually adopted on the other fronts as well. In particular, the visible stone parapets were abandoned as they were too easy a target for artillery, in favor of thin slits and low lines of sacks that blended in with the color of the ground; and, in the same vein, the shielded slits that carved their precise geometric profile on the white wall texture were replaced by simple gaps between the sacks, hardly visible even at the shortest distance and constantly changeable. Armored roofs raised above ground level also became increasingly rare, and there was a preference for galvanized sheet metal or tar-covered boards to reduce thickness and thus visibility. Another significant modification was made in the organization of the entrenched profiles, significantly decreasing their width to guarantee better safety for the soldiers against the destructive effects of explosive grenades[498].

On the other hand, as far as temporary and field fortifications built in mountainous contexts are concerned, the different morphology of the territory stimulated the development of different types of construction compared to the trenches above "dug" into the ground typical of the Western Front or of the Italian-Austrian border on the Isonzo and the Slovenian Karst plateaus. The rocky nature of the soil did not allow for the easy creation of works dug at great depths but, in the most favorable cases, only trenches for shooters on their knees or seated. Usually, the most practical solution was to form a parapet with a drystone wall about 80 cm high and made of blocks and stones roughly hewn and found on site. The soil obtained from the eventual excavation of a wide and shallow trench was used to mask the wall by creating a sloping profile

497 RICHTER, 2011, p.16.

498 Underlying this transformation was the realization that the presence of overly broad trenches corresponded to a greater likelihood of being easily penetrated by bombardments: combat had demonstrated their devastating effect when detonated within the track. Still, it had also revealed minor damage if dropped beyond the trench margins.



Pic.7.10
Entrenched systems
in mountain contexts.

on which tree branches, props, and barbed wire nets were often placed. In case the presence of hard rock did not allow any excavation, bags of earth were placed on top of the wall. In mountainous contexts, however, rocky spurs, depressions, high ground, and tiny ridges were already present in nature, representing natural parapets ideal for being fortified, garrisoned, and used by the troops to their advantage. From this point of view, the mountain territory, with its multiform accidentality and various conformations, offered inexhaustible resources that, even with only a minimum of work, could become excellent field defensive posts.

At a general level, rather than on articulated parallel lines of entrenchments as in the plains, the militarization of the mountains was based on the realization of a series of defensive/offensive punctual and closely connected posts, consisting of shelters, observatories, walkways in elevated positions to control the valleys, cave posts, well protected by grids, obstacle fields and shoring. If the shelters and the firing positions were not built at the highest altitude, and therefore could potentially be attacked "from above", a light sloping cover was added to these uncovered works to protect the space occupied by the shooter, made according to different types depending on the materials available on site (Pic.7.10)[499].

499 The "Norme complementary all instruction sui lavori del Campo di Battaglia" ("Complementary Norms to the Instruction on Battlefield Works") drawn up by the Command of the Italian Corps of General Staff in 1915, state that "*for it to be barely visible and not likely to be hit by grenades, it will be held at an angle of ¼ towards the roves if the ground allows it. The 2.50 to 3.00m long roof beams will be supported in various ways, with dry stone walls or other beams arranged vertically, taking care not to prevent the troops from using their weapons at the right moment along with the entire length emplacement or indecisive sections. A lot of timber of the required dimensions must be available for the construction of these covers".*

In this regard, it is significant to highlight how also reflected the temporary nature of these works in the technological choices made for their construction: while in the case of high-altitude buildings, shelters, observatories, and barracks perched on rock faces, the difficult accessibility made it possible to use almost exclusively wood, in the slightly more accessible contexts stone was often used. The exciting aspect, specified in the "Austro-Hungarian planning aids" but standard on the various fronts concerned the fact that the resistant structures of these works were in any case made of wood. At the same time, the stone was often used as a covering material, both for walls and roofs, to better camouflage the construction in the surrounding rocky landscape (Pic.7.11). On the other hand, in high alpine contexts, layers of compacted snow at least 3 meters thick could provide sufficient protection against rifle fire at distances of over 100 meters.[500]

In support of the front line positions, shelters for the troops and

500 Finally, snow can be used as a shelter when it reaches the desired thickness: a refuge of accumulated snow at least three meters thick provides sufficient protection against rifle fire at distances of over 100 meters. An average thickness of 8 m. at a distance of 1,000 m. and 5.5 m. at 2,500 m. is required to protect against artillery shells. For further information, see Norme complementary, Genio Militare Italiano, 1915.

Pic.7.11
Baraccamenti Fronte Alpino, 1915.

reserves were developed, built with the same construction technologies and created on the reverse side of the heights, or even better, behind high and steep escarpments, to be in a defiladed position concerning possible attacks by the adversaries. Furthermore, in the same way as the transversal trenches connecting the open field entrenched systems, defiladed and covered walkways were prepared (if exposed to possible enemy fire) to join the firing positions with the shelters and shelters behind and guarantee the functioning of the entire defensive network. In this regard, in mountainous contexts, the observers were of absolute importance, usually equipped with signaling devices, placed in particularly significant positions to control the territory and immediately signal any circumventing movements, thus giving the troops time to organize the appropriate counter-maneuvers. Very often these observers could also become first lines of defense if tactical reasons and the availability of soldiers and armaments made this possible and necessary.

As far as the militarisation of barriers and the high ground was concerned, usually set up defense lines close to the ridgeline to make the defensive arrangements less visible to the enemy while retaining a sufficient field of fire. Although such an arrangement left some areas poorly beaten, they could implement the defense by inserting specific shelters for side shooters and flanking sections with well-hidden machine guns or by resorting to artillery crossfire and my actions. The topographical accidentality of the terrain or rounded hills were suitable positions for the creation of action strongholds, i.e., privileged classes made up of entrenched systems with a curvilinear layout and converging at the ends, as if forming a 'ring,' from which other lighter running lines departed to guard the entire hillside.[501]

Generally speaking, the Italo-Austrian front was the quintessential example of "mountain warfare," which began a year after the western front had settled down from the "war of positions", but was initially conceived in the same way, imagined as short and moving, noble and ennobling simply because would fight it against the backdrop of the great alpine landscapes painted only a few years earlier by the famous painter Segantini, frequented and praised by the communities of the area.[502]

And yet, even in this case, it was immediately clear that such a war would be long, heavy, difficult, and perhaps even more articulated than that of the plains. More than any other WS-Class, the mountain fortified landscape still represents the embodiment of what the historian Leoni

501 For specifics on these construction methods, see Norme complementary, Genio Militare Italiano, 1915.

502 LEONI, 2017.

Pic.7.12
Baraccamenti Filon del Mot, Stelvio Border.

calls a "*new alliance between Technology and Nature*"[503], in which the technological knowledge of the art of fortification succeeded in de-structuring the mountain to recompose it through mechanics, construction techniques and the chemistry of explosives, following new forms, new logics of necessity, from the creation of control garrisons on the highest crests of the Alpine peaks, to the hollow construction of real fortified citadels within the rocks and glaciers. With the climatic changes taking place, fragments of these defensive structures are increasingly coming to light, giving back to the communities the remains of the wooden barracks, the cableways, the armaments carried up to high altitudes, the objects of daily use of the soldiers who lived and died in these places. Together with the contemporary phenomenon of repopulation of the "highlands", these considerations impose new reflections on how to think about the fate of these high-altitude "war landscapes". In this sense, the recognition of different "testimonial gradients" can certainly provide an important contribution, and therefore the ability to recognise this palimpsest of "signs" becomes a necessary condition.

Lastly, some brief considerations regarding the accessory defense, which, although in a certain sense independent, represented a fundamental aspect of temporary and field fortification. The realization

503 LEONI, 2017.

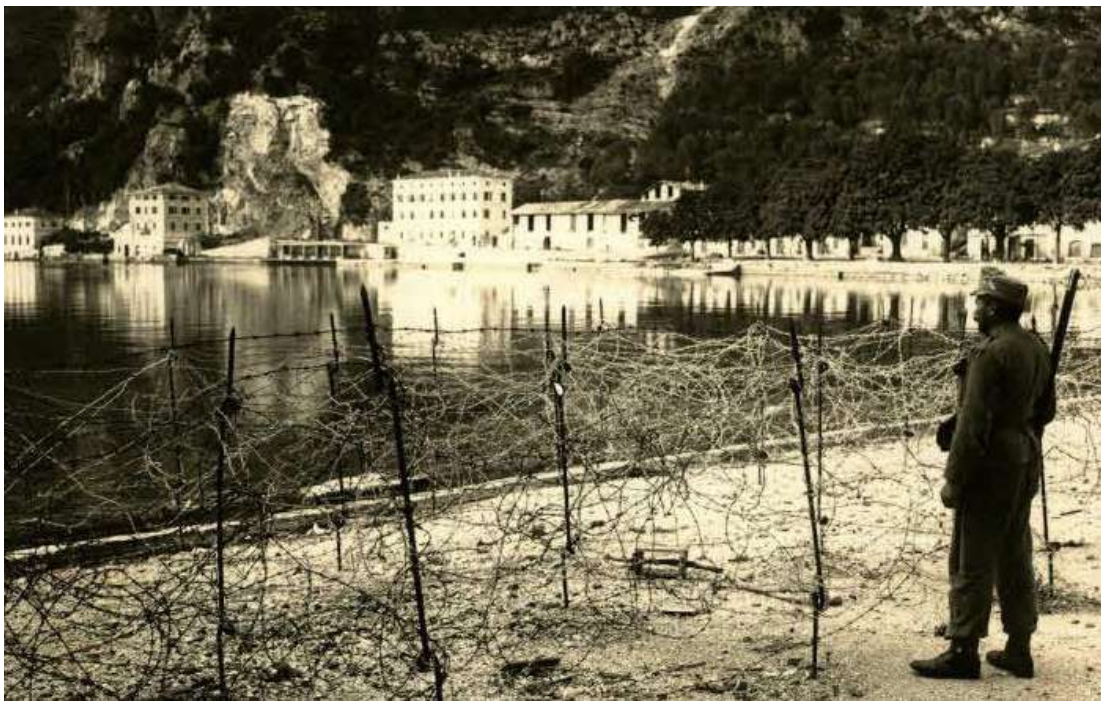
of grids, obstacle courses, shoring, natural weaving, and barbed wire had the priority objective of supporting the defensive activity carried out by the entrenched systems described above by slowing down the enemy's advances within the "no man's land". Unlike the permanent and temporary fortified works, these elements did not have to respond to any need for structural resistance, if not concerning stability in their effective impediments for the adversaries. As demonstrated by the extensive studies reserved for them in military manuals, obstacle courses and grids had to be designed in as much detail as any other element of the fortified system, from the choice of their precise location in a position protected from enemy artillery but sufficiently distant from the front lines to the identification of the types that best suited the morphology of the reference context. These obstacles had to carry out the function for which they had been realized without offering any potential cover to the adversaries who, on the contrary, had to be blocked for as long as possible in positions exposed to friendly fire. Very often, the morphological irregularities of the territories could be transformed, with a minimum of effort, into obstacles difficult to overcome: the accentuation of a ditch, the digging of hidden or camouflaged holes in the ground, the planting of bushes at the lowest point of a slope and in a position not visible from afar, the flooding of specific areas slightly depressed exploiting to their advantage the presence of the water table at low depth, were just some of the simple tricks that were

Pic.7.13
Entaglements around Mero Fort, Italy.

often put in place. Where natural obstacles were not sufficient, artificial impediments were inserted, specially designed and built, as explained in the manuals and visible in the iconographic documents of the time. Kilometers and kilometers of barbed wire and fences interspersed with wooden props fixed in the ground at different depths, Frisian horses alternating with piles and fences, Japanese laces and entanglements obtained from the random accumulation of branches, brush, and tree trunks cut and purposely laid on the ground: an intricate and disordered palimpsest in which, in reality, each element occupied a defined place and performed a precise function.

Like the temporary and field fortifications, the constituent elements of the accessory defenses also represented an essential part of the complex assemblage that were the "war landscapes," but they were often canceled by the dynamics more than the other components of post-war transformation. However, it is not uncommon to find fragments of barbed wire and other metal elements scattered within the current landscape, testifying, once again, that the imprint of the Great War has shaped the landscape of a hundred years ago but persists in our contemporary world. (Pic.7.13-7.14).

Pic.7.14
Entaglements, Riva del Garda, Italy.



7.2 The Great War as an "opportunity for technological experimentation"

7.2.1 The development of new materials: from "cemento rinforzato" to "cemento armato"

As already widely stated in the previous chapters, one of the many ways of interpreting the Great War phenomenon is to interpret it as an important historical moment in which avant-garde construction technologies were developed and tested, such as experiments on reinforced concrete gradually became part of everyday building techniques. Analysing the issue on a broader scale, the contextualisation is evident. In the second half of the 19th century the undisputed protagonists of the world's economic development were iron and cement. In a very short time, cement production increased exponentially in Europe[504] ,triggering numerous industrial-scale production centres in England, Germany, France, and Italy, even if the cement industry in Italy started with a certain delay.[505]

Many engineers, architects and builders developed theories and experiments to investigate the potential of the new material and its structural behaviour in combination with iron and steel: in addition to the many experiences and "insights" of J.L. Lambot, F. Coignet and J. Monier[506] , the studies carried out by the Military Geniuses of European countries, who used the fortifications of the Great War as an opportunity to experiment with these new construction technologies, were fundamental. In particular, the combination of cement concrete and iron gradually proved to be very effective in increasing the resistance of structures in response to the increased destructive power of armaments. Still, defining the new material "reinforced concrete" as it is currently understood, was very long and gradual.

504 The research and scientific knowledge on binders started in the eighteenth century (SMEATON, 1756, PARKER, 1796) perfected in the first decades of the nineteenth century (LESAGE, 1800, VICAT, 1818), led to the industrial production of cement (the factory in Portland was opened in 1824 and then the one in Boulogne Sur Mer in 1840, allowed the development of concrete. For more details, see also GATTI, 2013; ISGRO', 2019.

505 The reasons for this are varied, but first and foremost, the use of cement imported from outside, however, due to the long transport and storage times was often used "spoiled" and therefore with relatively poor results. Furthermore, in Italy, stone construction was preferred for a long time due to the abundance of raw materials, often combined with hydraulic binders based on fat lime and pozzolan; for further details, see VACCHELLI, 1903.

506 The experiments of the gardener Monier are well known. He presented several patents, first for the process of constructing cement mortar pots reinforced with iron wireframes, then for the construction of pipes and tanks, and finally for slabs (1869), bridges (1873), stairs, and vaults (1875).

At first, cementitious concrete was used to replace or combine with substantial layers of fill soil to cover the parts subjected to direct artillery fire, and then, precisely concerning the constant improvements in the same, different chemical compositions and percentages of its various components were tested to obtain ever greater resistance. Finally, numerous destructive experiments were carried out by the various military geniuses that contributed to defining the structural behaviour of this new construction material called "special concrete", not yet "reinforced" but crucial to the development of the new type of permanent fortification that began to develop in this period, namely the "armoured battery". In his treatise "L'influence du tir plongeant et des obus-torpilles sur la fortification", Brialmont himself wrote: "*[...] it will be preferable to use cement concrete, which acquires an extraordinary hardness when it is formed of acorns or fragments of primary rocks. Grenades do indeed make deeper marks than in granite, but they do not split it as easily*"[507]. For these various reasons, all over Europe, while experiments on concretes continued with the aim of finding a valid substitute for the costly *Portland* cement, constantly used this new material both in the construction of military structures functional to the forts, such as lodgings, factories, warehouses, powder magazines, and in the consolidation of the fortifications themselves[508].

The various laboratories began a sort of 'race' to identify the best quality in the manufacture of concrete, from the components to the relative proportions, from the production methods to the casting systems, and even in-depth studies not only on the degree of resistance to inelastic impact but also on the degree of compression of the individual layers cast. Without going into the details of the specific experiments carried out at European level, for a detailed examination of which see the bibliography of reference.[509] the various laboratories began a sort of 'race' to identify the best quality in the manufacture of concrete, from the components to the relative proportions, from the production methods to the casting systems, and even in-depth studies not only on the degree of resistance to inelastic impact but also on the degree of compression of the individual layers cast. Without going into the details of the specific experiments carried out at European level, for a detailed examination of which see the bibliography of reference one of the compositions that gave the best results consisted of 0.3 m^3 of gravel, 0.9 m^3 of pebbles and 400 kg of cement for every cubic metre of special concrete placed on the parts exposed to artillery fire. could reduce the amount of cement to

507 BRIALMONT, 1869.

508 GATTI, CACCIAGUERRA, QUENDOLO, 2016.

509 In particular, reference is made to the studies conducted by S. Isgrò and published in ISGRO', 2018, 2019.

300 kg for parts not exposed to direct shellfire. For better strength, the concrete blocks had to be poured without interruption to form, at least in theory, monolithic blocks. Such concrete could reinforce the roofs of the pre-existing masonry basements, and therefore had to be covered with a layer of sand at least 1 metre thick to absorb any bombardment, as was done in the forts of Longchamp, Douaumont or Vaux. But new structures were also built with this special cement mix, for example in the fortifications of Girancourt, Villey Sec or Domgermain, or place of old masonry buildings as in the forts of the Great Hague or Uxegney. In this type of reinforcement, the thickness of the concrete had to be at least 2m50 for a span of 5m: at Fort La Grande Haye, for example, the thickness of the concrete reached 2m65. It is interesting to note even today about the presence of concrete reinforcements. Inside the premises, the concrete parts were often indicated on the walls by a red line, useful for soldiers to understand that they were inside armoured areas.

After 1897, implemented special concrete by combining it with iron to produce reinforced concrete, the introduction of which made it possible to cast concrete by reducing its thickness to 1.50 m for tunnels, 1.60 m for counterframes and 1.75 m for barracks. This concrete had the same properties as the special concrete, except that it contained many iron bars of different diameters. In reality, the combination of concrete and iron was not new, in fact since the early nineteenth century there had been buildings with a metal structure and concrete roofs, but in these cases the structural behaviour of the two materials was independent (iron resistant to traction and concrete to compression). In contrast, the important innovation was precisely the intuition to combine these respective properties to form a 'homogeneous whole' capable of withstanding the greatest stresses.

Despite the initial diffidence regarding this new material, given its resistance characteristics, the use of reinforced concrete spread very quickly, in parallel with the many experiments to improve its efficiency and quality, particularly concerning the possibility of reducing the size of the elements, improving the adherence of the bars by introducing "hook" bends and distributing the iron (which is very expensive) rationally inside the concrete. Through the many experiments carried out by the various military Geniuses, important considerations emerged which determined the constant improvement of this construction technique, such as, for example, the high quality of Portland cement compared to other types of cement[510] or the high resistance to penetration

510 Due to their slow hardening, Trass del Reno cement or pozzolan could only be used for secondary constructions.

of cement-rich concretes but their simultaneous tendency to crack.[511]

Laboratory experiments using full-scale prototypes also made it possible to create reference tables of minimum thicknesses of reinforced concrete elements directly exposed to artillery fire, which became an integral part of the manuals used in military academies and fortification schools in various countries.[512] Moreover, from an operational point of view, one of the main requirements was to make the new construction technologies easy for the not particularly specialised workforce of the time.

In short, what is important to highlight once again is the fundamental importance that military experiments had in the development of this new construction technique and the relative methods of calculation and realisation (the Monier system, the Hennebique system, the Golding system, the Mantel system, to name but a few), which in the following years led to the application of the same techniques in civil construction. From this point of view, the fortifications of the Great War embody a further inestimable value, that is to say that they are themselves direct evidence of contemporary engineering, "*an inexhaustible source of research and perspectives for the pure historian, the archaeologist, the scholar, the art critic and the architecture and technology of war*"[513].

7.2.2. The Austro-Hungarian School and Eisenbeton

In the "Design Subsidies" drawn up by the Austro-Hungarian Military Engineers, detailed explanations of the different construction technologies for armoured shells are used on permanent or semi-permanent structures. The construction of the covers was a determining factor in the definition of the passive resistance capacity of the structures,

511 The Austro-Hungarian Empire, for example, stipulated the use of concretes consisting of 87% aggregates (65% gravel and 22% sand) and 13% cement, thus with a composition very similar to the current ones (57% gravel, 26% sand, and 14% cement).

512 In the planning aids drawn up by the Austro-Hungarian Military Engineers, for example, there are specifications regarding the construction of the vaults, which were initially "made with two concrete linings (1.50 m thick) with a layer of sand or wall debris in between to dampen the vibrations produced by the explosion of the grenade, 1.00 m of sand or wall debris, later replaced with Coke powder, light material with high insulating power. Subsequent experiments demonstrated the ineffectiveness of this solution in favor of monolithic vaults, the optimal thickness of which was set at 2.50 m since the funnels produced by mine or grenade blasts reached a maximum depth of 0.65 cm, and only in exceptional cases was it possible to reach 1 m, so that further increases in height would have no influence on the resistance and would also considerably increase the cost. To increase the strength, iron meshes were later inserted between the concrete linings and then iron beams. Inserted ventilation ducts in the cavities, indispensable elements for the safety and functionality of the structure, but which had to have maximum protection". In GATTI, CACCIAGUERRA, QUENDOLO, 2016.

513 QUENDOLO, 2016.

which was divided into four different classes: resistance to mountain artillery fire, resistance to field artillery fire, resistance to grenade fire (pieces up to 20 cm calibre) and bomb-proof structures (pieces over 20 cm calibre)[514]. The elaboration of the different construction solutions proposed by the Austro-Hungarian military engineers results from an in-depth study of the structural behaviour of the new composite material obtained by the combined use of cement concrete and iron beams of various profiles. This combination proved to be an excellent solution to make the most of the structural capabilities of the two different materials, harmonising the high compressive strength of concrete with the tensile strength of steel.

Although this innovative construction technology of concrete reinforced with iron beams did not yet represent reinforced concrete as it is currently understood, the various experiments carried out demonstrated its great effectiveness in better resisting the potential bombardment of the renewed artillery than both the traditional stone roofs of 19th-century forts and the vaulted roofs of simple compressed concrete built by the Italian Army Corps of Engineers. General Rocchi had developed his model of an armoured fortress, taking up and reinterpreting, mainly for economic reasons, the construction technique used in the Austro-Hungarian forts of the previous era, the Vogl era, in which did not use iron beams but only layers of cement concrete in thicknesses from 1.0 to 2.5 metres as reinforcing coatings for the original stone vaults. On the contrary, the Austro-Hungarian Empire had already given up using only reinforced concrete vaulting walls by the end of the 1980s. It introduced compressed concrete roofs resting on a simple frame of iron girders. Since then, experiments on this new composite material, "reinforced concrete", have led to the definition of different construction solutions for these bomb-proof roofs with maximum thicknesses ranging from 1.8m to 1.95m, depending on the use of I-beams No. 35, assuming a maximum permissible span of 4.5-5.5m.[515] In the last years of the 19th century, imperial engineers also experimented with the Monier system[516], however, the results did not meet expectations at the time, and so, in order not to give up the alleged advantages of compressed concrete, the technology of building with concrete reinforced with iron girders, known as Eisenbeton, was continued. The load-bearing elements were the iron girders of various profiles, which were laid on the bottom of the roof and embedded in a thick concrete casting, the thickness of which was measured from the lower edge of the rafters.

514 SCHNEIDER, 1939; HAPTNER, 1985

515 ROSNER, 2016.

516 Already known since 1850, the patent signed by the father of reinforced concrete dates from 1870.

Various ballistic resistance tests were carried out, which led to an increase in the overall thickness to 2.15 metres for the horizontal roofs, on I-beams No. 40, and 2.7 metres for the vaults.[517]

The application of this Eisenbeton structural typology and the roof structures also resulted in the possibility of creating intermediate flat horizons between the different levels of the permanent fortifications, replacing the wooden floors with new, more resistant structures. In the design manuals, the detailed descriptions of these new technologies are often accompanied by actual dimensioning tables in which, depending on the geometry of the structures, the type of supports and the expected stress loads, the different design solutions are presented that envisage the use of iron profiles (*eisernen Traegern*), of corrugated sheets *(Wellblech*), up to the reuse of railway tracks (*Eisenbahnschienen*) as reinforcement beams. In this respect, particularly significant is Sheet 7.1, which effectively summarises the different types of grenade-proof roofing proposed for semi-permanent masonry constructions without protective earth layers. The in-depth analysis and redrawing of the abacus in question has made it possible to better understand useful information concerning the strengths envisaged for the masonry side walls and the different frames proposed about the type of beam used (I-beam, railway track type, corrugated sheet metal), but also to the different mix ratios for the cement concrete depending on whether it is used for foundation works (1:4:8), roofing (1:3:4) or vertical structures (1:4:6).

In the following sections of the manual, each of the types of construction identified on this map was followed by further detailed sheets, which were to contribute operationally to the future realisation of the works designed. In this regard, for example, Tab.7.2 illustrates the different types of supports designed for the resistant I-beam structures, the relative dimensional characteristics determined concerning the span and the overall thickness of the resistant part. At the same time, Tab.7.3 gives the technological specifications for the assembly and fastening of the structures made of corrugated sheets.

Similarly, Sheet 7.4 presents the technological-constructive solutions devised for grenade-proof roofs of temporary constructions in wood, iron, masonry and, in this case, with a substantial protective layer of earth. These proposals are quite interesting in that they also highlight the Austro-Hungarian army's attention to technological details capable of guaranteeing the best possible healthiness inside the built environment, for example by inserting measures to prevent water infiltration into the masonry and roofing against the ground.

517 For an extensive discussion of this, see Rosner's research on the same issues, well systematized in ROSNER, 2016.

Pic.7.15
Concrete remains, Cima Vezzena Fort, Italy

7.4 The contribution of the "Manuals of fortification" in the typological-constructive recognition of permanences

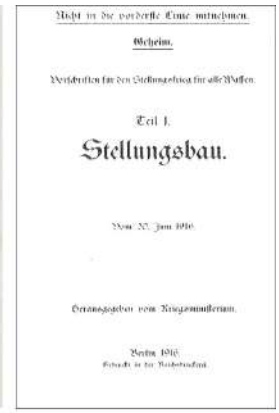
7.4.1 Processing of comparison schedules

In relation to what emerged from the analysis of the potential and fragility of the different "war landscapes", the in-depth studies presented in the previous chapters provide a very useful cognitive contribution to addressing the issue of the difficult recognition of the "traces of history" in the multi-layered contemporary landscape. The inevitable natural and anthropic transformation processes over time have in fact modified the typological nature and state of conservation of these traces, making them difficult to read and identify. In order to facilitate their recognition, a further significant contribution can be provided by the study of the iconographic and design apparatuses accompanying the various manuals drawn up by the fortification schools. These are model-types that represented the outcome of the articulated processes of fortification planning and the technical support indispensable to the various soldiers and officers in order to understand with greater ease and immediacy the typological and constructive characteristics of the different fortifications that they would have had to build and in which they would have lived. These guidelines proposed various project examples, hypothesising different materials, formal solutions and technical/technological details depending on the size, context and ease of finding construction materials, organising the case studies by type of construction: from studies of strongholds, shelters against grenades and infantry positions, to possible methods of constructing grids and camouflage.

One hundred years after the conflict, going back to studying these sketches, drawings and notes, also by comparing them with period and current photographs, translates into the possibility of knowing in detail the semiotics according to which the different "war landscapes" were written, with the aim of understanding their interpretative codes. It is precisely the knowledge of these codes, in fact, that can contribute to the elaboration of reference case histories useful for facilitating the recognition of these different types and construction technologies in the fragile permanences that still exist in the contemporary landscape, even in contexts where degradation and abandonment compromise their legibility (Tab.7.10-7.17).

The application of this method and the possibilities of knowledge obtained thanks to it, represent the operational contribution that indicator nr. 2 (on building typologies and technologies) can provide in the definition of the specific testimonial gradients, from the recognition of which future choices in terms of protection, conservation and

Manuali di progettazione forniti dal Genio Militare Italiano
Riferimento gen. Enrico Rocchi



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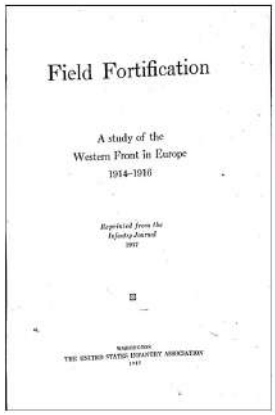
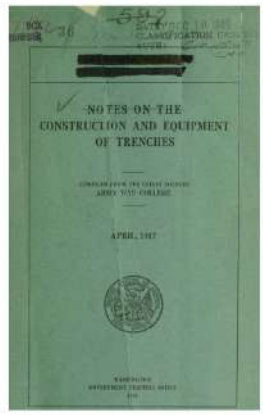
Fortificazione permanente, semipermanente e campale





Studi sulle fortificazioni del Fronte occidentale effettuati
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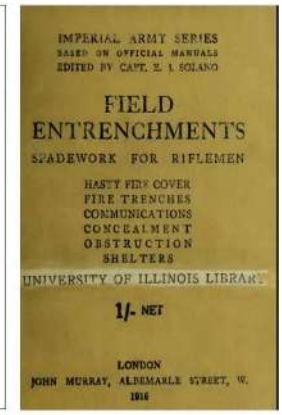


Manuali di progettazione forniti dal Genio Militare Belga
Riferimento gen. Brialmont

enhancement can be based.

It is therefore a question of declining this interdisciplinary cognitive method through operational tools, that is, defining "comparison tables" in which, in the face of a broad theoretical-knowledge base already described above, it is the communicative force of the images and drawings that guides the narration.

The following reflections, first of a general nature and then concerning some in-depth studies of an exemplary nature, have been elaborated by analysing and integrating the information from the fortification manuals of the various European military schools[518]. As has already

518 In particular, the study of the different construction technologies proposed by the Austro-Hungarian military engineers to construct anti-grenade roofs, and detailed considerations on some of the elements characterising the field fortifications. As stated in the introduction to the chapter, the intention of this study is not to apply the proposed cognitive method exhaustively to all the elements that make up the fortified systems and that are dealt with in the military manuals, but rather to highlight, using some

emerged in the previous section on the typological study of the remains, the constructional characteristics of the fortified works differed above all about the specific morphological conditions of the various territories (and therefore of the respective WS-Classes of reference) rather than because they belonged to one or another military school. Despite this, the study of the iconographic apparatus of the various military manuals has also made it possible to identify specificities and differences, particularly concerning original technological-constructive solutions rather than typological ones.

With this in mind, and perhaps for reasons of geographical and emotional proximity, the "Sussidi alla progettazione" drawn up by the Austro-Hungarian Empire and the Kingdom of Italy were first analysed in detail. Then the data obtained from them were compared and contrasted with the manuals of other European schools.[519]

General considerations.

Being set up as real school aids for the members of the various official schools, a common feature of the various manuals is the organisation by "lessons", that is, by single topics referring to specific elements of the fortified systems (entrenchments, linings, accessory defences, profiles and layouts, observatories, to name but a few). This approach facilitates the reading and the comparison of the solutions proposed by the various fortification schools. The first sections often consist of a general reminder of the essential principles of "practical geometry", i.e. the basic concepts that are indispensable for all types of military design, including the definitions of surface, layout, section, profile, scarp, etc.[520], but also a quick review of the basic rules of descriptive geometry concerning orthogonal, axonometric and perspective projections of plane and three-dimensional

experiments, the potential of this approach to create a useful cognitive base to facilitate the recognition of specific construction techniques/technologies in the current remains.

519 The following have been consulted: the planning aids drawn up by the Austro-Hungarian Military Engineers, kept at the Kriegsarchiv in Vienna and copies at the State Archives and the Provincial Archives of Trento; the planning manuals drawn up by the Allies (British and American), freely available online thanks to cataloging projects managed by Harvard University; the manuals and treatises written by A. Brialmont regarding Belgian fortifications; some planning aids and manuals drawn up by the Prussian Engineers; Italian military manuals kept at ISCAG, AUSSME, AUSSME, ISCAG, and AUSSME. Brialmont regarding Belgian fortifications; some planning aids and manuals elaborated by the Prussian Corps of Engineers; the Italian military manuals preserved at ISCAG, AUSSME, the Italian Historical Museum of War in Rovereto.

520 Practical geometry" as defined in the "Elementary notions of fortification carried out according to the program of the Instruction for the examination of suitability for the rank of second lieutenant of completion" of the Italian Corps of Engineers. 1890.

figures.

Secondly, an important focus is on how to inspect the terrain and context to identify the most advantageous and privileged positions to be fortified and deploy troops correctly.

Then, getting to the heart of the matter, the works are usually subdivided into permanent or semi-permanent, temporary and field structures. At the same time, independent chapters are reserved for the description of obstacle courses, such as the systems of interweaving wire and barbed wire with screws and stakes.

Concerning some proposed general solutions, the project drawings identify mixed construction techniques in stone, concrete and steel beams for long-term constructions. At the same time, the use of wood is favoured in the construction of barracks and temporary shelters. In this regard, the importance of the active role of the landscape in the war process that took place there is also reflected in the choice of specific construction techniques. In fact, for temporary constructions, solutions are repeatedly proposed in which wood is used for structural purposes (both for roofs and vertical structures). In contrast, stone is used as a covering material, probably to seek camouflage concerning the mountain landscape in which could build these structures.[521]

These model-types not only concern the structural aspects, but also present numerous technological devices designed to guarantee minimum levels of liveability inside the structures, including the identification of different drainage systems for the works against the ground, with consistent layers of rough-hewn stone arranged in a sloping position to keep any water infiltration away from the outside, or the provision of appropriate cavities for air circulation and heating.

Great importance was given to the methods of constructing entrenchments, presenting in detail not only the different types of profiles and layouts about the function they had to perform (active defence, shelter, rear, seated, kneeling and standing positions, to name but a few) but also the technological solutions for the covering of the walls, for water drainage and the use of the most convenient materials. In this regard, all the manuals show how the bank of the ditch facing the enemy had to have a step at the base for the entire length of the excavation to facilitate observation of the opposite front, while different solutions to protect the walls of the trenches from landslides and flooding were envisaged with timber cladding and trellises, differentiated according to

521 In this regard, reference is made, for example, to the design subsidies drawn up by the Austro-Hungarian military engineers for semi-permanent and temporary works in medium/high altitude mountain contexts, where the need for camouflage and mimesis within the alpine landscape favored stone cladding to conform to the surrounding rocky morphology.

the stratigraphic nature of the ground.

It is interesting to note how the comparison of the models proposed in the manuals of the different fortification schools reveals very similar characteristics: from the dimensioned drawings of the single uprights of the barbed wires and fences, to the complex organisation of the Spanish obstacles and horses, the different ways of inserting the props into the ground are proposed, as well as the ways of connecting the barbed wires to the wooden piles, up to the possible use of trunks and cut tree branches as elements for camouflage. In some manuals, specific in-depth studies are dedicated to the presentation of the different ways of restoring and adapting entrenched systems to new use after assaults and bombings and the possibilities of occupying the craters left on the ground by the bombings for defensive/offensive purposes.[522]

On the other hand, other compendia indicate how to build temporary fortifications and entrenchments around an entire village or part of it, for different purposes: protection of the village, use as a support position for the front line, occupation and conquest.[523]

While a series of typological-constructive characteristics are common and repeated in the manuals belonging to the various fortification schools, there are also some differences and different degrees of detail regarding specific themes.

In particular, as already mentioned in the previous paragraph concerning the "Design Subsidies" drawn up by the Austro-Hungarian Empire, there are interesting technological-constructive abacuses about the methods of structural reinforcement of existing fortifications after the introduction of torpedo grenades and other innovations in the field of artillery, specifically about the construction technologies of the anti-grenade covers.

In the Belgian and English manuals, on the other hand, there are particular details regarding the methods of crossing the ditches around the forts in the presence of water, with solutions that could could also use for the construction of dry passages in the entrenched systems on the western front, where the presence of the water table at very low depths, as already mentioned, made excavation operations very difficult.

The comparisons between the different Fortification Schools are summarized in Tables 7.5-7.9.

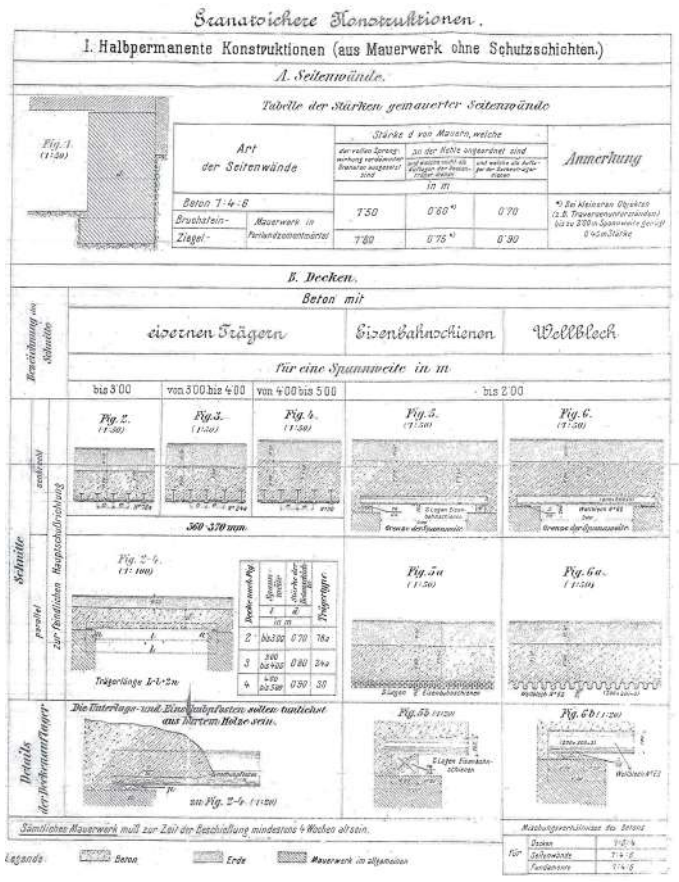
522 In particolare ciò si ritrovava in "Notes on the construction and equipment of trenches, War Department, Document. NR: 592, aprile 1917, Washington Government Printing Office".

523 In particular this was found in "Hasty intrenchments. Reference book with nine plates, London, Henry S. King&Co., 65 Cornhill, 1872."

Conclusions

To understand the actual role of these guidelines in the actions of landscape modification, it is interesting to compare the proposed model-solutions, independent of specific contexts, with indirect documentary sources and historical period photographs: the outcome of these comparisons highlights a direct correspondence between the various prototypes drawn in the 'Subsidies' and the concrete realisations of the permanent and field fortifications scattered along the entire front line, in morphologically very different contexts. In the light of these considerations, one realises how the 'war landscape' was a palimpsest constructed from an intricate network of carefully designed signs. Concerning contexts that, due to their intrinsic fragility, are no longer legible today, the awareness of this close relationship between project-type and realisation makes it possible to start from the knowledge of these manuals as a useful reference to investigate the territory in search of the traces of these contexts.

Manuals:



Specifically, in section A. Seitenwande (side walls), corresponding to the adjacent Fig.1, the different thicknesses d that the walls supporting the roofs were to have in relation to the construction materials and the direct or indirect exposure to potential bombardment are presented. The thickness of walls built of cement concrete or stone with cement mortar directly exposed to the bombing had to be at least 1.50m, while it was reduced to 70cm if they were not directly exposed but the roof supported them, and to 60cm if they were not exposed but did not even support the floors. Larger dimensions were required for brick walls, for which the thicknesses were 1.80m, 90cm, or 75cm, respectively. In section B, on the other hand, the longitudinal and transversal sections of the different roof packages are compared, with relative structural dimensioning, in relation to the use of resistant elements in I-profiles of various dimensions (Fig. 2,3,4), in railway tracks (Fig.5) and in corrugated metal sheets (Fig.6). Without going into the details of the dimensional specifications, which can be clearly deduced from the redrawn table, it can be seen that for spans from 3.00 to 5.00 meters, the use of I-profiles was exclusively envisaged, while if the span was less than 2.00 meters the railway track sleepers could be used, specifically arranged as shown in Fig. 5a, or corrugated sheet metal elements appropriately fixed on mainly wooden sleepers as shown in Fig. 6b.

Costruzioni anti-granata

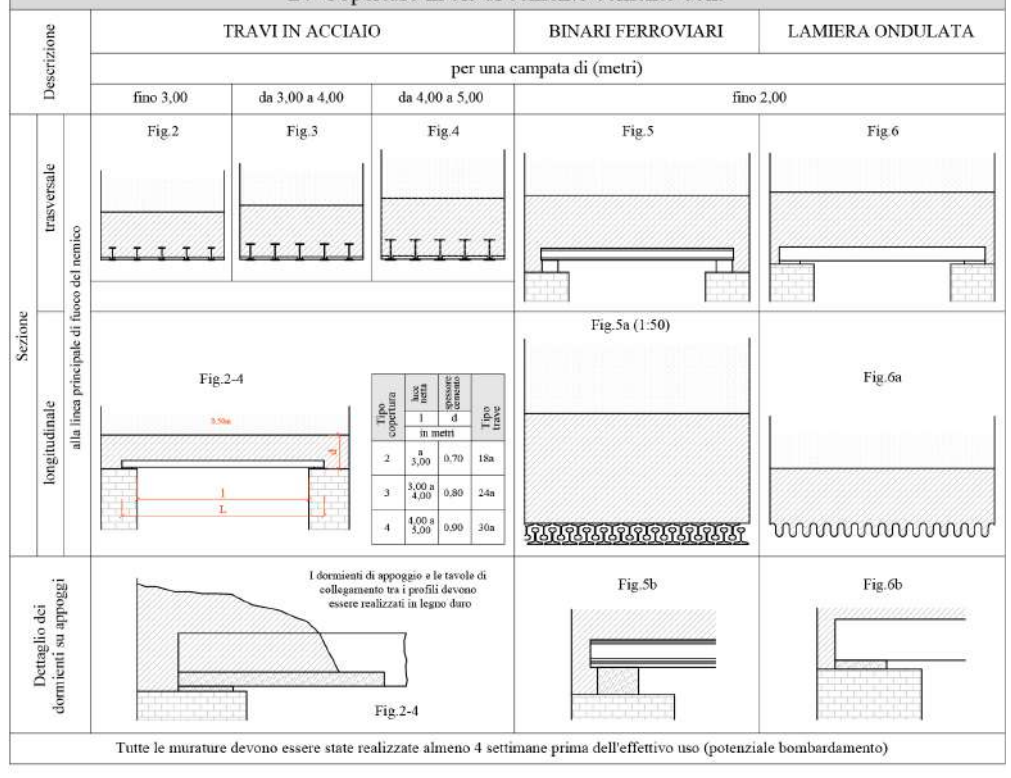
I. Costruzioni semipermanenti (in muratura senza strati protettivi)

A. Parete laterali

Fig.1

Tipologia di pareti laterali		Spessore d della muratura: Esposta alla carica esplosiva intera della granata	Non esposta alla granata: non serve come supporto per le travi del soffitto	Non esposta alla granata: serve come supporto per le travi del soffitto	Note
		in m			
Cemento 1 : 4 : 6		1,60	0,60*	0,70	(ad esempio ricoveri a capriate) fino a 2,00m di larghezza per 0,45m di spessore
Pietra	Muratura con malta di cemento Portland				
Mattone		1,80	0,75*	0,90	

B. Coperture in cls di cemento cemento con:

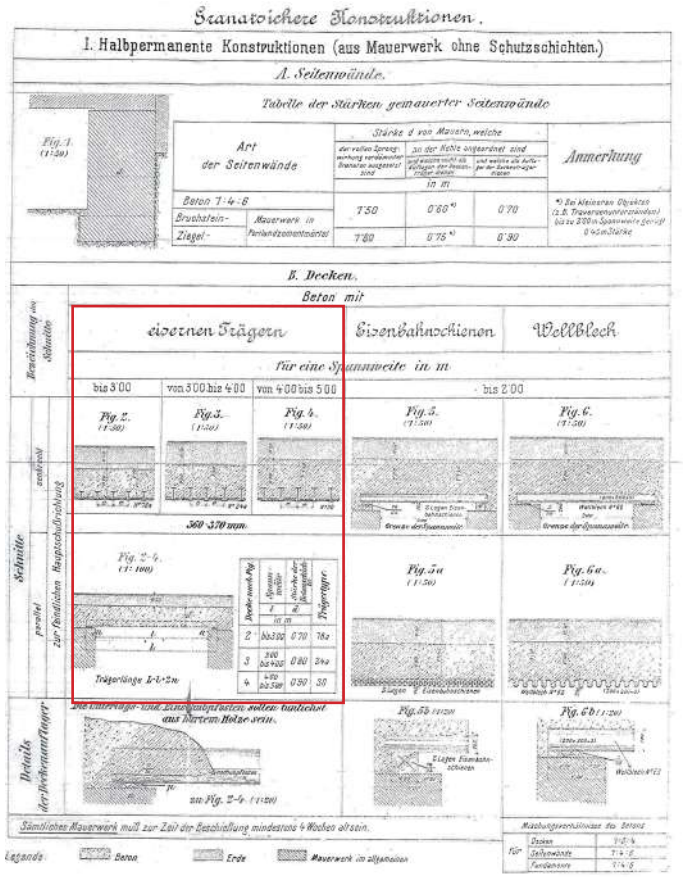


Legenda			
Cemento	Terreno	Muratura	Legno

Miscela dei contenuti di cemento		
per	coperture	1 : 3 : 4
	pareti laterali	1 : 4 : 6
	fondazioni	1 : 4 : 8

Belvedere Fort - Lavarone (Italy)

Manuals:



Granatsichere Konstruktionen.

I. Halbpermanente Konstruktionen (aus Mauerwerk ohne Schutzschichten.)

A. Seitenwände.

Tabelle der Stärken gemauerter Seitenwände

Art der Seitenwände	Stärke d von Mauern, welche: der vollen Sprengwirkung verdämmter Granaten ausgesetzt sind	an der Kehle angeordnet sind	Anmerkung
	in m		
Beton 1:4:6	1·50	0·60 *)	0·70
Bruchstein- Mauerwerk in Portlandzementmörtel	1·80	0·75 *)	0·90

*) Bei kleineren Objekten (z.B. Traversenunterstandsräumen) bis zu 200 m Spannweite genügt 0·45 m Stärke

B. Decken.

Beton mit

Verwendung als Schnitte	eisernen Trägern	Eisenbahnschienen	Wellblech
	für eine Spannweite in m		
	bis 3·00 / von 3·00 bis 4·00 / von 4·00 bis 5·00	bis 2·00	
zentrisch	Fig. 2. (1:50) / Fig. 3. (1:50) / Fig. 4. (1:50)	Fig. 5. (1:50)	Fig. 6. (1:50)
parallel zur Fahrbahnachse	360-370 mm.		
Hauptschnitt	Fig. 2-4. (1:100)	Fig. 5a (1:50)	Fig. 6a (1:50)
Details der Eisenkonstruktion	zu Fig. 2-4. (1:10)	Fig. 5b (1:20)	Fig. 6b (1:20)

Decke nach Fig.	Spannweite in m bis	Stärke der Betondecke	Trägertype
	l	d	
	in m		
2	bis 3·00	0·70	18a
3	3·00 bis 4·00	0·80	24a
4	4·00 bis 5·00	0·90	30

Trägerlänge L = l + 2n

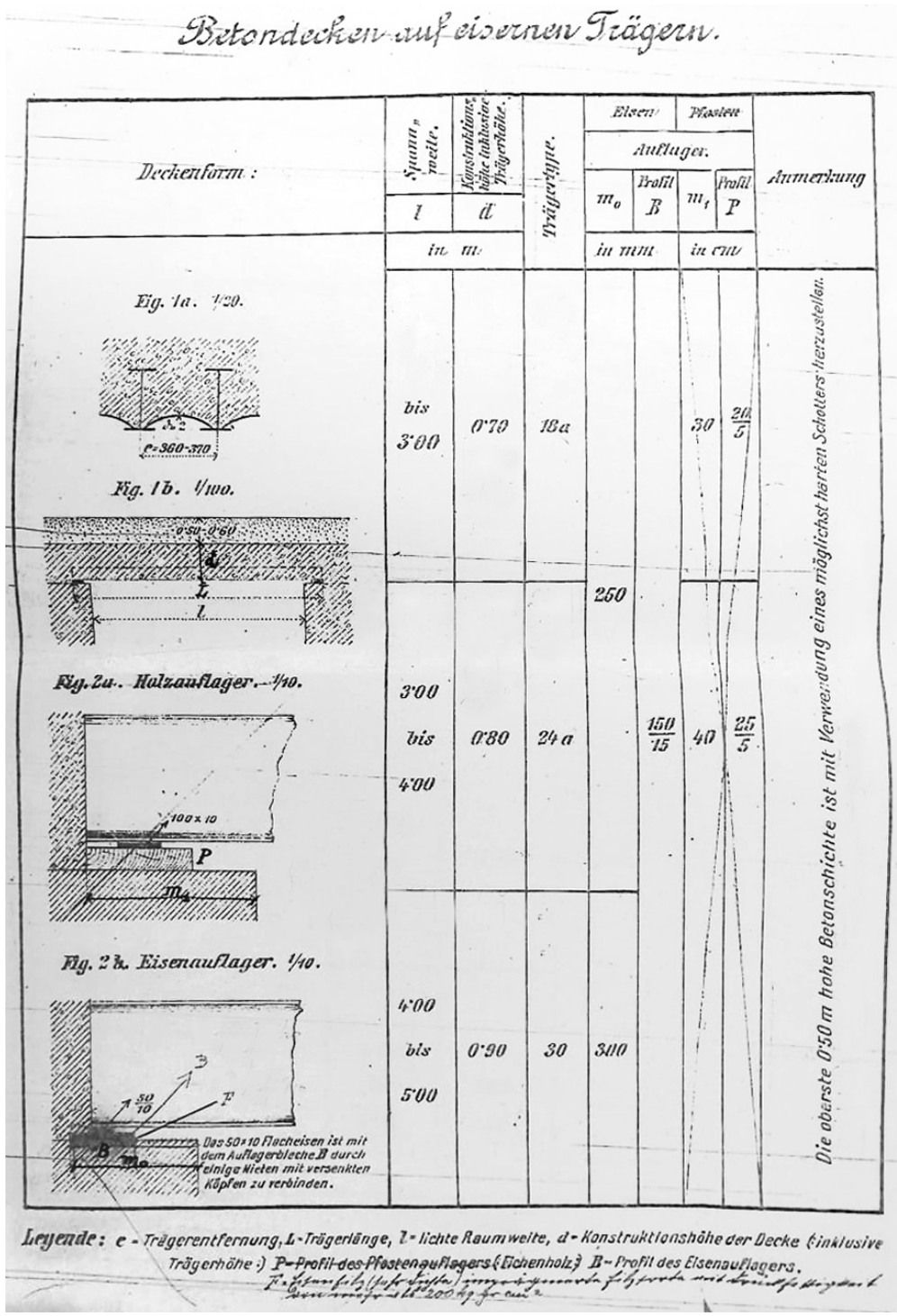
Die Unterzugs- und Randschutzpfosten sollen tunlichst aus hartem Holze sein.

Sämtliches Mauerwerk muß zur Zeit der Beschießung mindestens 4 Wochen alt sein.

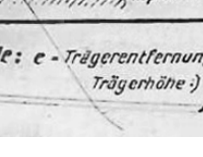
Mischungsverhältnisse des Betons

für	
Decken	1:3:6
Seitenwände	1:4:6
Fundamente	1:4:8

Legende: Beton / Erde / Mauerwerk im allgemeinen



Betondecken auf eisernen Trägern.

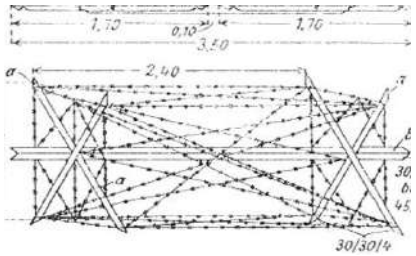
Deckenform:	Spannweite l in m	Konstruktionshöhe (inklusive Trägerhöhe) d in m	Trägertype	Eisen: Auflager m_0	Eisen: Auflager Profil B	Pfosten: Auflager m_1	Pfosten: Auflager Profil P	Anmerkung
				in mm		in cm		
Fig. 1a. 1/20.  c = 360-370	bis 3·00	0·70	18a	250		30	20/5	Die oberste 0·50 m hohe Betonschichte ist mit Verwendung eines möglichst harten Schotters herzustellen.
Fig. 1b. 1/100. 0·50-0·60	3·00 bis 4·00	0·80	24a		150/15	40	25/5	
Fig. 2a. Holzauflager. 1/10. 100 x 10	4·00 bis 5·00	0·90	30	300				
Fig. 2b. Eisenauflager. 1/10. Das 50×10 Flacheisen ist mit dem Auflagerbleche B durch einige Nieten mit versenkten Köpfen zu verbinden.								

Legende: c - Trägerentfernung, L - Trägerlänge, l - lichte Raumweite, d - Konstruktionshöhe der Decke (inklusive Trägerhöhe); P - Profil des Pfostenauflagers (Eichenholz) B - Profil des Eisenauflagers.

As a comment on what is shown in Tab.7.1, it can be seen that Fig.1a and Fig.1b show respectively the transversal and longitudinal sections of the type of roof proposed in I-beams, laid on-site with spacing between 360 and 370mm. The thickness d of the layer of concrete varies between 70, 80, and 90cm in relation to the free span of the span and the respective type of beam used: for spans of up to 3.00 meters, it was envisaged to use profiles no. 18a, for spans between 3.00 and 4.00 meters beams no. 24a was indicated, while to cover spans between 4.00 and 5.00 meters beams no. 30a were to be used. The section on the right shows the two different types of support designed, specifying the dimensioning not only for the type of sleeper itself (in wood or iron) but also for the different depth at which the sleeper had to be positioned with respect to the internal face of the supporting masonry. In the case of the wooden element, as shown in Fig.2a, what varied was not the size of the section of the sleeper (150x15mm) but rather the distance m1 at which it had to be inserted: 25cm back from the internal edge of the wall for spans up to 4.00, 30cm for those between 4.00 and 5.00 meters. The iron profile was 20x5cm for spans of up to 3.00 meters, with m0 equal to 30cm, and a larger dormer of 25x5cm set back 40cm from the inside edge of the wall for spans of between 3.00 and 5.00 meters.

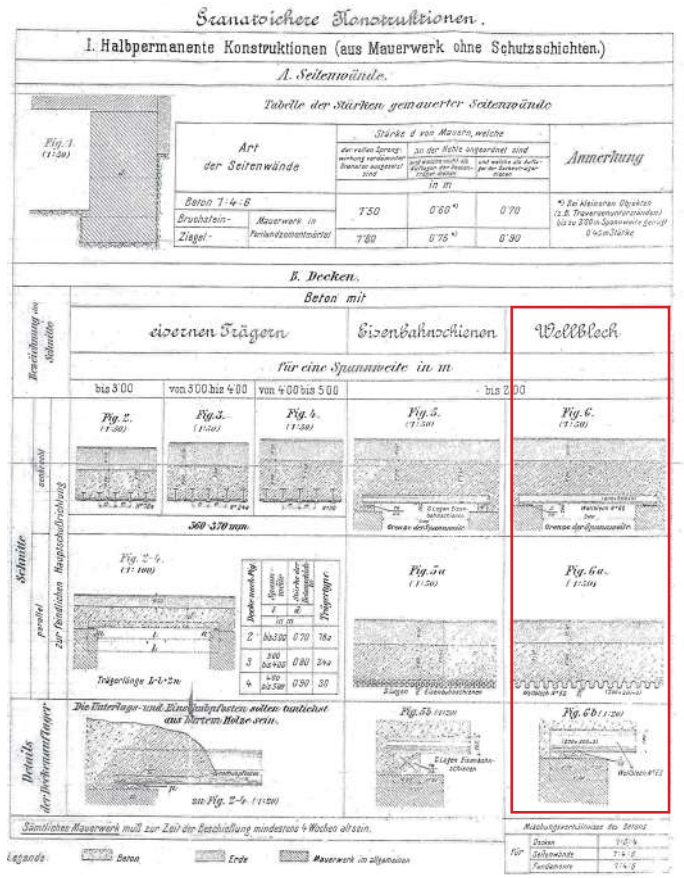
Manuals:

Wellbleche (for vaulted roofs)

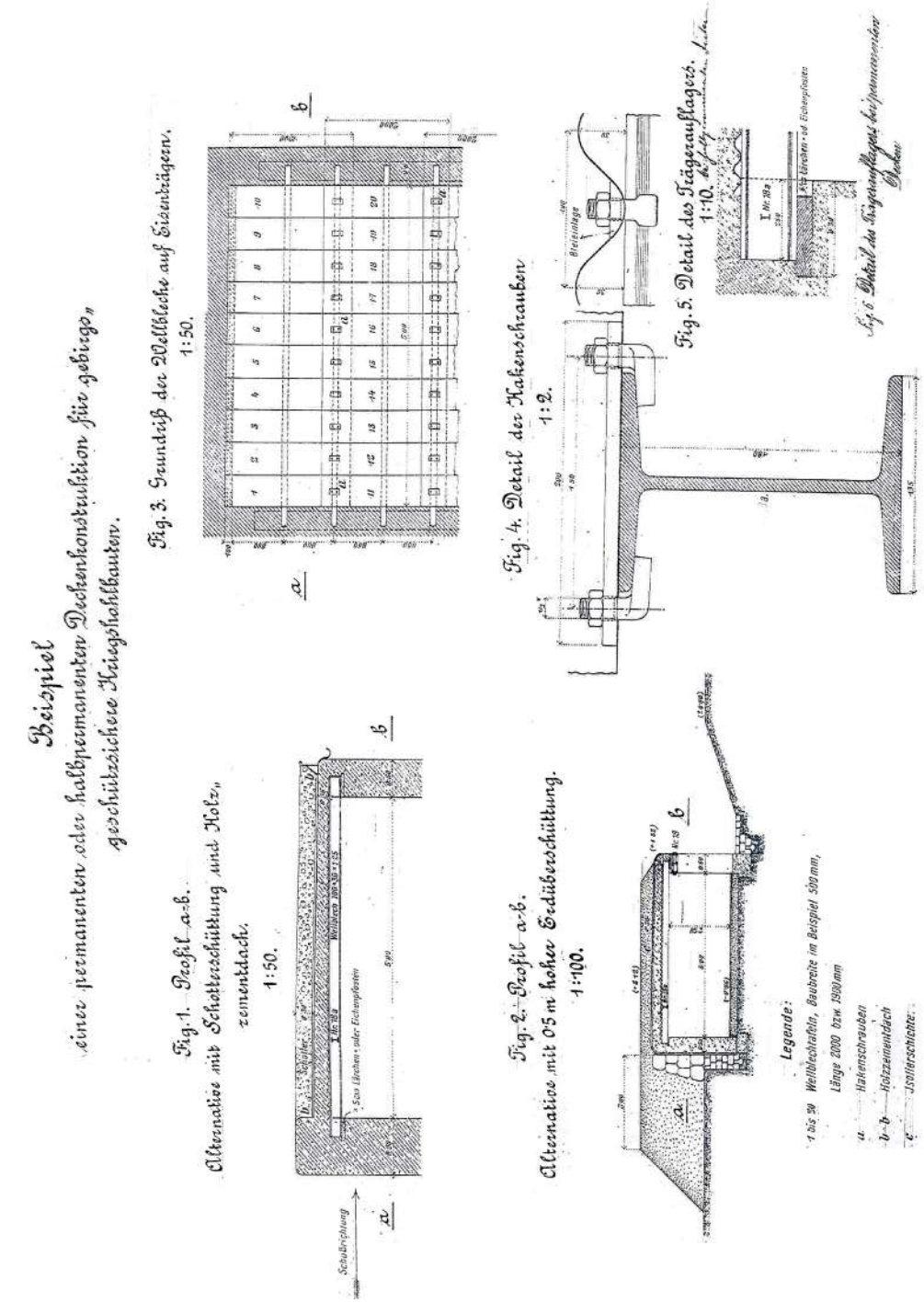


Garda Fort - Riva del Garda (Italy)

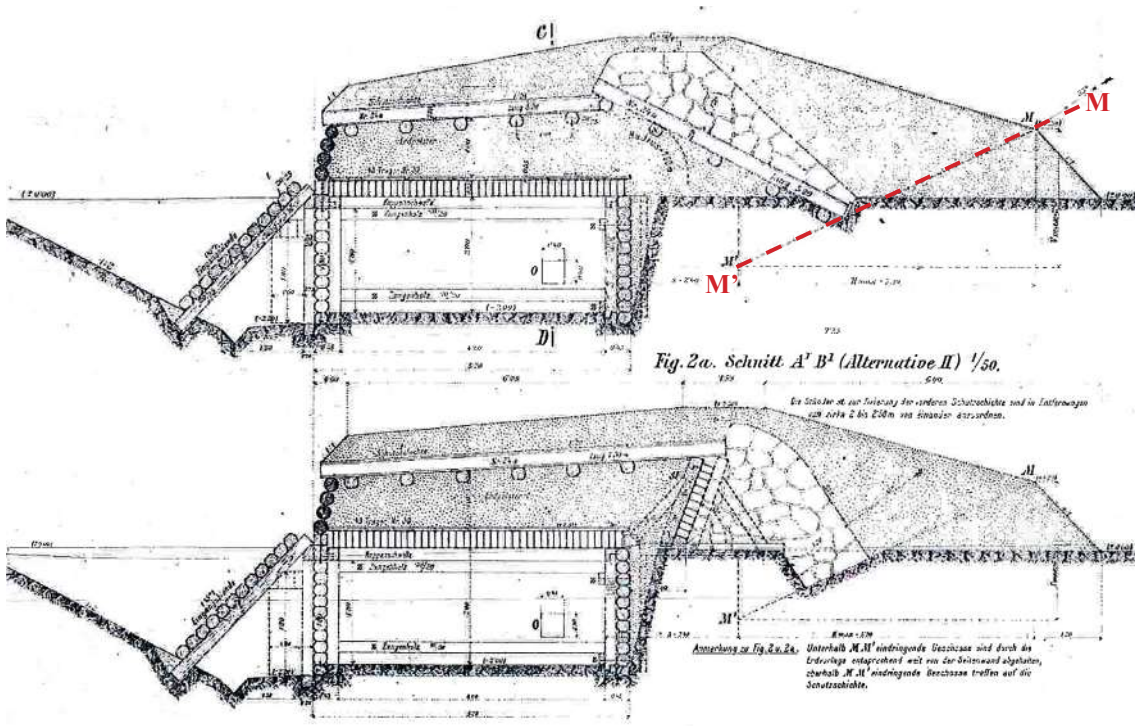
Alto Fort - Mattarello, Trento (Italy)

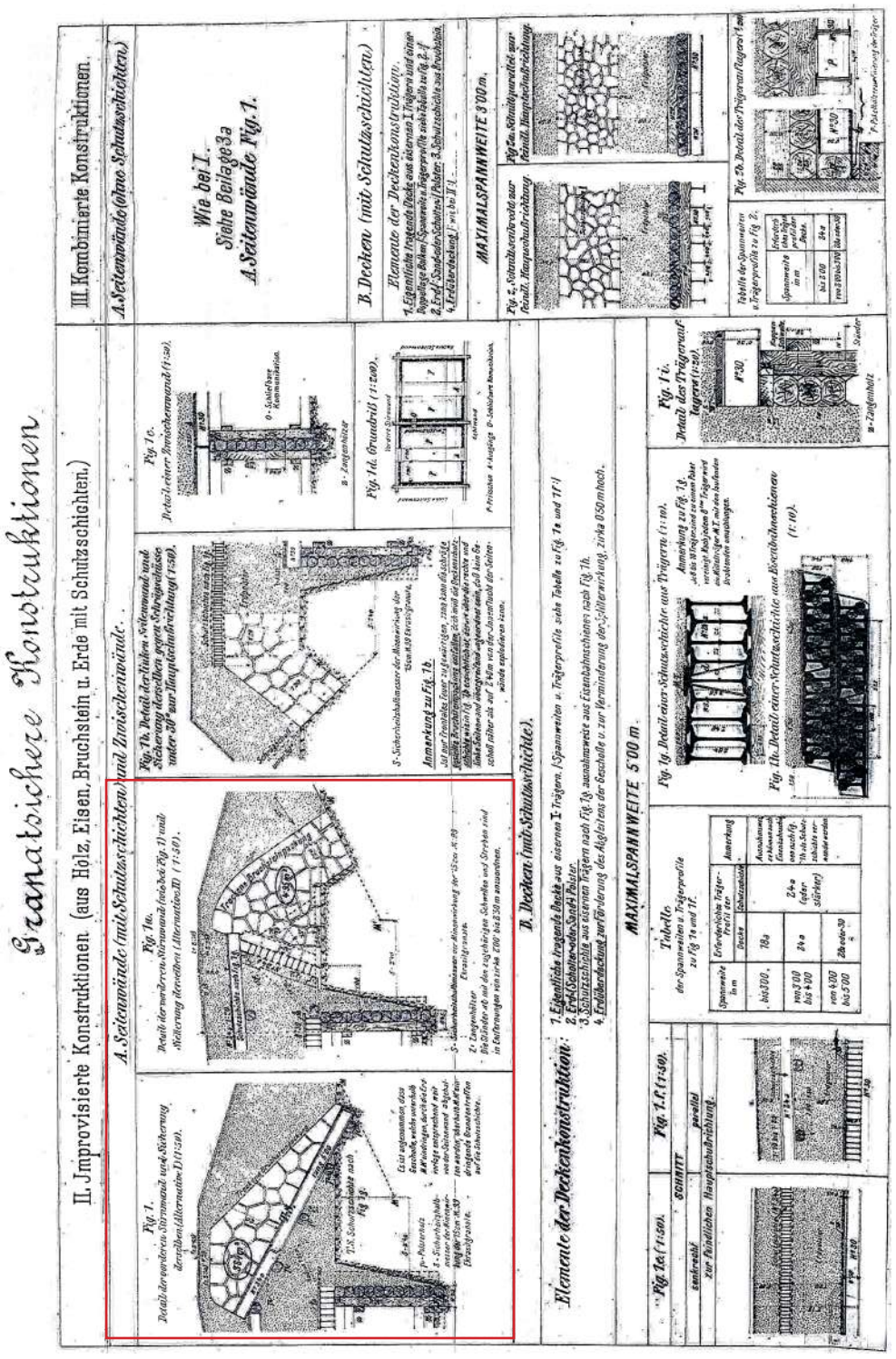


As a corollary to the diagram summarising the different types of construction for the grain-resistant roofs of the semi-permanent works, the attached drawing shows in detail the technical and technological specifications for the structures built using corrugated sheets supported and fixed on iron beams. As is evident from the plan shown in Fig.3 and from the legend, the corrugated sheets were made up of panels (in the drawing numbered from 1 to 20) measuring 200x50cm, bolted onto iron beams with I-profile no. 18a, laid orthogonally to the longitudinal direction of the sheets, with an interest of approximately 80cm. Fig.4 shows the detail of the fastening by means of bolts. Fig.1 and Fig.2 show two different alternatives with respect to the stratigraphy of the roof. Compared to the traditional earth layer of about half a meter (Fig.2) with an insulating layer in between close to the roof, Fig.1 shows a package called Holzzement with gravel, typical of Austro-Hungarian constructions and already used for the roofs of temporary works in mountainous areas. This particular material, developed in 1839 by Hausler (forerunner of the flat roof), consisted of overlapping layers of oil and cardboard glued with pitch or tar onto wooden formwork and covered with a layer of sand or gravel. By proposing a kind of prefabrication of what could be a green roof, the Holzzement could also make an important contribution to the masking and camouflaging needs of these works.



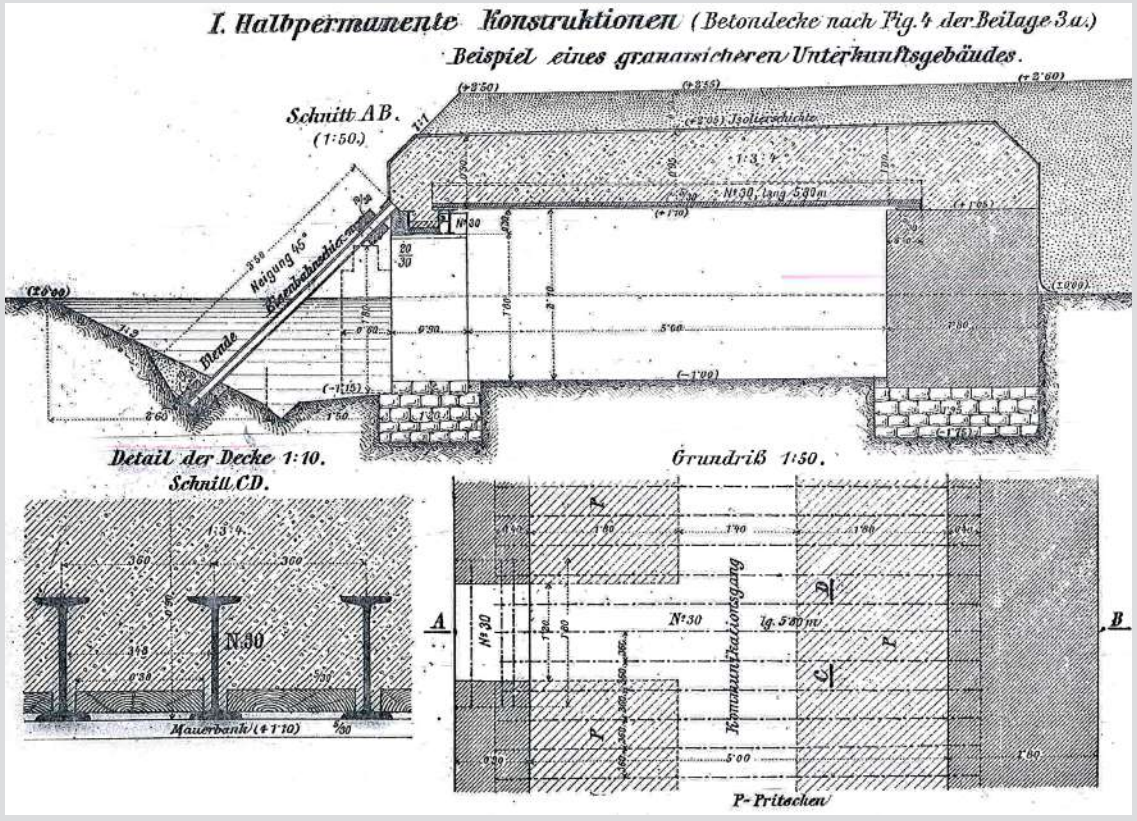
Tab.7.4 | ANTI-GRANATIC CONSTRUCTIONS - Temporary basement works - Austro-Hungarian subsidies





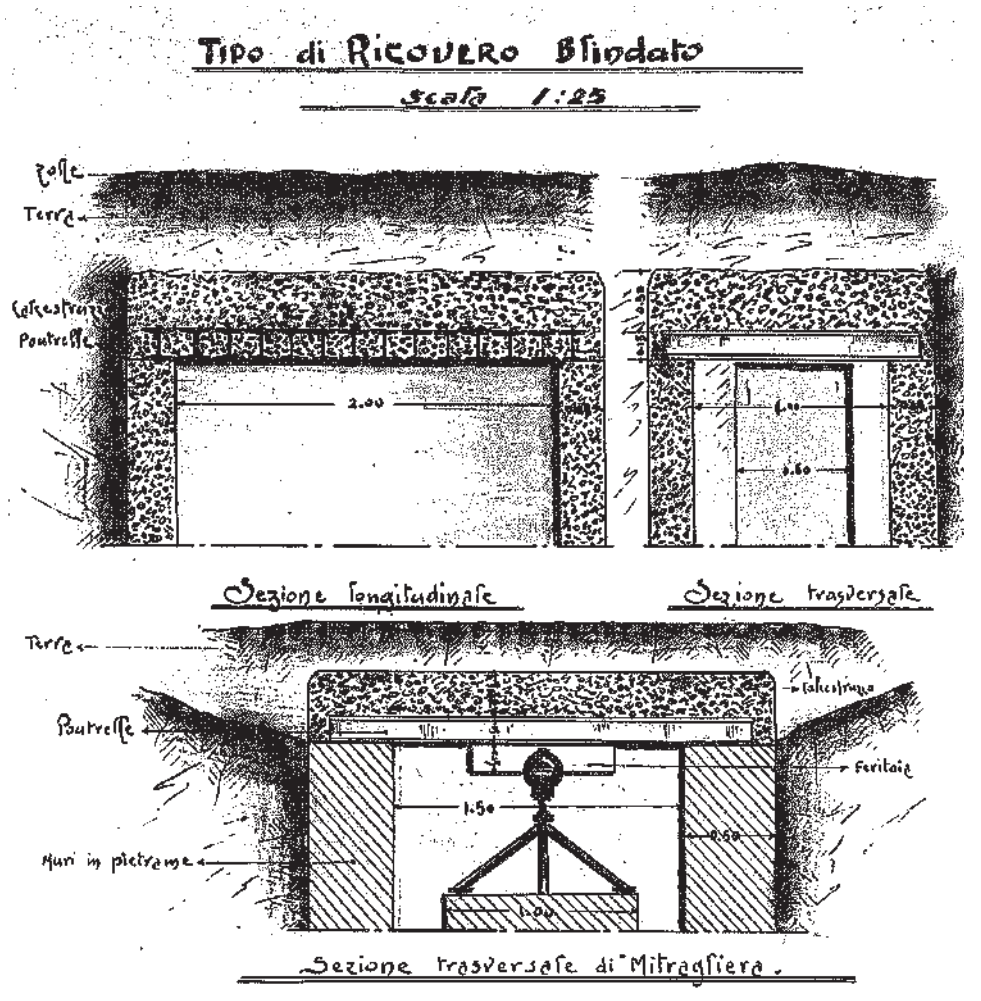
The declination of the types of construction of armored roofs for temporary constructions, to be built with a protective layer of earth, substantially resembles the solutions proposed in Table 7.1, with the addition of a sort of double armored protection hidden between the free surface and the extrados of the actual roof. As can be seen from the drawings in section A (Sidewalls with a protective layer and partition), this intermediate protective layer consisted of a resistant iron girder structure, which could be either I-profiles (Fig. 1g) or Eisenbahnschienen (Fig. 1h), resting on a simple wooden girder frame and protected, on the side exposed to enemy fire, by a draining layer of compacted rough-hewn stones. Depending on the morphological context of reference and the distances from the enemy lines, the inclination of these protective layers and the number of compacted stones could vary, but the basic logic remained the same. The security guaranteed by these solutions was based on the knowledge that any projectiles penetrating below the MM' line would dissipate their explosive charge in the layers of soil, while those penetrating above this hypothetical line would be blocked by the double armored cover. As can be seen in the details opposite, the resistant iron profiles were almost 'embedded' one inside the other in such a way as to form a sort of continuous resistant shell, creating an underground declination of the armored domes which, in those years, were used to protect the exposed parts of the permanent fortifications. As already mentioned, the analysis of these model projects reveals another very interesting technological device concerning the need to prevent the infiltration of water into underground roofs/masonries. As is clear from the drawings, the layer of compacted stones protecting the resistant iron structure also performed a sort of draining function, channeling the water away from the construction and towards the enemy.

"Design Grants" - AUSTRO-HUNGARIAN EMPIRE



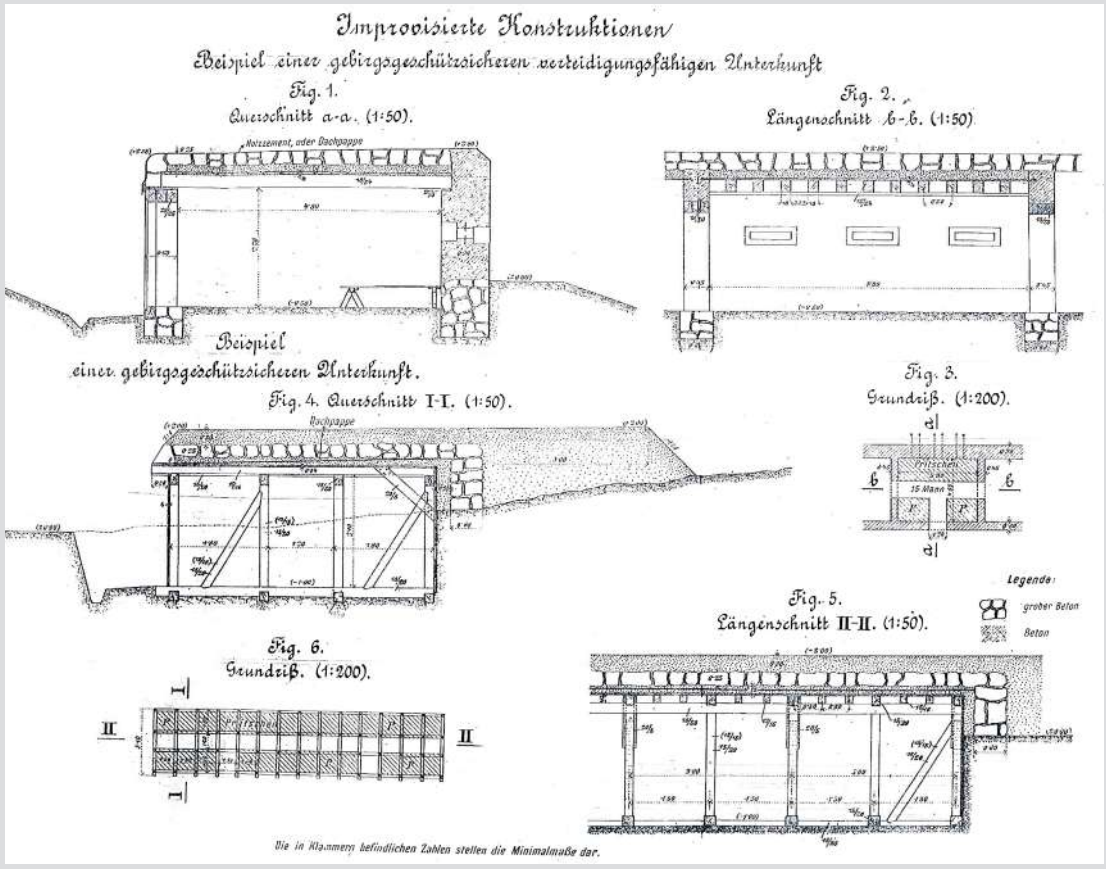
In the "Sussidi di progettazione" drawn up by the Austro-Hungarian Military Engineers, there are different models for constructing semi-permanent shelters against grenades, differentiated according to the type of armored cover proposed. In the example shown above, the roof structure is set up according to Eisenbeton construction technology, in which the load-bearing elements are represented by iron beams laid on the bottom of a thick cement concrete casting (95-100cm) consisting of the traditional 1:3:4 mix ratio as required for armored roofs (see TAV.XX). The iron profiles are I-type no.30 and are positioned at 36cm centers; in length, they cover the entire free span of the room with a 40cm support on the sidewalls, which are not made of cement concrete. As can be seen from the CD detail section, 5x30cm constrosoffittatura tiles are placed on the extrados of the metal truss. In contrast, 5x30cm wooden boards are placed in the same direction to contain the concrete casting between one metal element. An insulating sheath is placed between the concrete casting and the ground covering to prevent water infiltration. A comparison with the prototype elaborated by the Italian Military Engineers for the same type of construction shows that, with the same structural technology, the Austro-Hungarian aids propose a dimensionally more important model and also more significant attention to the technological-constructive details.

Military manuals - KINGDOM OF ITALY



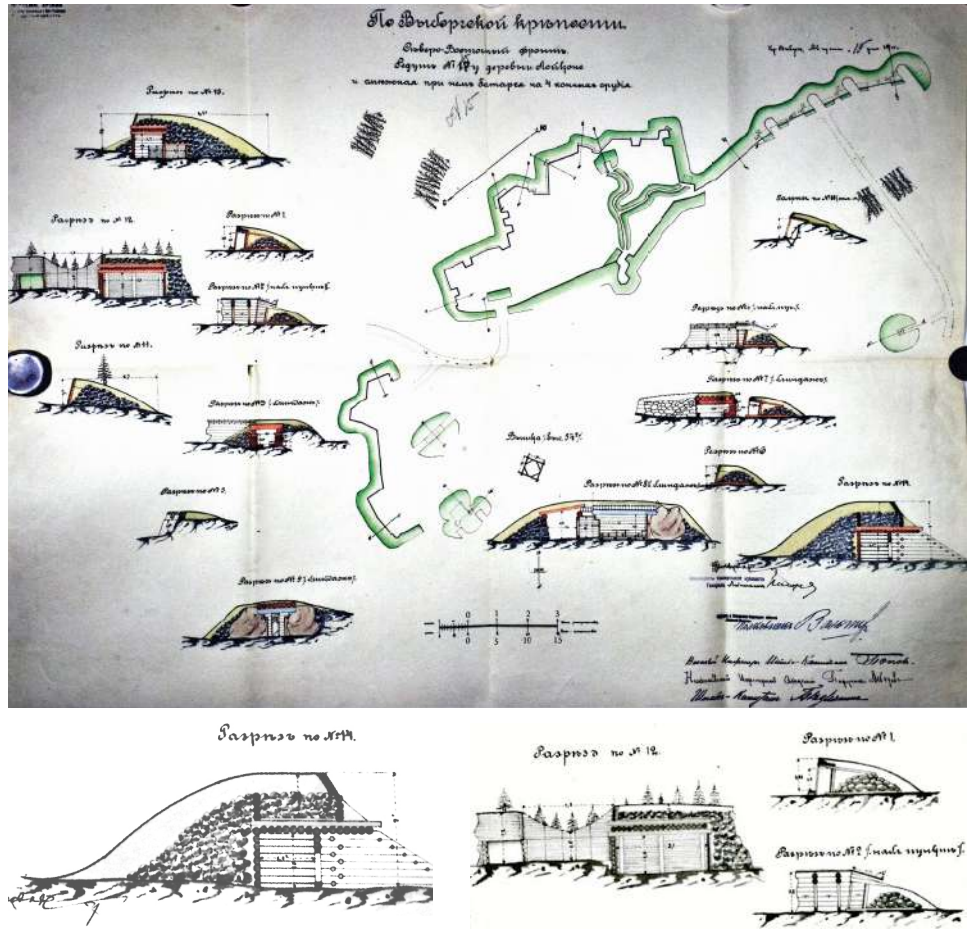
In the military manuals drawn up by the Italian Military Engineers, there are various models of armored covers for semi-permanent and temporary works, typologically similar to the models found in the Austro-Hungarian aids. In the case shown above, it can immediately be seen that the proposed structural solution is very similar to the one developed by the imperial colleagues, i.e., a concrete roof with iron girders embedded at the base. The first noticeable difference concerns the degree of detail in the proposed design, which is more of a construction scheme than an accurate model to be followed on site. In addition, it can be seen that the girders are very small in size compared to those provided for by the Austro-Hungarian subsidies. The layer of concrete above them is only 50 cm: however, it must be emphasized that this cannot be considered a reason for a different structural strength assessment since the boundary conditions envisaged may be different.

"Design Grants" - AUSTRO-HUNGARIAN EMPIRE



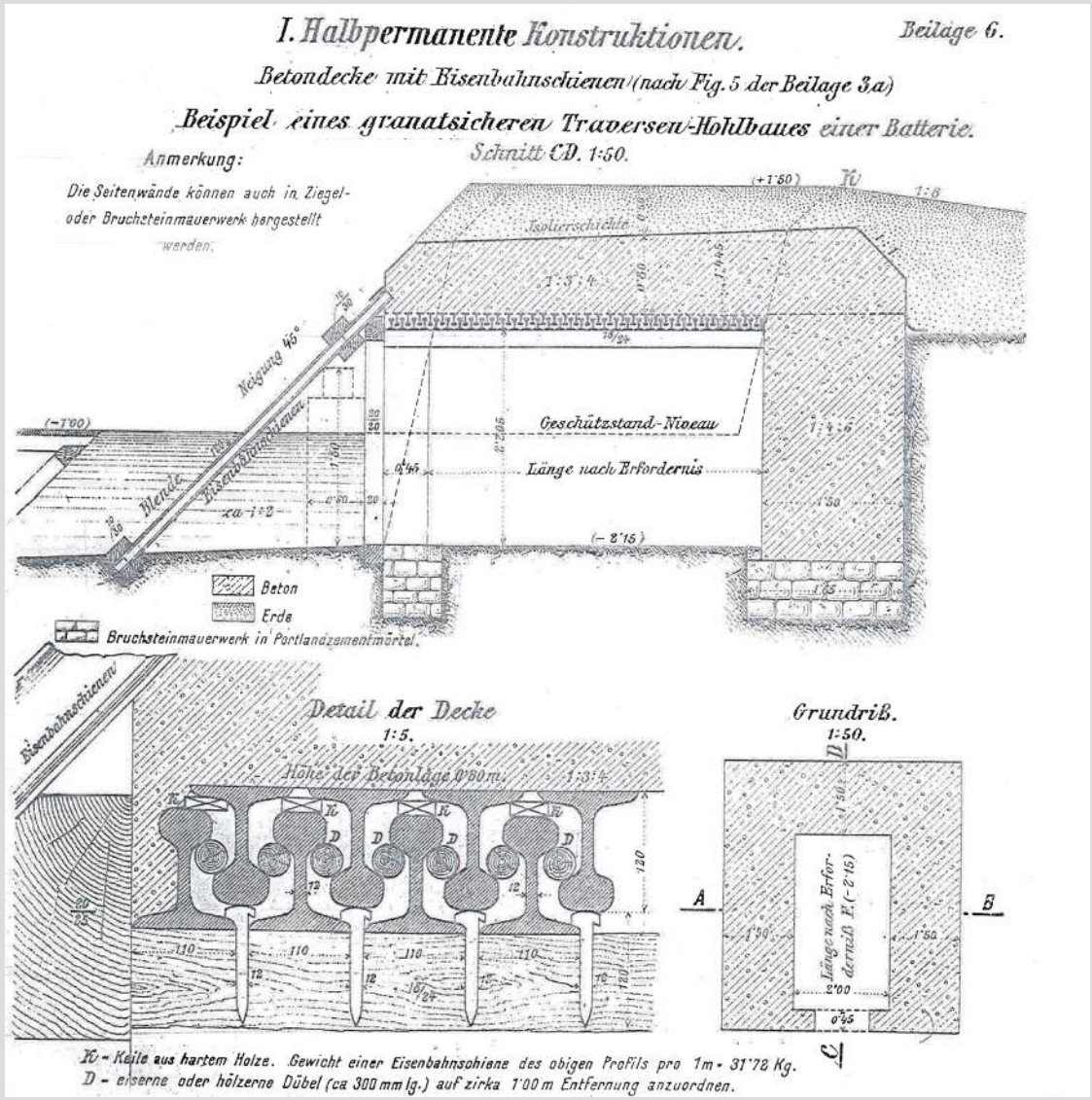
As far as temporary constructions are concerned, the "Sussidi di progettazione" drawn up by the Austro-Hungarian Army Corps of Engineers presented different solutions according to the context in which they were built, differentiating in particular between cases in which they were built entirely above ground or leaned against natural shelters such as slopes or mountainsides, at least on one side. Since they are temporary constructions and not designed to "last" over time, as far as building materials are concerned, there is massive use of wooden elements, both for the vertical bearing structures and the roofing. In the case of constructions entirely above ground and therefore not protected by natural elements, the side walls were cement concrete. At the same time, the roof structure had a wooden frame with 18x24cm beams, above which the Holzzement package was to be inserted (see TAv.XX). This technology, in fact, thanks to the upper layer of gravel and rough-hewn stones, contributed to camouflaging the shelter in the surrounding landscape to make it less recognizable to enemy aerial reconnaissance. In the case of temporary shelters on mountain slopes, the covering layer could be made of earth, thus extending the natural element. In the latter case, moreover, since the structure was naturally protected, almost entirely wooden structures were envisaged, even as regards the vertical elements, provided with a 15x20cm section as indicated in sections I-I and II-II.

Military manuals - RUSSIA



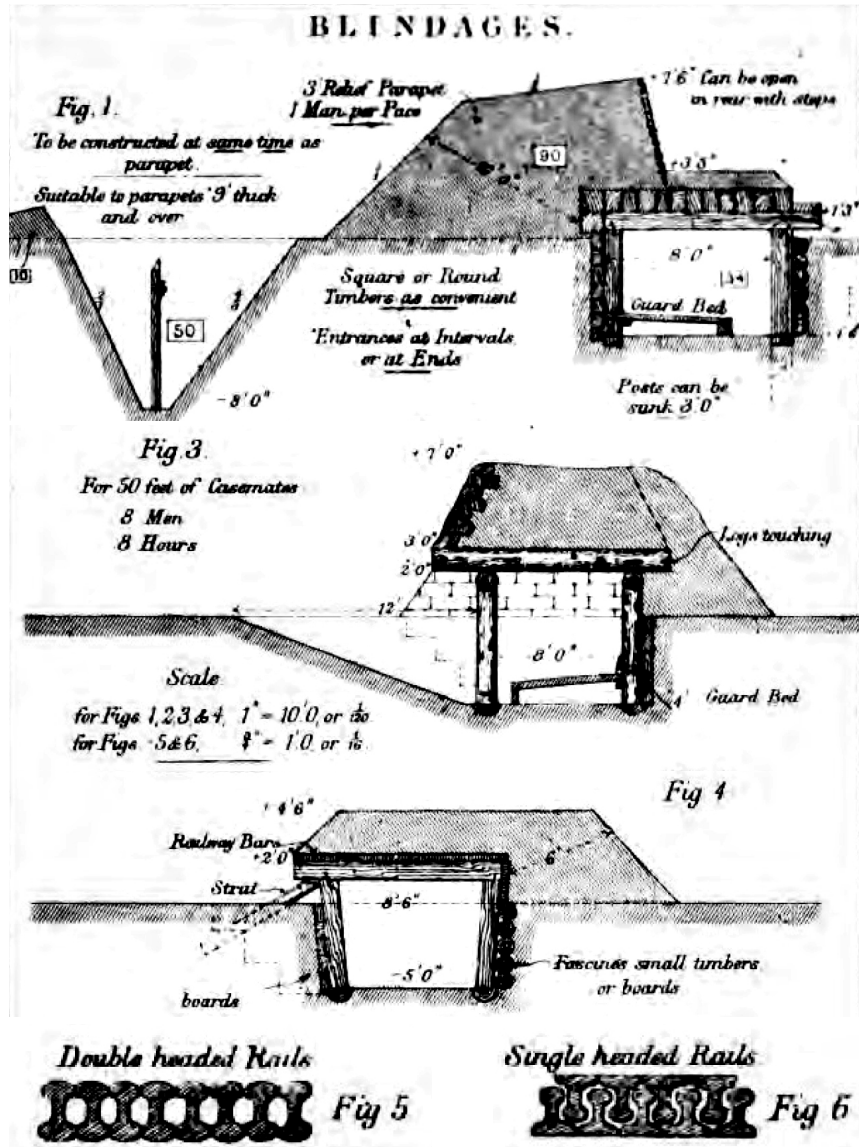
The retrieval of documentation regarding the fortification manuals drawn up by the Russian Military Engineers was particularly complicated, not least because of the difficulty in understanding the documents written entirely in Russian. In any case, a comparison of the design drawings does not require any specific annotations and therefore allows us to make some interesting observations. Although one immediately notices the different degree of detail in these drawings, which look more like typological sketches than building site prototypes, what is immediately apparent are some important technological-constructive similarities. The main construction material is again wood, although not processed but used in logs, according to a dry construction technology similar to Blockbau, but this should be verified. Also in this case the above-ground constructions were camouflaged by creating artificial earthen backfills and slopes, built by inserting substantial layers of large stones, most likely for drainage purposes. What is not present in these drawings is the use of cement concrete.

"Design Grants" - AUSTRO-HUNGARIAN EMPIRE



In the case study of armoured roofs proposed by the Austro-Hungarian manuals, the solution proposes the use of coupled railway tracks as a resistant metal element instead of I-shaped iron profiles. As can be seen from the scale detail above, this proposal foresaw that the railway sleepers, whose weight per unit length was about 31.72kg, were positioned at an interest of 11cm, with a double staggered warp in order to obtain a sort of continuous resistant plate resting on wooden beams of 18x24cm. Above the metal shell thus obtained, a layer of cement concrete over 80cm thick could be poured.

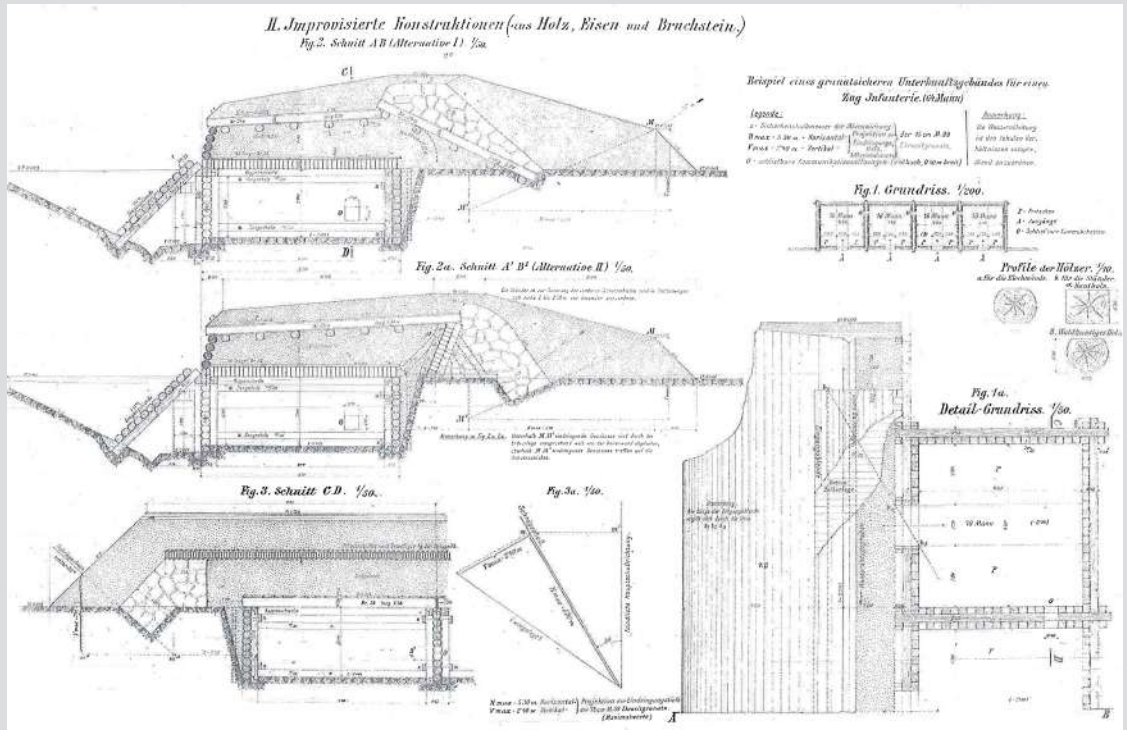
Military manuals - ENGLAND



The design drawings shown above refer to the design manuals drawn up by the British Army Corps of Engineers and specifically concern the armour plating for the semi-permanent and provisional works. Without going into detail, what is particularly significant are Fig. 5 and 6, which reproduce the same solution advanced by the Austro-Hungarian Corps of Engineers to use, single or double, of railway sleepers instead of traditional metal profiles.

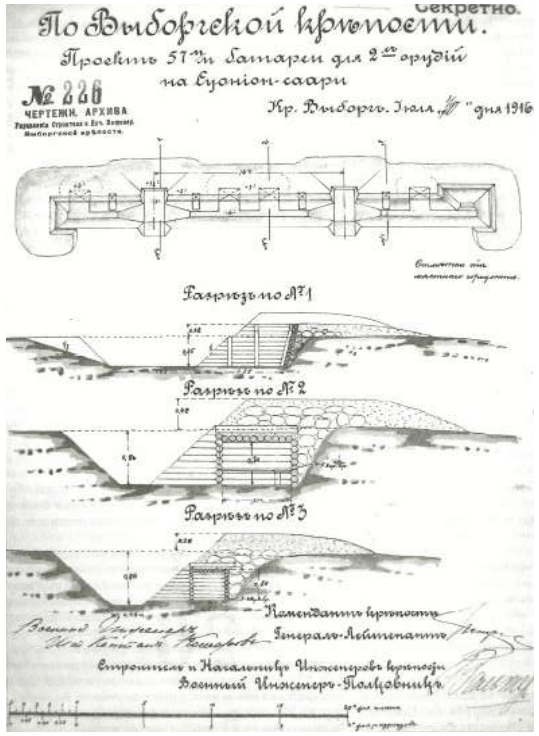
Tab.7.8 | MANUALISTICS IN COMPARISON | Temporary works with armoured covers Austria-Ung. | Russia

"Design Grants" - AUSTRO-HUNGARIAN EMPIRE

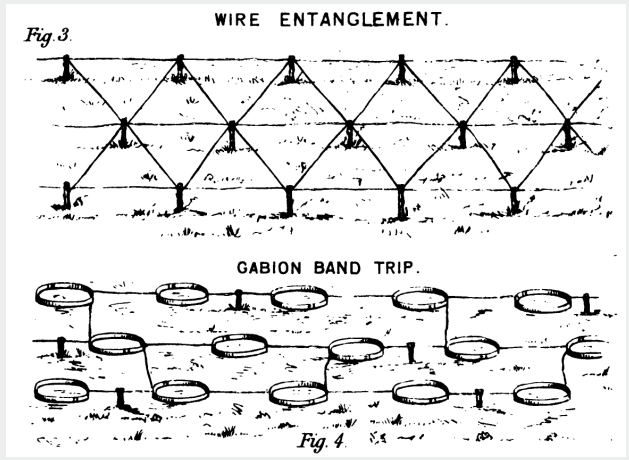


The examples given above are part of the list of construction types of armoured roofs for temporary constructions, to be built with the addition of a sort of double armoured protection hidden between the free surface and the extrados of the roof itself, before the layer of earth protection above. For the technological specifications, see Sheet XX. However, in this comparison with the solutions proposed by the Russian Army Corps of Engineers for buildings of a similar type, it is interesting to focus attention on the dual function of the separating layer made of stone material compacted dry and supported by transversal iron elements. As can be seen from the analysis of Alternatives I and II in Fig.2, the geometric design of this layer is variable. It derives from the need to obtain a resistant layer to absorb the explosive charge of any bombardment, protecting the shelter below. Depending on the context of insertion, and therefore on the possible inclinations of fire with which this element could be hit, the Austro-Hungarian engineers designed different geometric responses of varying thickness, with different orientations concerning the fire trajectories. In order to dissipate the energy by distributing the impact with the layers of soil above, this protective layer was compacted without the use of cement concrete. For this reason it also fulfilled the function of a drainage layer to prevent water infiltration into the interior.

Military manuals - RUSSIA

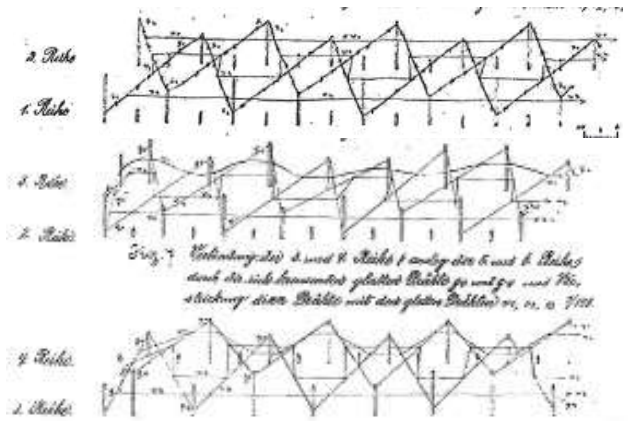


As already explained, the study of the documentation regarding the Manuals drawn up by the Russian Military Engineers was based exclusively on the interpretation of the design drawings, since every annotation and text accompanying these drawings was written entirely in Russian. Through this comparison with the Austro-Hungarian manuals on the side concerning semi-basement constructions, what we wish to highlight concerns the presence, between the extrados of the armoured roofs and the layer of soil above, of a substantial separating layer made of medium-large-sized hewn stone. In the Russian case, as can be seen from the photograph above right, the drawing of large blocks and drafts on the manual does not constitute a simplified graphic code but represents the condition followed during construction. Analysing sections 1-2-3 in more detail, it can be observed that the arrangement of the stone elements of this separating layer follows an essentially sub-horizontal texture, adapting to the inclination of the ground behind but not creating a sloping cusp as is present in the Austro-Hungarian drawings. A plausible explanation may concern the function of these elements: in the Russian case, their arrangement seems to converge essentially in a function of a draining layer, to prevent the infiltration of water from the ground to the interior rooms; in the Austro-Hungarian conformation, the geometry of this layer also clearly responds to a need to dissipate the explosive effect of potential bombardments.



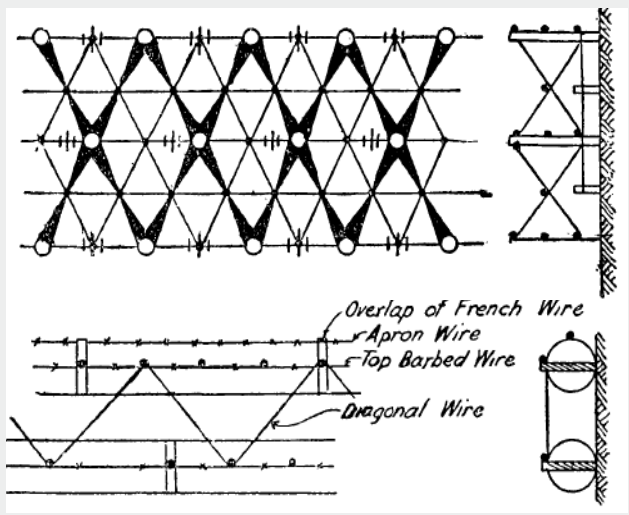
English manuals

In the manuals drawn up by the British Army Corps of Engineers, various ways are proposed for creating obstacle courses with braided barbed wire screwed onto wooden props set at different depths in the ground (Fig.3). Other solutions proposed concern specific ties and snares arranged singly or in combination as shown in Fig.4.



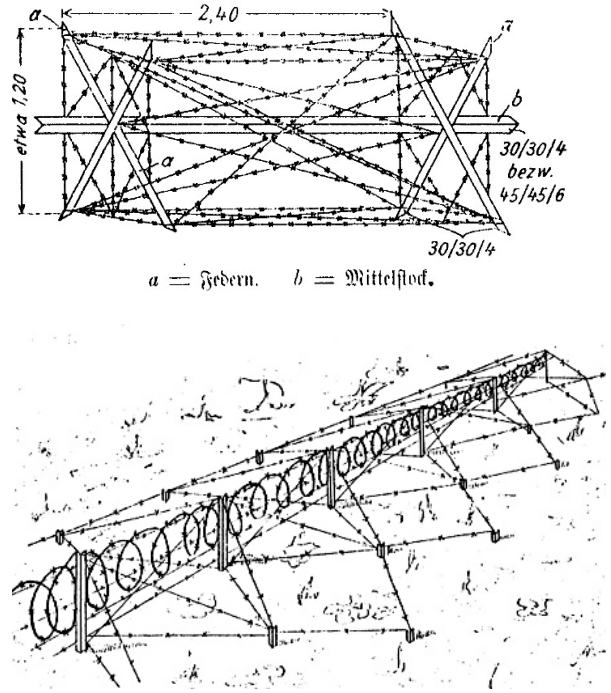
Austro-Hungarian aids

The Austro-Hungarian "Design aids" present various ways of constructing the obstacle and shoring fields, as evidenced by the design extract inserted on the right, in which different ways of weaving the barbed wire onto two rows of wooden props protruding from the ground at different heights are proposed.



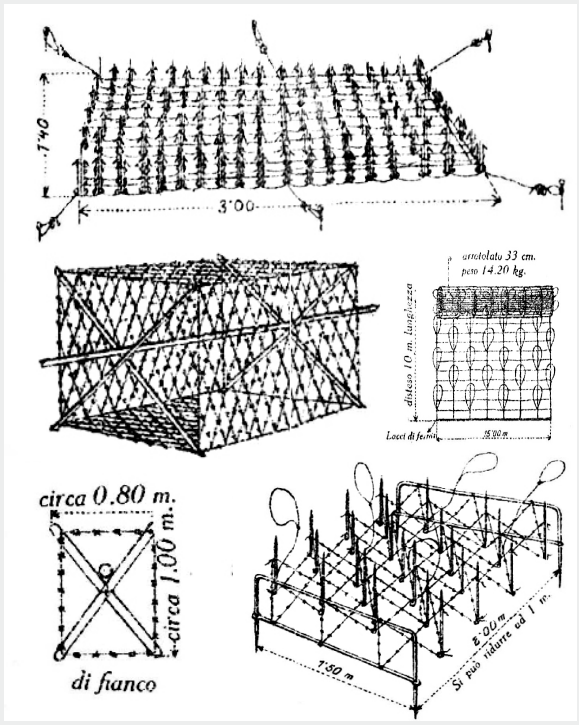
American manuals

Although more schematic than the Austro-Hungarian manuals, the aids elaborated by the Allies overseas do not differ substantially from what was previously proposed. Confirming the essentially operative function of these drawings, the inclusion of a top-down and frontal view of these obstacle courses and an axonometric view as in the previous cases is explanatory..



German manuals

The construction of the obstacles called "Friesian Horses" is common to all field fortifications built by the various military forces. They represent a defensive obstacle consisting of a wooden prop on which metal or wooden nails are driven, over which several layers of barbed wire are woven. To this 'traditional' solution, the various Geni developed different alternatives according to the needs and conformation of the territories in which they were to be inserted.

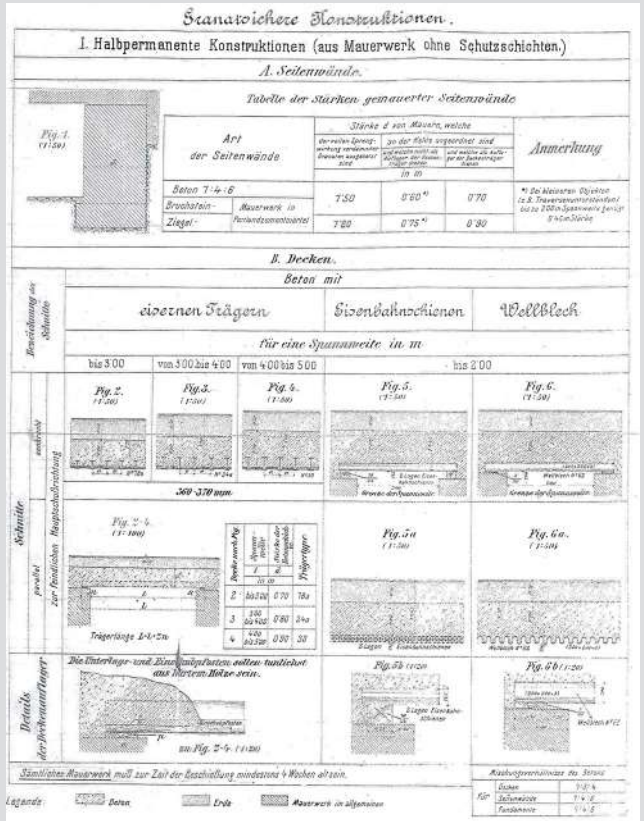


Italian manuals

As can be seen, constructing defensive obstacles is quite common in all fortification handbooks. In the Italian case, too, solutions are proposed with barbed wire weaves set on wooden or metal props driven into the ground at different depths, Frisian horses with wooden structures measuring about 80x100cm, different types of props made with laces and other types of barbed wire, metal gabions.

Tab.7.10 | COMPARISON ABACHI | Grain-proof roofing with iron I-profiles and concrete I-profiles

Manual: Grain-proof roofing with iron profiles


Granatsichere Konstruktionen.

I. Halbpermanente Konstruktionen (aus Mauerwerk ohne Schutzschichten.)

A. Seitenwände.

Tabelle der Stärken gemauerter Seitenwände

B. Decken.

Beton mit

eisernen Trägern | Eisenbahnschienen | Wellblech

für eine Spannweite in m

bis 3·00 | von 3·00 bis 4·00 | von 4·00 bis 5·00 | bis 2·00

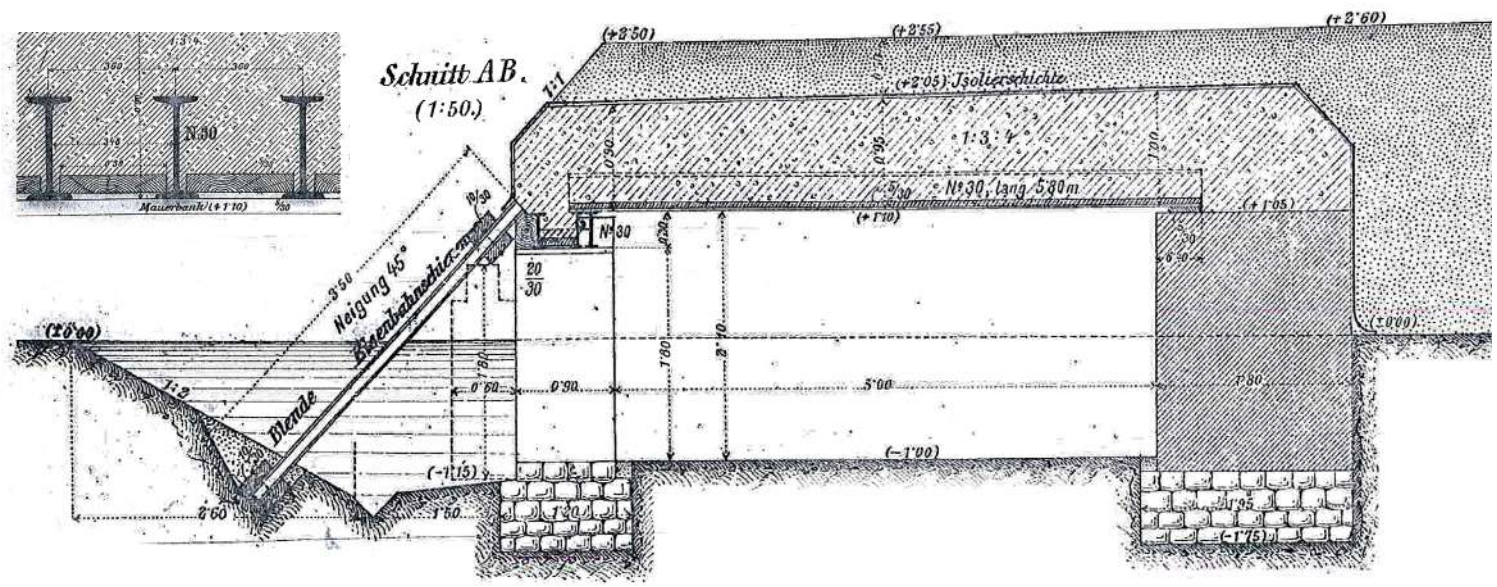
Legenda
in alto a sx, “Projecktbehelfe”, manuali Impero Austroungarico;
in basso a sx, “Stellungsbau 1916”, Berlino, manuali tedeschi;
in alto a dx, ricoscimento tecnica in fortificazioni attuali;
in basso a dx,dettaglio sezione trasversale opera semipermanente.

Recognition of construction technology in the current permanence of various fortifications

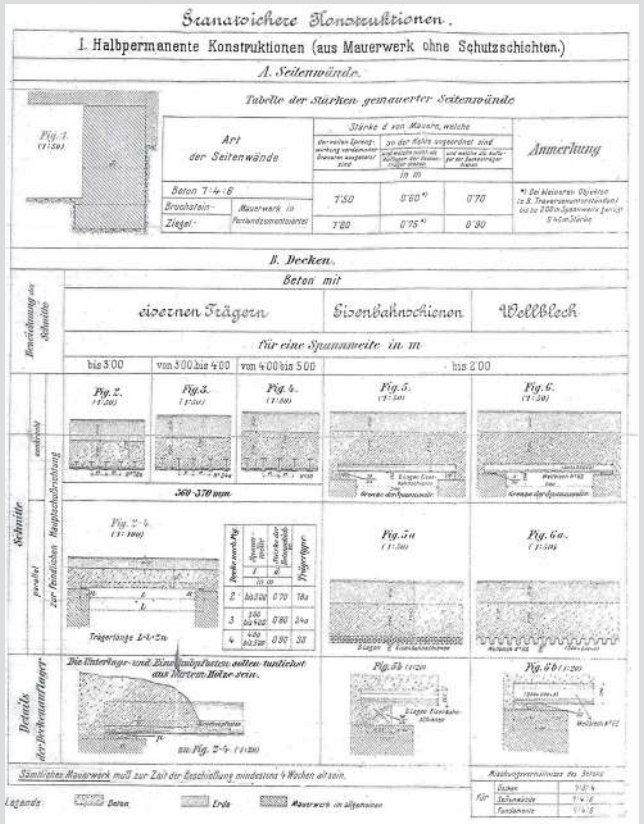

Verle Fort - Trentino
Italy (Austro-Ungarian Fort)

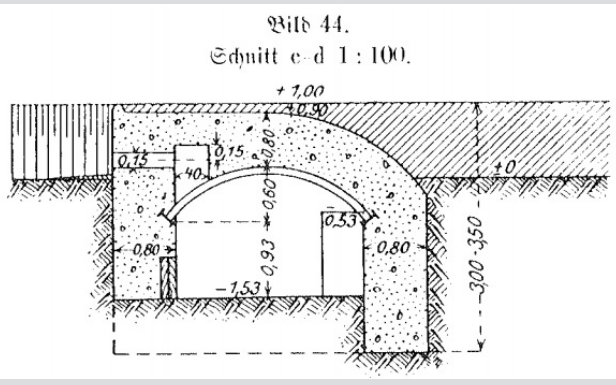

Luserna Fort - Trentino
Italy (Austro-Ungarian Fort)

In the Austro-Hungarian planning aids there are many solutions regarding the construction technologies of anti-granate roofs for semi-permanent and permanent structures, with different limit resistances about the type of metal profile used (in this table I-profiles are discussed, in the next corrugated sheet metal) and the loads above. Thanks to the knowledge of such model-types and the comparison with period photographs that confirm their direct application, the drawing up of such abacuses constitutes an indispensable cognitive basis for recognising such construction technologies even in ruin/macery contexts such as those shown in the images above. If not produced by the war itself, these conditions were caused by the action of the salvage contractors, who since the First World War have carried out an intense stripping of every metal element from these structures, often leading to their collapse. Nevertheless, thanks to these comparisons it is possible to recognise the traces of metal profiles even in the “absences” produced by these spoliations, as in the case of forte Luserna.



Manuals: Grain-proof roofing - Blindings


Granatsichere Konstruktionen.
I. Halbpermanente Konstruktionen (aus Mauerwerk ohne Schutzschichten.)
A. Seitenwände.
Tabelle der Stärken gesmauerter Seitenwände
B. Decken.
Beton mit
eisernen Trägern
Eisenbahnschienen
Wellblech
Für eine Spannweite in m
bis 3·00
von 3·00 bis 4·00
von 4·00 bis 5·00
bis 2·00
Fig. 2.
Fig. 3.
Fig. 4.
Fig. 5.
Fig. 6.
Fig. 5a.
Fig. 6a.
Fig. 5b.
Fig. 6b.
360 · 370 mm.
Anmerkung
Art der Seitenwände
Beton 1:4:8
Bruchstein-
Ziegel-
Mauerwerk in Portlandzementmörtel
1·50
0·60
0·70
1·20
0·75
0·30
Legende: Beton, Erde, Mauerwerk in Alfgemeinen



Legend
top left, “Projecktbehelfe”, Austro-Hungarian Empire manuals;
bottom left, “Stellungsbau 1916”, Berlin, German manuals;
top right, technical recognition in current fortifications;
bottom right, detail of cross-section of semi-permanent work.

Recognition of construction technology in the current permanence of various fortifications


Barchon Fort
Liegi (Belgium)

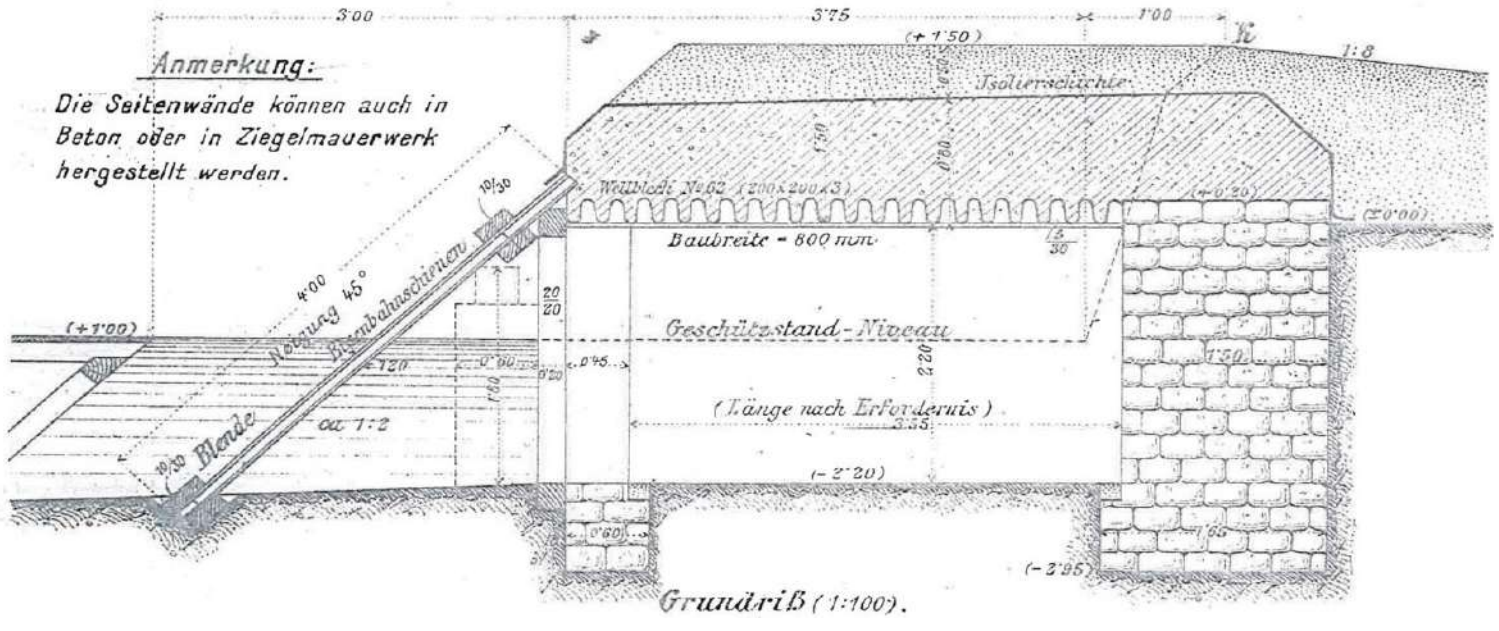

Cognoleè Fort
Liegi (Belgium)


Prinzregent Luitpold Fort
Metz (Germany)


Spitz Verle Fort
Italy (Austro-Ungarian Fort)

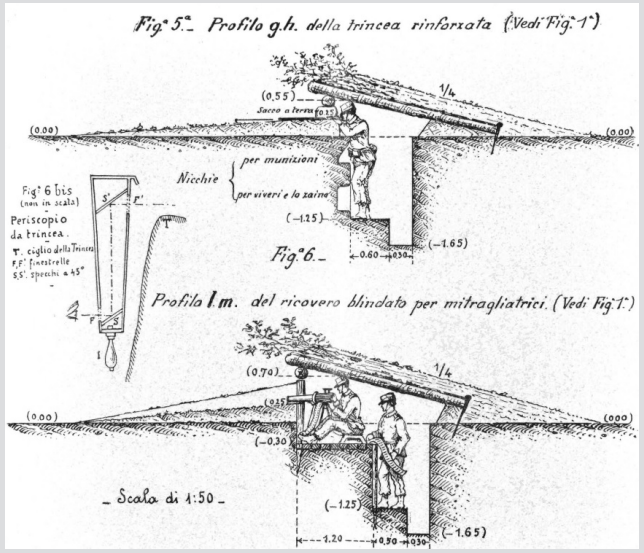

Garda Fort - Trentino
Italy (Austro-Ungarian Fort)


Mattarello Fort - Trentino
Italy (Austro-Ungarian Fort)



Tab.7.12 | COVERED trenches and firing positions (mainly Italian army)

Manuals: Trenches and firing positions



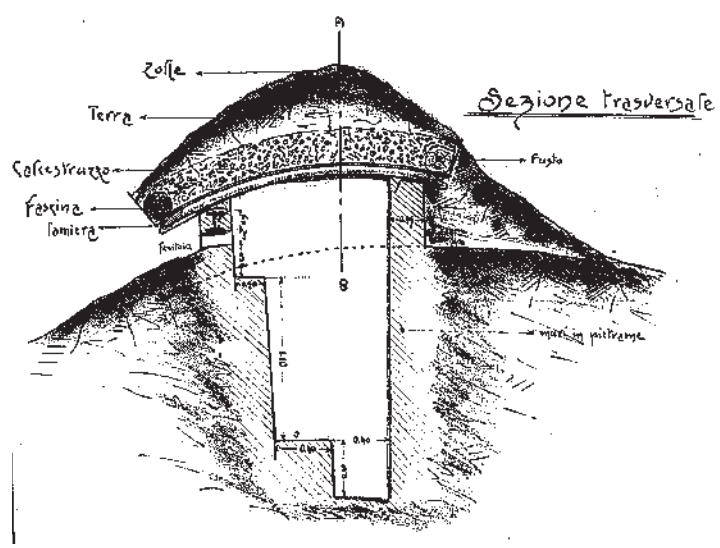
Recognition of construction technology in the current permanence of various fortifications

Talpina Trenches - Trentino
Italy

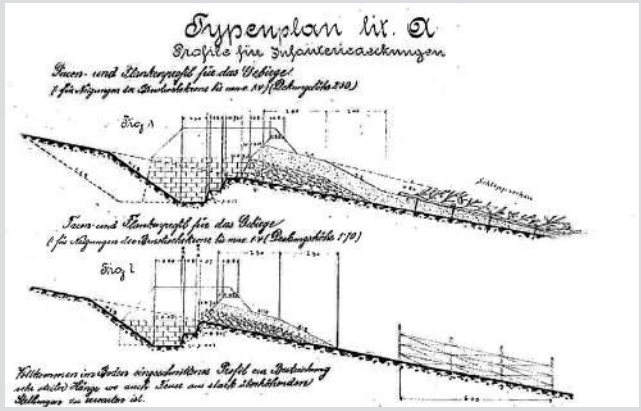
Nagià Grom Trenches - Trentino
Italy

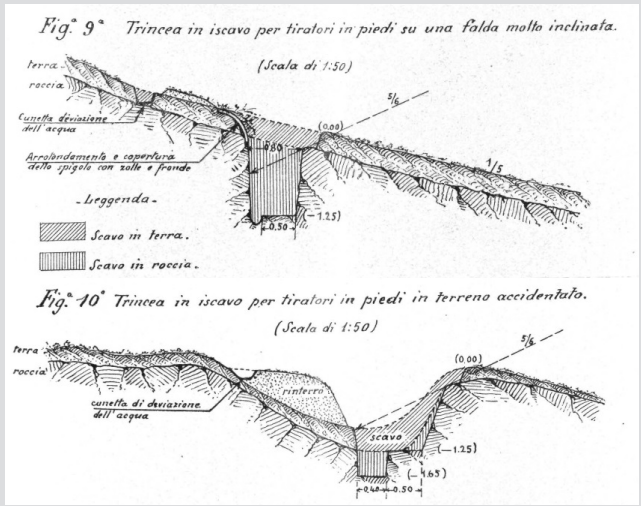
Monte Zugna Trenches - Trentino
Italy

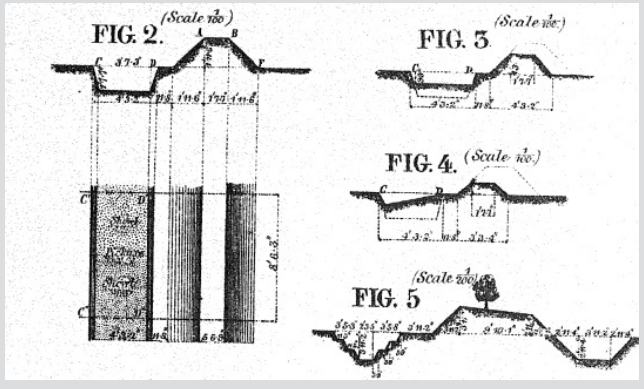
In the military manuals drawn up by the Italian Army there are numerous references to the different methods of construction of entrenchments and firing positions for riflemen, concerning the different territorial morphologies of construction. From the proposed model-types it is clear that the bank of the ditch facing the enemy was usually built with a step at the base along the entire excavation length to facilitate observation of the opposite front. Higher up, another recess was usually built to support the rifle and allow firing with greater stability. These entrenched systems could be uncovered or covered and served as walkways or connecting trenches. As can be seen from the drawings, different types of cover were envisaged (inclined linear, curved, straight or uncovered). From the technological point of view, the covering of armoured trenches was always made of concrete supplemented by profiles or corrugated steel sheets. To protect the walls of the trenches from landslides and flooding, timber cladding and trellises were usually provided. However, local stone was often used as a priority material in mountainous contexts or concrete pours. The knowledge of these model-types becomes the useful tool to recognise such construction types in contemporary remains, where the state of preservation compromises their legibility. In addition to the above examples, below are two examples of Italian trenches: on the left a portion of the entrenched system above Tiero-Mori, Trentino (Italy), already recovered, and on the right the entrenchments of the Talpina stronghold, Trentino (Italy), where legibility is strongly compromised by abandonment and slow degradation.



Manuals: Grain-proof roofing - Blindings







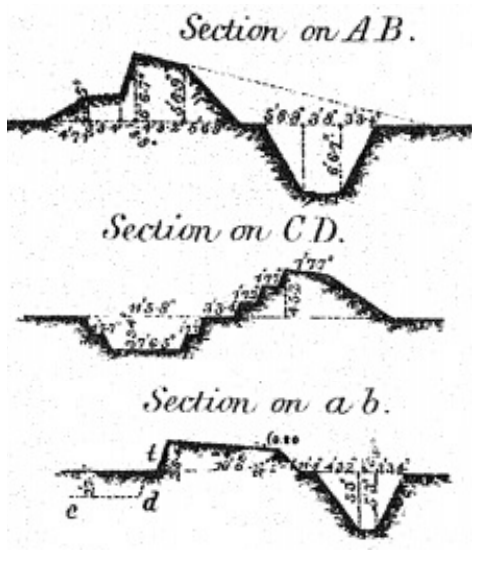
Recognition of construction technology in the current permanence of various fortifications

Entrenched system around Vezzena Fort
Trentino - Italy (Austro-Ungarian Fort)

Entrenched system around XXX
Antwerp - Belgium (Germany trenches)

Entrenched system around Verle Fort
Trentino - Italy (Austro-Ungarian Fort)

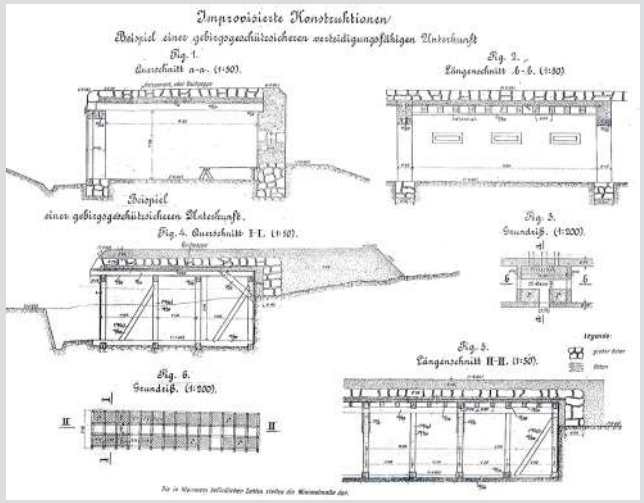
Concerning the construction of entrenched systems, different types of profiles are presented in the Fortification Manuals concerning the orographic conditions of the sites: unlike in high-altitude contexts, where the eventual construction of entrenchments had to involve excavation in the rock with the relative use of mines, in contexts where the terrain permitted it, the trenches were usually constructed by digging at different depths into the ground. The inclined modelling of the excavation slopes meant that thought had to be given to containing the ground to avoid collapses. However, if the trenches were not in the front line and served essentially as a link these different linings were not always in place. For this reason, and because of the reuse of different war materials since the early post-war period, these linings no longer exist. The physical accumulation of successive layers has stratified the original layouts and levelled them by reducing the depths. The edges are no longer sharp and recognisable. Yet, there are often irregular patterns and curvatures that, thanks to the knowledge provided by the elaboration of these comparison abacuses, can be recognised as permanent features of the original zigzag trenches. The comparison between the manuals of the different fortification schools shows that the profiles and layouts are quite similar. In addition, it must be considered that very often the trenches had to be built at speed during the conflict itself, so the dimensions indicated in the manuals could be slightly modified.

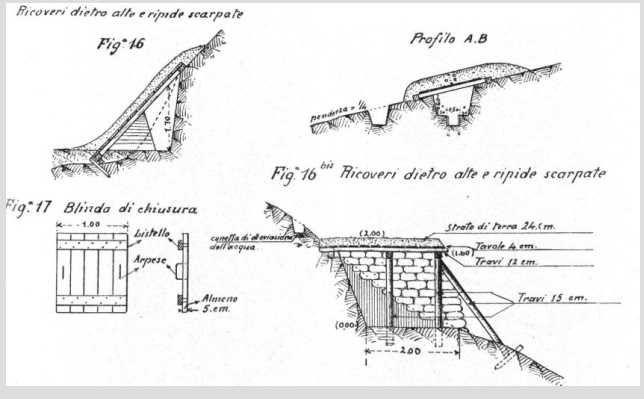


Tab.7.13 | COMPARISON ABACHS | Uncovered and connecting trenches not in high mountains

Tab.7.14 | Barracks and shelters in mountain contexts (Italian and Austro-Hungarian armies)

Manuals: Temporary shelters - Barracks





Barrack - Tratta Piana
Austro-Hungarian Empire

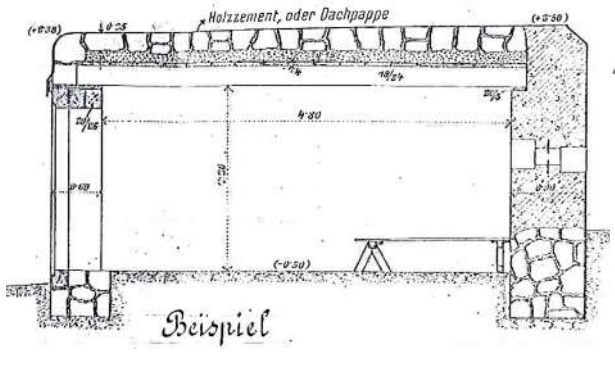
Monte Zugna barracks
Italy

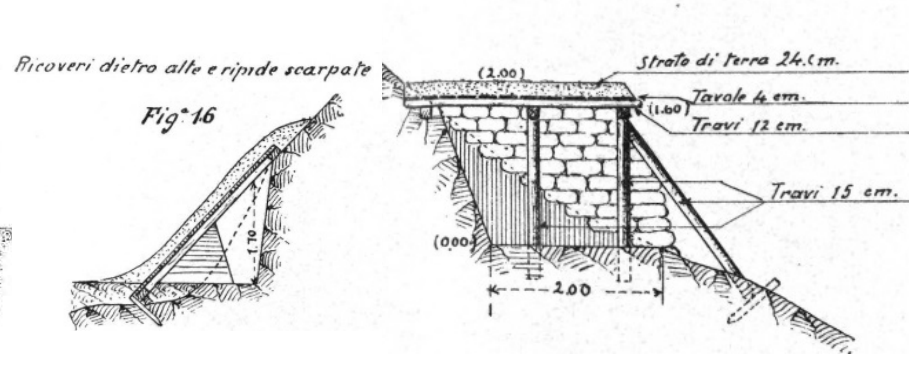
Monte Cristallo Barracks
Austro-Hungarian Empire

In the military manuals drawn up by the Italian Army there are numerous references to the different methods of construction of entrenchments and firing positions for riflemen, concerning the different territorial morphologies of construction. From the proposed model-types it is clear that the bank of the ditch facing the enemy was usually built with a step at the base along the entire excavation length to facilitate observation of the opposite front. Higher up, another recess was usually built to support the rifle and allow firing with greater stability.

Military barracks, Filon del mot, Stelvio
Italy (Austro-Ungarian Empire)

Artillery mountain position, Cimon delle Gere, Presanella
Italy (Austro-Ungarian Empire)





Manuals: Obstacle courses

A widespread practice was the creation of obstacle courses by shoring up in the ground bent iron bars, whose shape has become famous and universally recognised, connected by several layers of barbed wire. Depending on the context, the geometry of the development of these obstacles could be more or less regular, as can be seen in the historical photographs below. One hundred years after the end of the conflict, complete metal obstructions no longer exist. However, it is not uncommon to find remnants of these metal elements scattered here and there, perhaps buried, in militarised contexts with defensive and offensive works.

Obstacles - Riva del Garda - Italy (Austro-Ungarian)

Mero Fort - Trentino - Italy (Austro-Ungarian Fort)

Legend
top left, “Projecktbehelfe”, manuals Austro-Hungarian Empire;

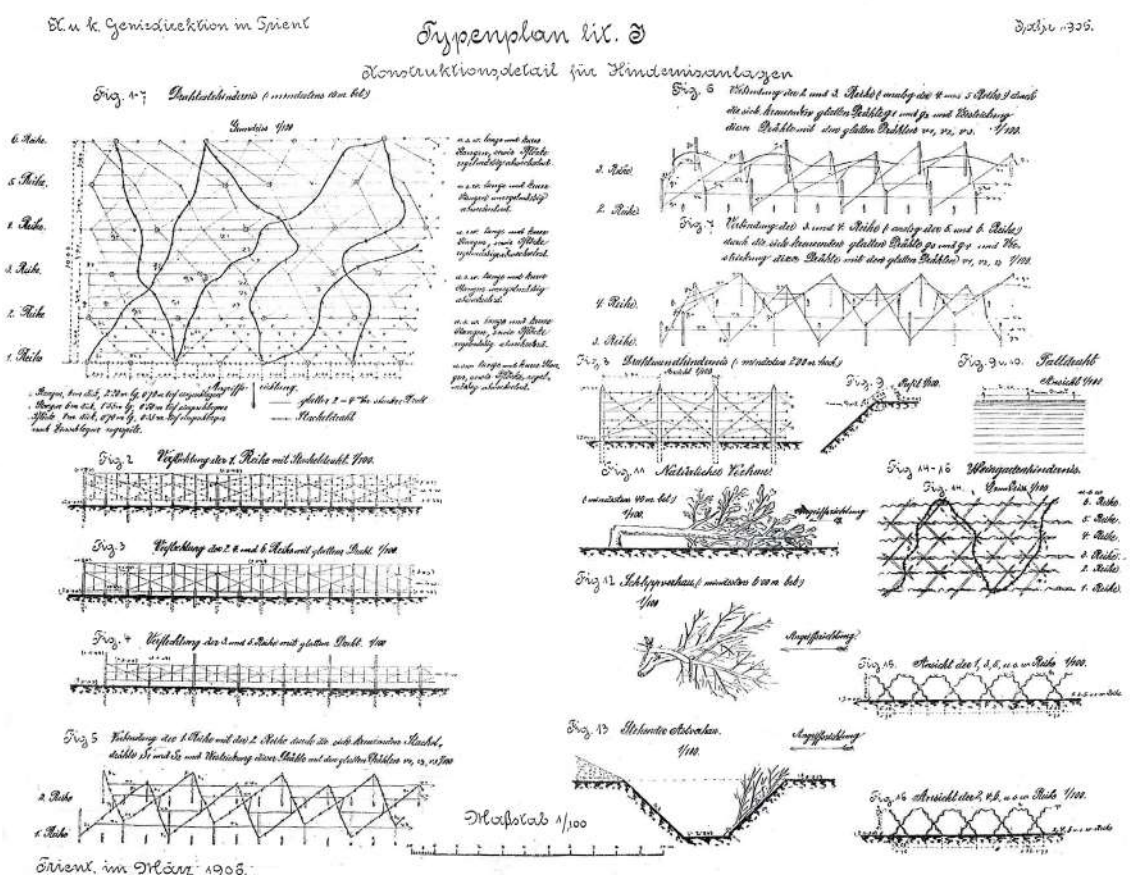
Recognition of types of obstacles in current permanencies within the contemporary landscape

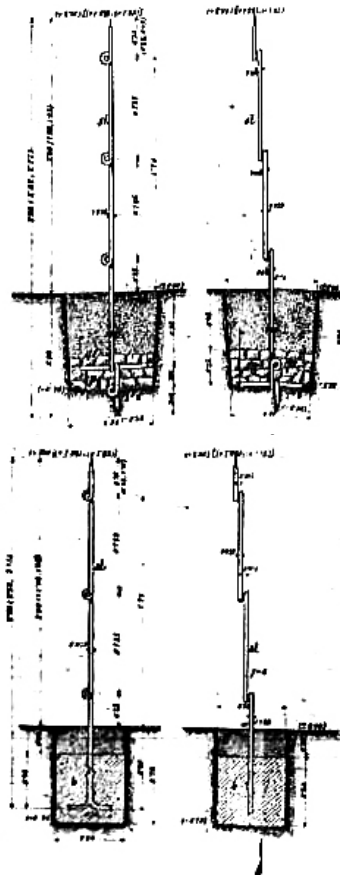
Hooge Crater Museum
Ypres - Belgium

S.Rocco Fort - Trento
Italy (A-U. Fort)

Hooge Crater Museum
Ypres - Belgium

Sanctuary Wood Museum
Ypres - Belgium





Tab.7.16 | CONFRONT SHELTERS | Fusiliers' strongholds and trenches, shoring and natural obstacles

- Infantry strongholds and positions - Planning aids - Austro-Hungarian Empire
Planning aids - Austro-Hungarian Empire

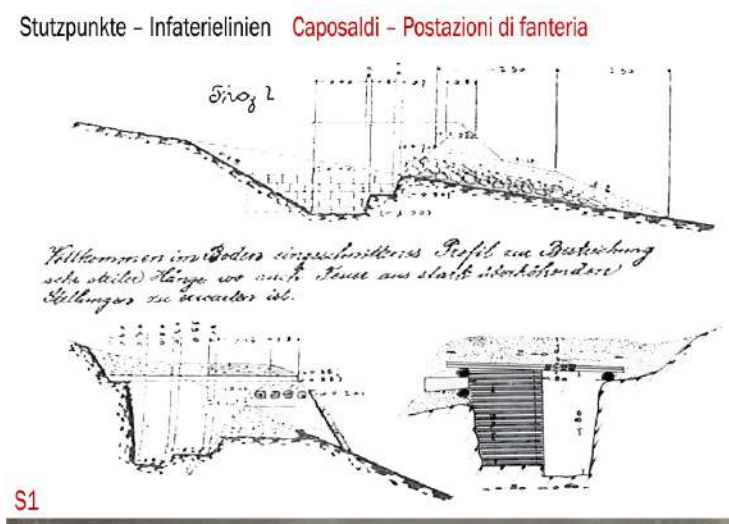
In the trenches and firing positions, the slope of the slope was modelled on steps of different depths on which the marksmen could lean to have greater visibility. In addition, at intervals that were not always regular, there were also covered passages made of wooden structures, as can be seen in the photograph, in correspondence with which there were often entrances to shelters or temporary shelters. Such profiles were common on all front lines, in fact the photograph on the right shows a trench on the western front.

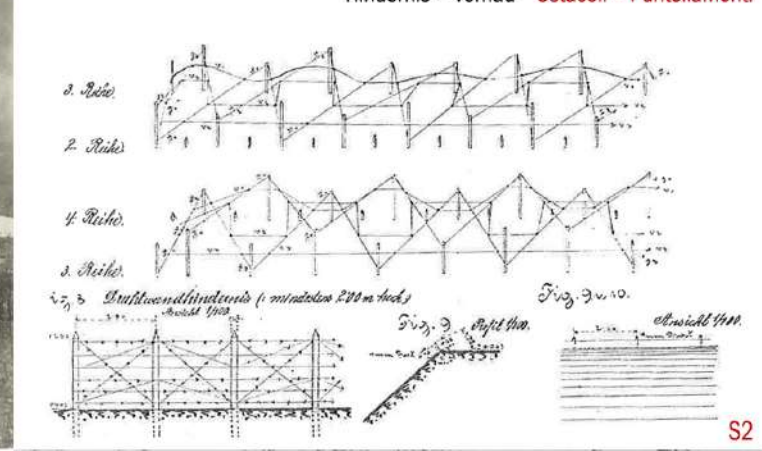
- Metal shoring and obstructions - Design aids - Austro-Hungarian Empire
Planning aids - Austro-Hungarian Empire

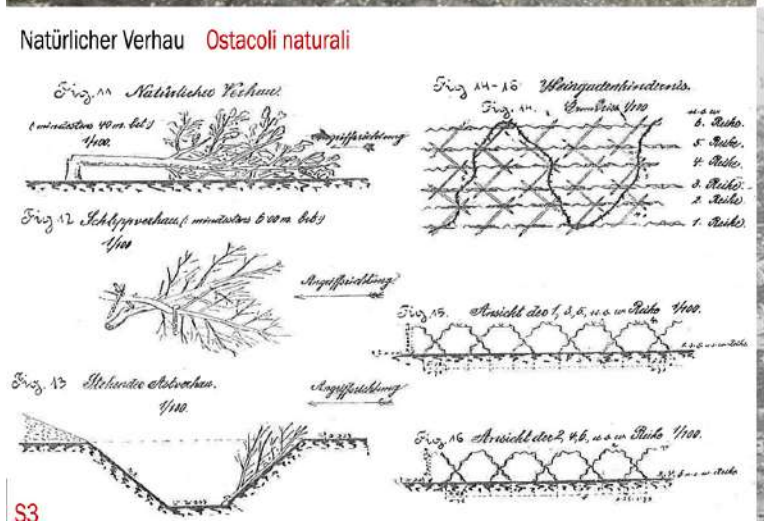
Iron rods were planted in the ground, bent and pointed at both ends, at regular intervals and in staggered rows, as shown in the manual drawing. The different lines were connected with wire mesh and kilometres of barbed wire to create a dense and practically impassable network. As you can see from the photograph, the height of the wire elements is almost equal to the average height of a person.

- Natural obstacles -
Planning aids - Austro-Hungarian Empire

Very often the trees were cut about 30-40cm above the ground and the trunks were purposely laid on the ground in such a way as to create overlaps and continuous irregularities to make crossing difficult. If not all of the trees were cut down, the foliage was certainly cut off in order to make the view unobstructed: the cut fronts were left on the ground, which created even more confusion, or in other cases they were moved and placed on the hidden slopes of ditches, so as to prevent them from crossing.

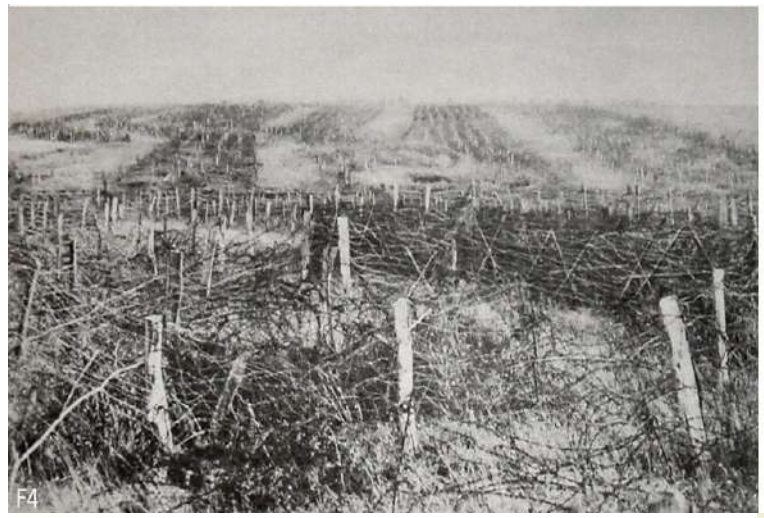


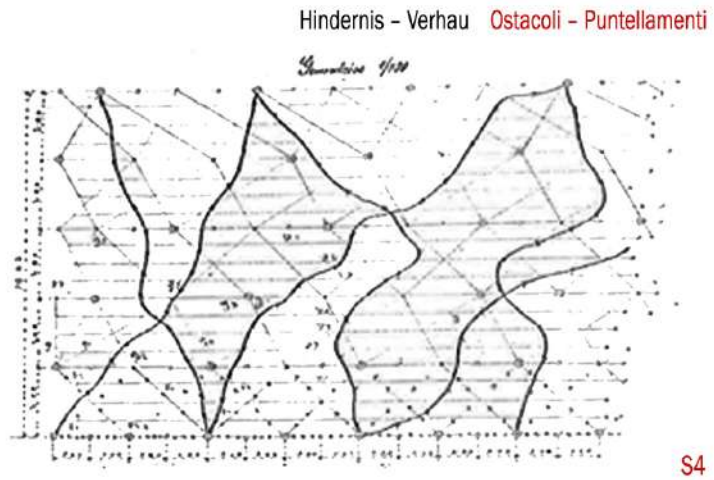




- Obstructions and shoring -
Planning aids - Austro-Hungarian Empire

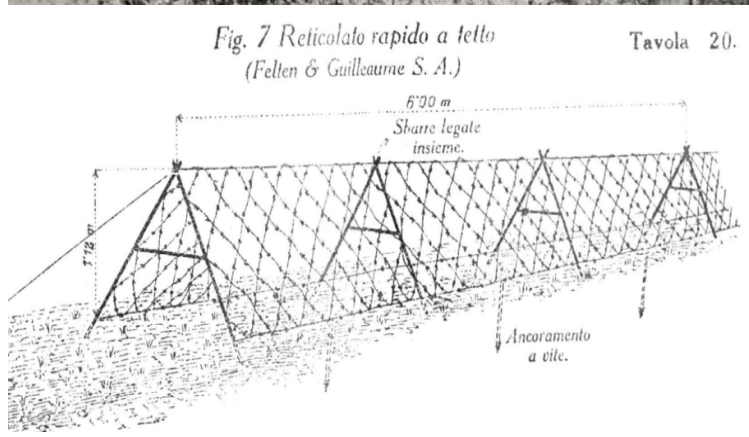
As can be seen in the diagram presented in the reference manuals, obstructions of this type were created by inserting wooden props into the ground at different depths, which were then connected by barbed wire, wire netting and even branches to create an intricate tangle that was difficult to break through.

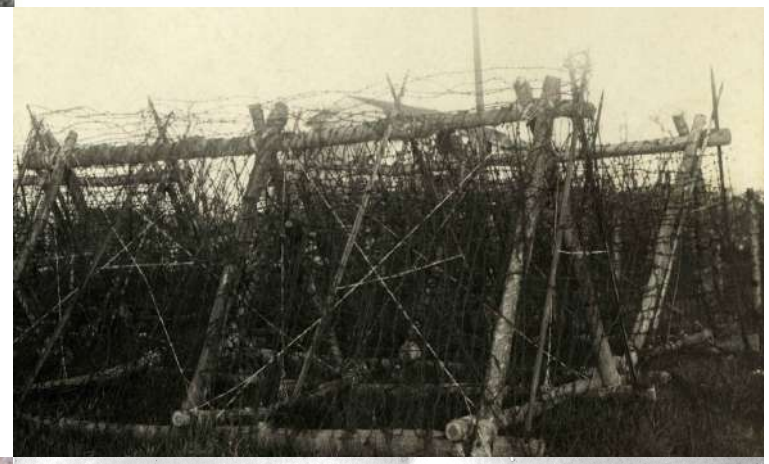

F4



- Rapid roof nets -
Military Compendiums - Kingdom of Italy

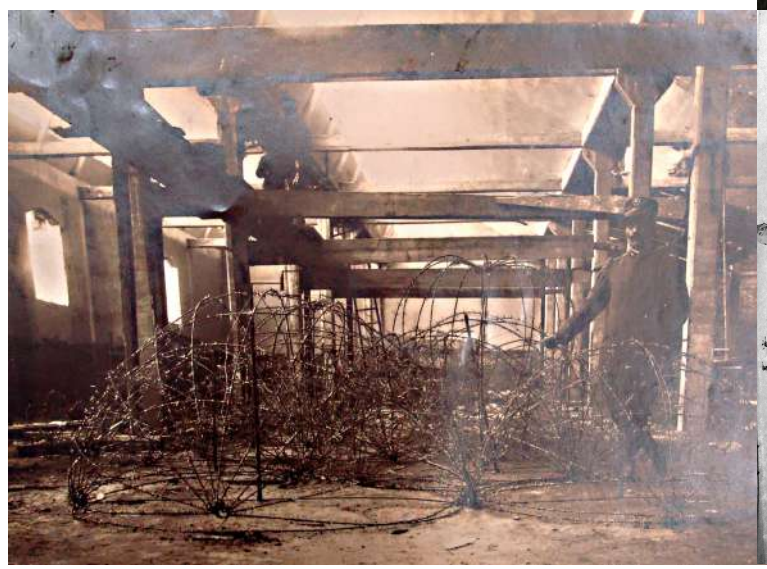
This type of fence was built using a main triangular structure of wooden elements or metal bars tied together and anchored to the ground with screws. Also arranged on superimposed levels, Grids of barbed wire were attached to this structure. The average height was about 1.10 metres and they could be more than 6 metres high.

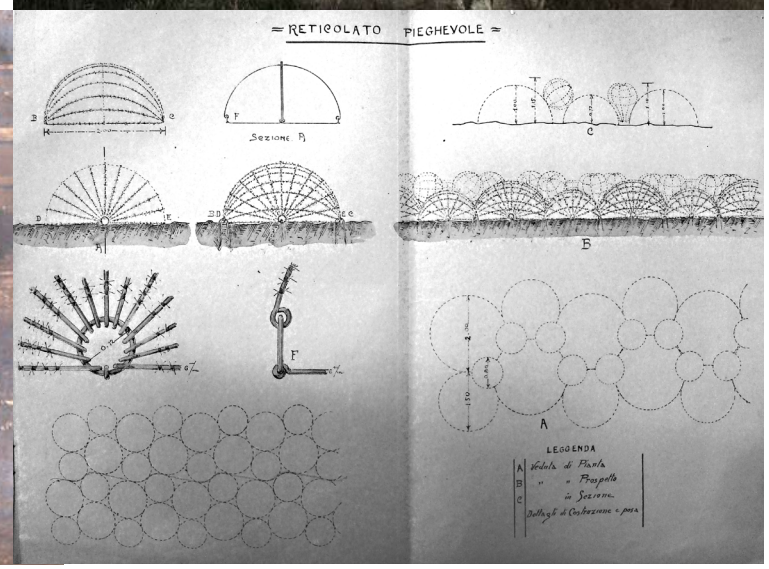




- Foldable Reticulate -
Military Compendiums - Kingdom of Italy

The collapsible reticule was composed of many half spheres arranged suitably on the ground. One element of such a grid consisted of two hemispheres superimposed so that their generators formed a so-called angle, and reinforced by a central upright that increased its rigidity. It was an easy-to-transport type of lattice, weighing about 18kg each.





Garda Fort, Trentino, Italy.
Pic. A. Quendolo

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Chapter 8

Testimonial gradient: the elaboration of the “Stratigraphic telescope” method as a contribution to unvel the footprint’s permanences

8.1 Warscapes as “*materia signata*”: a “submerged” informative basin to unveil

A Following the study presented in the previous chapter regarding the theoretical-operational contribution that the knowledge of the military manuals can provide in the specification of Indicator 2 given better identification of the different “testimonial gradients,” with the same objective, the present study addresses the ability to expand the recognition of the “testimonial value” at the scale of the different warscapes, exploring the delicate question of the recognisability of the fragments of the most fragile relics in terms of permanence within the contemporary landscape.

As already described in the previous chapters, in fact, in recent years, the growing interest in this unique heritage has led to the development of a series of different design interventions which, however, have mainly concerned the permanent fortifications, leaving in the background the temporary and field fortifications, as well as the traces directly imprinted on the ground by the conflict.[524] Although they are fragile, minute, and more likely to be reabsorbed into the dynamics of landscape transformation, today, many of these traces are often latent, physically ‘submerged’ under post-depositional layers that over time have obliterated their view but not their significance as material evidence of a historical moment that determined the formation of European identity.[525]

524 Concerning these considerations, see what has already been said in Chapter 4 and Chapter 6.

525 As regards the memorial potential and the value of the vestiges of the Great War, both in the permanent fortifications and in the more fragile “signs” in terms of

For this reason, the responsibility of the present time is to ensure that such permanences can continue to narrate their "being in time" also to future generations, triggering "memory possibilities" but also virtuous circuits for the cultural, social, and economic development of the communities.

Therefore, considering the threshold-space between the visible and the submerged as a dense and pregnant information basin in which these "signs" have accumulated over time, the present contribution focuses on elaborating a helpful cognitive method to facilitate their identification that they. However, at different temperatures, they constitute what remains of the imprint of the Great War and that, for this reason, they acquire particular importance in terms of narrative potentiality. Specifically, it is proposed to elaborate a methodological system based on the construction of a path of helpful knowledge to investigate the various "landscapes of war," at different scales, exploring the processes of structure and stratification through the physical traces of their alternation, i.e., additions, absences, erasures, rewritings. This means redefining the biography of the different warscapes as the result of a succession of signs of addition, subtraction, transformation, and destruction, placing at the center of the analysis precisely this threshold-space between the manifest and the latent.

This translates into adopting an approach that refers to the methodological approach of stratigraphic studies, and therefore, in this specific field of anthropic and natural actions, to what can be defined as a "stratigraphic telescope." It represents the operational tool that expands the interpretative code of architectural stratigraphy to the landscape scale to decode the alphabet according to which the "landscapes of war" are "written," relating the study of documentary sources, both with the construction characteristics of the artifacts (permanent or temporary) and with the modalities of modification of the territory.[526] The "telescope" also makes it possible to govern the continuous changes of scale to investigate the additional layers that may have been added over time to these "signs" linked to defense and offense and to recognize even in the various forms of degradation and alteration what remains of this complex "assemblage" of elements

permanence, such as the field fortifications and the traces of destruction, please refer to the in-depth studies presented in Chapter 5.

526 Reference is made to the concept of "stratigraphic telescope" as an expression that expands to the scale of the landscape the contribution that archaeologists and architects have made, since the 1980s, to the study of architecture with methods of analysis that render the history of works like the history of processes of addition, subtraction, and modification of matter that have left a physical trace and link them in a consequential order called a stratigraphic sequence. Studies that, in addition to the methodological question of research, have highlighted the cognitive significance of absenc

today. By being a valuable tool for learning to “read” the semiotics of the different warscapes, the “stratigraphic telescope” declines on an operative level the already widely supported need to adopt a holistic-transdisciplinary approach to understand the permanence of the imprint of the Great War in the contemporary landscape, decoding the traces, discontinuities, and meanings through the integration of knowledge belonging to different disciplines, including archaeology, geography, architecture, anthropology, history, and geomatics.

In this regard, starting from the meaning of the word “vestige,” which refers to the physical imprint of something that is no longer tangibly present, it leaves a memory of its passage through the traces impressed in the landscape[527], The development of the “stratigraphic telescope” method is part of the line of research already known as “Great War archaeology”[528], recognizing the complex palimpsest of vestiges, visible but also “submerged,” as “materia signata,” a wide and deep information basin to be investigated and recognized. This allows us to give a broader and more complete vision of this complex stratification of presences and absences to understand how these assets, understood as “material evidence with a value of civilization,” can be an authentic testimony and continue to become a concrete opportunity for economic and cultural development for local communities. Before dealing with the proposed methodology in detail, it is necessary to briefly outline the theoretical framework of reference concerning the interdisciplinary contributions.

8.1.1 Great War Archaeology: reference framework

Archaeology is a precise discipline that has as its task the reconstruction of buried contexts through stratigraphic excavation and its proper documentation: the stratigraphic method proceeds backward in time by first investigating the layers of soil that contain the most recent materials up to the oldest deposits, removing them only after they have been properly documented to avoid the loss of useful information to reconstruct the events of the human population in the past and its interactions with the environment.

527 The term vestigial is pregnant: from the Latin vestigium, it indicates a “sign left on the ground by walking” and is therefore synonymous with a footprint, trace, marker; in the plural, however, it refers to impressions not so much in themselves as “trace of passage.” The word is also enriched with other meanings, such as “act, work, monument that remains as a document and memory”; in the plural, it also means: ruins, remains. It is easy to understand the semantic significance of this term, which “evokes both an absence and a presence, an intersection between the visible and the invisible: the footprint is the physical sign of what is no longer there but has impressed a form in memory of its passage.” See also QUENDOLO, 2014.

528 See footnote 13 below.

The disciplinary field of archaeology is organized into multiple subcategories that refer to different chronological reference areas, such as Prehistoric, Protohistoric, Classical, Medieval, and Modern Archaeology, to name but a few. In parallel, other forms of archaeological research have developed over time, focusing on the examination of individual aspects of the biography of man and communities about history; Among these, theorized above all in the academic circles of the United Kingdom (first and foremost Bristol and Glasgow), is the Archaeology of Conflict, or "archaeology of war," whose main interest is precisely the understanding of the complicated theme of the clash between different human groups, starting from the investigation and recognition of the "physical signs" deposited on the landscape as evidence of these cultural encounters/clashes[529]. To give an overall picture, however, it is necessary to recall that this developing branch of research is characterized by several important archaeological sub-disciplines of a more operational and technical nature, including *Battlefield Archaeology*[530] e Military Archaeology[531] are certainly the most important[532].

Fro[m this perspective, it can be understood that there are no chronological limits to the action of archaeological research. Therefore, it should not seem strange to speak of archaeology referring to a relatively close event, such as the Great War, from a material point of view. The ultimate goal of this complex discipline does not concern the buried "things" per se, for their aesthetic or economic value, but rather the information potential that they can release, the knowledge that can

529 SAUNDERS, 2007; STARBUCK, 2012; SUTHERLAND, 2017, BEZZI, GIETL, 2018.

530 Developed as a result of the American Douglas D. Scott research at Little Bighorn, it focuses on the investigation of battlefields through classical archaeological methodology, i.e., through survey and stratigraphic excavation. See also SCOTT, FOX, 1987, SAUNDERS, 2007.

531 This branch generically studies military sites, irrespective of whether they have been affected by an armed conflict or not. See also SUTHERLAND, 2017; BEZZI, GIETL, 2018.

532 Often, archaeology concerned with the First World War has been called Battlefield archaeology. Still, this definition is not entirely correct, as it overlooks the crucial point of difference between the modern industrial warfare of the 20th century and every other kind of conflict in previous centuries. If until 1914, battlefields were circumscribed locations where fighting took place, after which they returned to being intact and harmless places; after the Great, War battlefields continued to claim victims in the following years due to the very high concentration of unexploded bombs and bullets. Moreover, Battlefields Archaeology is a term that fails to embrace the variety of landscapes created by modern warfare on an industrial scale. For this reason, it is now widely preferred to use the term 'conflict archaeology,' which has a more general and broader meaning. For more on this topic, see the proceedings of the conference Archaeology of the Great War held in Luserna (TN) in 2006.

emerge from them: an approach in which the excavation operations are not "to be considered the end of the research but the first act, logical and chronological, of a series of operations intended to lead to new, greater knowledge".[533] As is evident, it is an observatory that integrates different "knowledge," going beyond the short-sighted boundaries of specific disciplinary sectors to embrace a broader point of view, which declines exactly that holistic approach whose necessity, concerning the heritage of the Great War, has already been widely discussed in previous chapters.[534]

In other words, the archaeology of the First World War is at the same time an industrial archaeology, understanding the 'signs' of war as products of complex standardized processes of large-scale production, but also a historical, social and anthropological archaeology, which investigates the profound symbolic relationships that connect the fragments of the remains and define that quid value that characterizes and distinguishes them from any other type of heritage.[535]

Thanks to this transdisciplinary approach, the archaeology of the Great War has been able to develop and spread more and more at the European level over the last twenty years,[536] exploring and investigating

533 CIURLETTI, 2006.

534 From this perspective, it is clear that in the overall analysis of a conflict, especially if it is chronologically modern, more specifically, anthropological considerations cannot be overlooked either, such as possible "political and nationalistic motivations" and "notions of ethnicity and identity." For more on this topic, see also SAUNDERS, 2012.

535 Please refer to the previous chapters for the contextualization of the concept of quid values.

536 Under the heading "Archaeology of War" (with its homologs and definitional substitutes and its generic or specific domains of application, e.g., First or Second World War, American Civil War, Indian Wars, etc.) there is now, on an international level, a large body of specialist literature (DOBINSON, LAKE, SCHOFIELD 1977; ENGLISH HERITAGE 1998; GUTH, UNDERGROUND 1998; SCOTT 1998; GUTH, UNDERGROUND 1998).) there is now, at an international level, conspicuous specialist literature (DOBINSON, LAKE, SCHOFIELD 1977; ENGLISH HERITAGE 1998; GUTH, UNDERWOOD 1998; SCOTT et al. ii 2000; DE GUIO 2002, 2003; SAUNDERS 2001, 2002; BELLOGI 2002; HILL, WILEMAN 2002; DOYLE, BENNET 2002; EHLEN, ABRAHART 2002; DE GUIO, BETTO 2005), various editorials in the last 15 years of refereed journals such as "Antiquity" and "British Archaeology" (e.g., 76, 2004), conferences (e.g., the Sixth International Conference on Military Geology and Geography, 19 - 22 June 2005, School of Geography, University of Nottingham, U. K.) and now also courses dedicated to various levels of academic teaching (in particular MFA master-courses in the Anglo-Saxon area), thematic journals (e.g., Journal of Conflict Archaeology), numerous websites (e.g., HYPERLINK http://www.britarch.ac.uk/projects.dob) and dedicated research networks (e.g., C.A.I.R.N.: Conflict Archaeology International Research Network). In recent years moreover, dedicated departments have been created, such as the Centre for Battlefield Archaeology (University of Glasgow) and the Institute for Archaeological Heritage, Western Flanders (Belgium).

battlefields through traditional research methods such as excavations and manual surveys and a whole series of new high-tech tools for data acquisition and the creation/representation of three-dimensional models, obtained with radio-controlled drones and instrumental analyses such as territorial thermography or specially developed georadar surveys. The implementation of traditional techniques has not been immediate. Although the potential of these innovative methods is particularly significant, methodological progress in many disciplines, especially in the humanities, does not always keep pace with the speed of contemporary technological evolution.[537] In any case, the knowledge obtained from these analytical techniques, integrated with the interpretation of period aerial photographs produced by the air force, has made it possible to elaborate new forms of narration, including three-dimensional ones, which are particularly effective in conveying a greater quantity of processed information, and therefore of knowledge. Consequently, such methodologies have provided a valuable contribution to understanding the intrinsically anthropological nature of the material culture of the different warscapes and the identity meaning that the vestiges preserve and embody. In the words of historian N. Saunders, it could be said that "the archaeology of the Great War represents the recovery of memories, as well as bodies and objects." This has represented the first form of enhancement of this heritage, which has contributed to outlining the current awareness that recognizes the Archaeology of the Great War's ability to provide a unique and indispensable contribution to identifying the permanence of vestiges within contemporary landscapes.[538]

Dilating this concept to the scale of the landscape means contributing to recognizing the different "testimonial gradients," the knowledge of which is of fundamental importance to consciously orientate the choices for the destiny of this cultural heritage.

In this perspective, it is evident how the archaeology of the First World War represents an operational method capable of putting together different temporalities, in which the past does not remain relegated to something "other," external and impersonal, but becomes part of the present time, acquiring renewed importance and stimulating new

537 Even in universities, training courses do not always manage to keep up with the multidisciplinary use of digital technologies, leading to a particular discrepancy between methodological processes and technological advances. It is worth recalling, for example, the climate of profound mistrust with which the introduction of the term "virtual archaeology" was greeted in academic circles, both because of the debated terminological relevance and, above all, because of the difficulty, which is partly shared, of being able to imagine the scientific as well as the communicative potential of three-dimensional worlds, both forex Novo reconstructions ("virtual antiquity") and for the documentation of structures in situ ("observed antiquity"). For further information, see also FORTE, 2005.

538 SAUNDERS, 2002.

“possibilities of knowledge.

While the generation that lived through the war is almost disappearing, the landscape in its multi-layeredness is the last direct testimony able to connect these different temporalities. History thus becomes archaeology, and archaeology itself, thanks to this spatiotemporal expansion, is enriched with new meanings and recognizes a diversity of pasts and perspectives.

It is clear that the archaeological approach cannot rewrite the past but can reveal it and make it tangible, allowing direct contact with all those less official and more everyday aspects of the conflict, of life in the trenches, of their construction. An indispensable contribution that becomes nourishment for the knowledge of this “condenser full of values” and that is well intertwined with what has been discussed above regarding the specific declination of the concept of enhancement of these “places of memory,” in relation also to the possibilities of development that can trigger in them and the consequent, potentially beneficial effects on the community.

In recent years, this line of research has begun to develop at a European level to investigate, from this observatory, various areas of the original front line. From an operational point of view, the archaeological approach has been declined in different ways concerning the other morphological-territorial conditions of the Warscape Classes, developing from time to time more specialized methods of investigation that, while operating in the general context of the Archaeology of Conflict, have refined their techniques by adapting them to environmental needs. Analyzing the different warscapes through an archaeological lens has therefore led to the development of forms of an aerial, glacial, high mountain, underwater and speleo-archaeological archaeology, which to a certain extent reflect precisely those different “ways of seeing” a landscape, already set out in chapter 2.3.[539]

The proposed ‘stratigraphic telescope’ integrates, in a sense, several aspects that have been focused on and developed in detail in these subcategories, particularly in aerial, glacial, and high mountain archaeology, which it is worth briefly mentioning before continuing with the discussion.

539 As an example, the border between Italy and Austria is healthy representative of this variety of landscape contexts: it consisted of that sector of the war operations that went from the Stelvio Pass and, descending through the Ortles and Adamello Groups, reached Lake Garda and then continued to the Pasubio and, through the Sette Comuni, to the Gulf of Venice. Therefore, it is clear that this vast territory presented different characteristics, which now make field research complicated and impose particular archaeological techniques linked to different specific branches. Although a large part of the Italian front could be traced back to mountainous environments, other types of scenarios are not excluded, such as, for example, the underwater one (both maritime and inland glasses of water). See also BEZZI, GIETL, 2018.

Aerial Archaeology

Top-down archaeology deals with the study of sites from above through the photo-interpretation of data obtained using a variety of digital instruments, from aerial photographs to modern specialized applications linked to remote sensing technologies, right up to the development of other special remote sensing techniques for purely archaeological purposes, which are part of the new line of research known as Archaeobotics. The first and significant advantage over traditional archaeological research methods is the absolute non-invasiveness of these new instruments, which do not operate through alterations, even if controlled, of soil layers, but preserve their complete integrity, while still obtaining as much information as possible. Starting with the simplest of these techniques, the analysis of bird's-eye photographs was introduced during the war period through military aerial survey, which soon became a powerful new weapon. From that moment on, pilots and observers became the real 'eyes of the army,' and aerial photography became the most effective means of obtaining

Pic. 8.1 - Example comparison of typical aerial photographs. Stichelbaut, Gheyle, Van Eetvelde, Van Meirvenne, Saey, Note, Van den Berghe, Bourgeois, 2017.

information on the conformation of entrenchments, their occupation, the tactics employed, and the drawing up of more or fewer summary maps of friendly and enemy lines.[540]

The analysis of these photographs, now vintage, and the comparison with contemporary orthophotos showing the situation today can already provide an initial archaeological interpretation of the dynamics of landscape transformation. But even more precise and exciting results can be obtained through the use of traditional laser instruments of the LIDAR (Light Detection and Ranging) type, as well as specifically designed radio-controlled drones, which make it possible to analyze every morphological feature of the terrain in detail, even in areas with dense forest cover or where difficult conditions of accessibility/visibility would make it impossible to carry out either photographic reconnaissance or traditional surveys and inspections. The integrated combination of these non-invasive methods of archaeological analysis has led to the uncovering of numerous ‘traces of the past still imprinted on the ground and not eroded and canceled out by the landscape changes resulting from the passage of time, providing more precise, detailed, and high-definition cartographic and photographic documentation, and improving overall knowledge of the contemporary permanence of the war footprint of a hundred years ago. In this regard, the results obtained by Aerial Archaeology integrated with the use of remote sensing in Belgium are particularly interesting, specifically in the research carried out by the collaboration of several departments of Ghent University for the recognition of the permanence of the Great War in the fields of Flanders, even where the craters, trenches and deep ditches that had transformed the countryside into a lunar landscape had been filled with soil to facilitate the reconstruction and restoration of the original land uses (Pic.8.1).[541]

540 The insight that could also use the informative potential of these photographic records in an archaeological perspective is due to the pioneer of aerial archaeology Osbert Gut Stanhope Crawford, a British archaeologist who served with the 14th British and Scottish Battalions and who already in 1917, during his service as an aerial observer and photographer, sensed the potential of using aerial photographs to study the prehistoric landscape in Britain. See STICHELBAUT, CHIELENS, BOURGEOIS, 2018;

541 Recently, several interdepartmental research units have been set up at Ghent University, which bases their studies on the analysis and interpretation of military aerial photographs as a tool for tracing the evolutionary history of landscapes through the geographical, archaeological, and ecological approaches. For a more in-depth study of the subject, see also: STICHELBAUT, 2004; STICHELBAUT, SAEY, MEEUWS, BOURGEOIS, VAN MAIRVENNE, 2011; STICHELBAUT, GHEYLE, SAEY, VAN EETVELDE, VAN MEIRVENNE, NOTE, VAN DER BERGHE, BOURGOIS, 2016; STICHELBAUT, GHEYLE, VAN EETVELDE, VAN MEIRVENNE, SAEY, NOTE, VAN DER BERGHE, BOURGOIS, 2017; STICHELBAUT, CHIELENS, BOURGEOIS, 2018; STICHELBAUT, 2020.

High Mountain Archaeology

Directly linked to the previous one in terms of objectives and aims, High Mountain Archaeology focuses on the morphological contexts of high altitudes, in which the Great War left its "marks" on landscapes of great visual and scenic impact, leading to the construction of daring entrenchments, barracks and strategic posts. These constructions are physical evidence of the high levels of construction technique achieved by military engineering, which is still fairly well preserved today thanks to the difficulties of accessibility, which have preserved them both from the uncontrolled action of illegal salvage operators and the spoliation authorized in the name of the reuse of war materials in post-war building reconstruction practices. For this reason, the information that these particular warscapes still preserve today represents a very useful pool of information for understanding the dynamics of the Alpine front during the Great War. To be able to carry out surveillance in such contexts, this specific branch of research has developed wide-ranging techniques that integrate the excursion methods typical of mountaineering (with ropes, descenders, etc.) with the opportunities offered by remote sensing described above to detect the remains of entrenched systems, artillery positions, observatories, barracks, footbridges, and shelters. An example of this is represented by the Soprintendenza di Bolzano (Italy) initiatives at Croda Rossa and Croda dei Rondoi in the Sesto Dolomites in South Tyrol (Pic.8.2).

Pic. 8.2 - Open-air Museum, Croda Rossa, Sesto, Alto Adige, Italy.

Glacial Archaeology

A specialization of High Mountain Archaeology is certainly Glacial Archaeology. That branch of research developed to adapt survey and analysis techniques to the problematic climatic and morphological conditions of high altitude contexts, specifically the tremendous Alpine glaciers on which the front lines grew. In such contexts, the accumulation basin of the remains of the Great War is not submerged by layers of soil but by accumulations of ice and snow. Therefore, it was necessary to integrate hot air generators or pumps with directional water jets. Despite the extreme working conditions, research carried out using the methods of this particular form of archaeology has often led to the discovery of exceptional finds, thanks also to their excellent state of preservation obtained from the actual freezing that has preserved even the most degradable materials, crystallizing them at the moment of their sudden burial: these are genuine 'time capsules,' as rare as they are potentially pregnant with meaning, if 'discovered' and investigated.[542] Precisely in this regard, and not only as a result of specific archaeological campaigns but also due to the climate change underway, it is interesting to recall how more and more often physical remains of vestiges such as wooden objects and tools, clothing of various kinds, documents, letters, helmets, rifles, bullets, barbed wire, sheet metal, to name but a few, are coming to light. In addition to these, however, they also find anthropological remains that are almost perfectly "mummified" beneath substantial layers of ice. This finding further substantiates what has already been stated in the previous chapters concerning the most sacred component embodied in "war landscapes," which defines their exceptional nature. It makes sense and essential to "take care" of them in the future. In recent years, this form of archaeological research has led to the realization of numerous important missions at a national and international level, including the excavation and visualization works promoted by the Soprintendenza per I Beni Culturali of Trento of the Punta Linke site in the Ortles-Cevedale group and the Corno di Cavento in the Adamello-Presanella group (Pic.8.3), as well as the operations at the summit of Gran Zebù followed by the Soprintendenza of Bolzano.

542 In archaeology, a 'time capsule' is defined as a situation characterized by the absence of subsequent phenomena that have disturbed even part of the original structure. This is usually a low condition, relegated only to glacial contexts or to underwater shipwrecks. Still, as far as the heritage of the remains of the Great War is concerned, this concept is not so unusual, since very often, sudden and traumatic events (bombardments, attacks, etc.) have often imposed a sudden caesura that has produced snapshots unchanged over time. In this regard, reference is also made to all the entrenched systems buried and filled with soil in Flanders and the underground shelters that were submerged by explosions above. See BEZZI, GIETL, 2018; STICHELBAUT, VERDEGEM, VAN HOLLEBEEKE, DEWILDE, WYFFELS, ERVYNCK, BRACKE, DECORTE, GHEYLE, 2018.

Pic. 8.3 - Mountain defense construction, Corno di Cavento (Adamello Group), Trentino, Italy.

Ultimately, these new methods of archaeological research, developed in recent years through a distinctly interdisciplinary approach, have shown that they can provide a valuable contribution to facilitating the unraveling of the "signs" linked to the First World War, present at different temperatures in that threshold-space between the visible and the "submerged" that holds, even today after a hundred years, the imprint of the Great War. Precisely for this reason, the "stratigraphic telescope" method is part of this line of research. It implements its development by deepening some specific aspects thanks to further interdisciplinary contributions to provide an operational assistance to recognizing areas with a different "testimonial gradient."

8.2 The Stratigraphic Telescope: a totally non-invasive interdisciplinary method for unveiling the permanences of vestiges within the contemporary multi-layered landscape

The “stratigraphic telescope” method is a valuable tool for learning to “read” contemporary landscapes through the lens of the stratigraphic-constructive observatory to be able to recognize the permanence of history, specifically of the Great War, even if “submerged” beneath successive stratifications. As already mentioned, this methodology is characterized by a marked holistic and interdisciplinary nature that brings together different “knowledge” and analytical tools to obtain the most significant possible amount of helpful information for investigating and interpreting the “signed material” in a non-invasive manner. The “stratigraphic telescope” integrates the knowledge gained from solving a series of data obtained thanks to the potential offered by high-resolution remote sensing techniques and non-destructive tests. Through the study of orthophotos and LIDAR data, satellite or aerial remote sensing are particularly useful for investigating the dynamics of territorial transformation over time, comparing the impact of the war event of a hundred years ago with the current survey of permanences. In this perspective, the use of software for the creation of Geographical Information Systems such as ArcGis and QuantumGis is of considerable importance, as these work environments allow for the overall coordination of the entire cognitive process: from the integrated management of the various input datasets (georeferencing of historical maps of militarisation and military aerial photographs) to the processing of the expected outputs through specific interpretative tools such as the RVT (Relief Visualization Toolbox)[543].

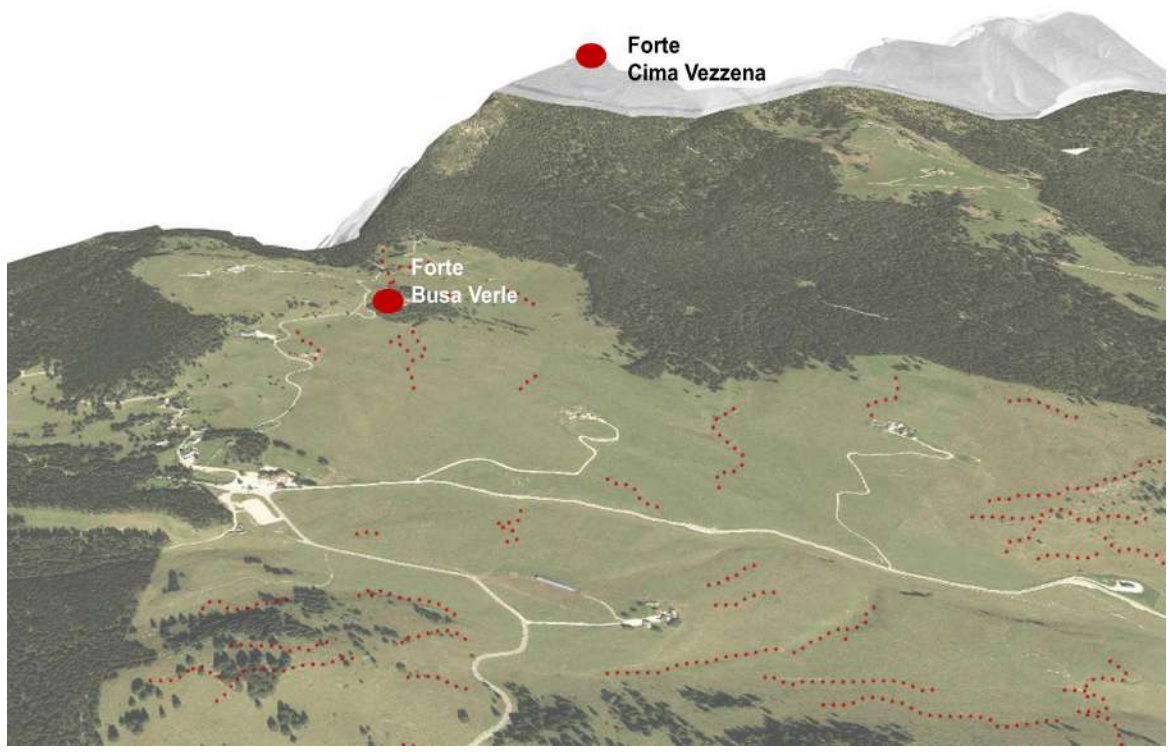
The entire methodology can be organized in three distinct but profoundly interrelated phases, which, just like a telescope, provide for successive and gradual levels of analysis and in-depth examination concerning the different degrees of complexity recognized. By bringing together the different scales of observation, from the general to the particular, and from the analysis of detail to the insertion of the same in the relative context of reference, this cognitive pathway enables the traces of history to be recognized operationally in the “materia signata,” metaphorically weaving the threads of the transformative dynamics that have modified its physical perception.

543 As already mentioned, the research units at Ghent University have undertaken intensive analytical work on precisely the same issues. This provided essential nourishment for the development of the present research, and particularly significant was the period of a study carried out in 2020 at the Department of Geography of Ghent University (supervisor Prof. Veerle Van Eetvelde) during which it was possible to investigate first-hand and in the field, the analytical methodologies experimented by Belgian scholars.

In the following paragraphs, the entire proposed method will be presented, declined in its different operational steps, first at a theoretical-methodological level and, subsequently, through the exemplified application on a specific warscape, namely the entrenched system insisting in the area around Forte Busa Verle (Table 8.1b) on the Vezzena plateau in Trentino (Italy). In fact, following the application of the multi-criteria analysis proposed in Chapter 6 on the fortified axis composed of the forts Campo Luserna, Vezzena, and Verle, the latter emerged as an area potentially more affluent in historical-memorial evidence but less efficiently decodifiable than the others (Table 8.1a). For this reason, it was decided to directly experiment with the methodology of the "stratigraphic telescope" in this context to verify its real contribution in uncovering this latent heritage. From an operational point of view, the first methodological steps were in any case applied to the entire axis formed by the three permanent structures to have a double confirmation, also through this method (as well as through multi-criteria analysis) of the strategic importance of Forte Verle in the context of future enhancement practices for an effective revival of the local territory.





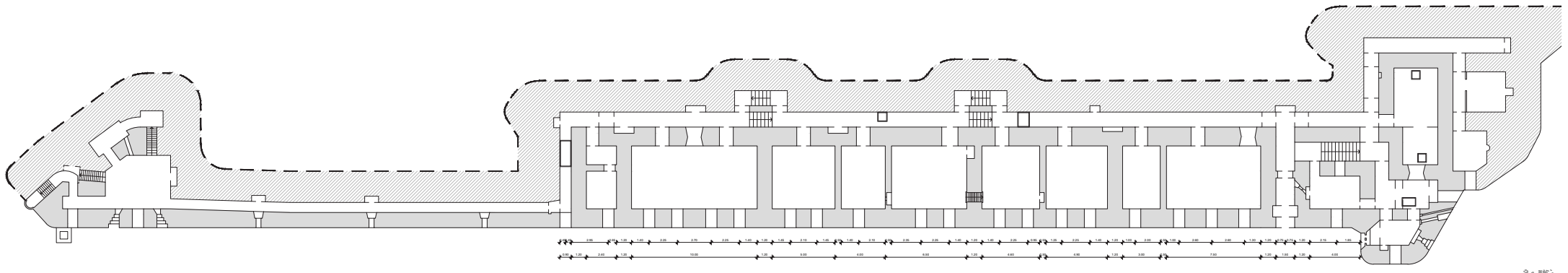


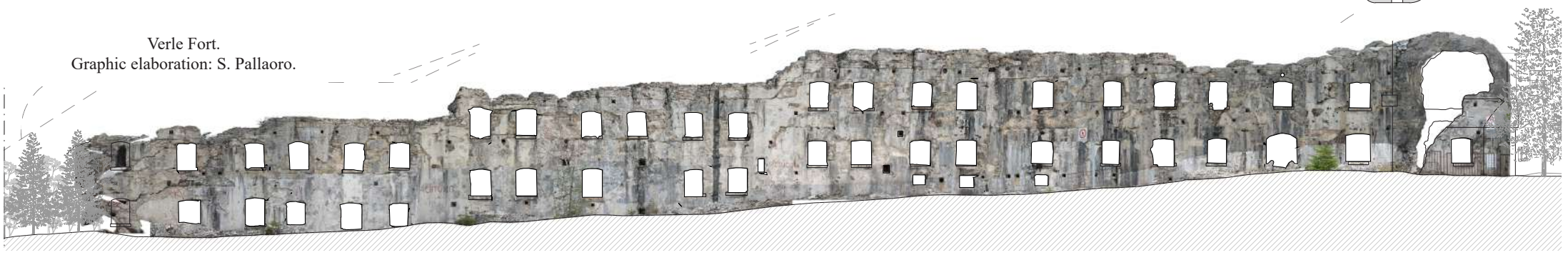




Tab. 8.1a | FORTIFIED SYSTEMS - Around Campo Luserna, Busa Verle and Vezzena Forts — *Present time (survay)*

Tab. 8.1b | Verle Fort: drawwings and current photographs





Verle Fort.
Graphic elaboration: S. Pallaoro.

8.2.1 Data collection: materials and surveys

Following the identification of the area to be analyzed, and consequently of the relative Warscape Class, the preliminary phases for the application of the method concern the retrieval of the available documentary materials and the input territorial datasets, on whose integrated and comparative interpretation the “stratigraphic telescope” is based. As far as the existing historical documentation is concerned, it is essentially a matter of archival and documentary research of the militarisation plans of the areas under analysis, of the written papers and designs of the fortified works and the period photographs conserved in museum collections and archives, with particular attention to those taken by the various air forces during the aerial reconnaissance phases. Specifically, the military cartography relating to the fortification plans drawn up by the various Military Geniuses in anticipation of war is usually kept in the State Archives or the Archives of the Historical Offices of the Army General Staff of the respective countries. Very often, these documents have already been studied and cataloged by various scholars belonging to different disciplines who have promoted their reproduction, also in digital format, to preserve their integrity and at the same time promote their diffusion.[544] As far as period photographic documentation is concerned, in addition to the National Archives, there are also vibrant collections held in Foundations, Cultural Associations and Museums related to the Great War, as well as various publications published in recent years, for which individuals have often provided period photographs held in private family collections. Moreover, it is worth remembering that a large part of the above-mentioned historical documentation is now also available online, thanks above all to the various cultural initiatives promoted at the international level on the occasion of the centenary.[545]

Alongside identifying these essential materials, the non-invasive contribution of remote sensing and modern aerial photogrammetry

544 As far as Italy is concerned, the documents are kept in the Italian National State Archive, with its territorial offices, the AUSSME, and the ISCAG. In Austria, the central reference archive is the KriegsArchiv in Vienna, which preserves all original documents read by the Austro-Hungarian Military Corps. In Switzerland, the military cartography is kept in the State Military Archives, which is particularly difficult to access. In addition to the state archives, there are specific museum institutions in each country that preserve other necessary documentation: for example, the Museo Della Guerra in Rovereto (TN), the Museo Storico Della Terza Armata in Padua, Italy; the Flanders Fields Museum in Ypres, Belgium; the Biblioteca Cantonale in Locarno (Switzerland) that preserves the Fondo Daccò-Viganò entirely dedicated to military fortifications, to name but a few.

545 In this regard, we refer to Chapter 2, where some critical initiatives of cataloging and disseminating documentation concerning the Great War promoted within the framework of the Centenary initiatives have already been presented.

technologies is of fundamental importance for creating informative datasets referring to the current morphology of the territorial reference areas. Specifically, the orthophotos and point clouds of the geographical data collected with the Airborne Laser Scanner (ASL) constitute the founding basis of the proposed method: they provide a precise and detailed three-dimensional modeling of the current orography of the sites which, when appropriately investigated, makes it possible to bring to light the remains of the Great War even in areas where successive stratifications and alterations due to degradation compromise recognition, accelerating the "risk of loss." At present, the diffusion of these territorial datasets is increasingly increasing as the various countries are implementing their use, above all for environmental and hydrogeological planning and the overall governance of the territory. For this reason, various national remote sensing campaigns are also planned to map areas that are not yet available.[546]

Although the availability of such information models on the web is not particularly difficult, if such spatial datasets are not already available for the areas under study, in the preliminary phase, it is necessary to plan a survey campaign in the field using remote sensing instruments from above that use active moving supports, such as drones equipped with sensors that use energy emitters to irradiate the target to be acquired.

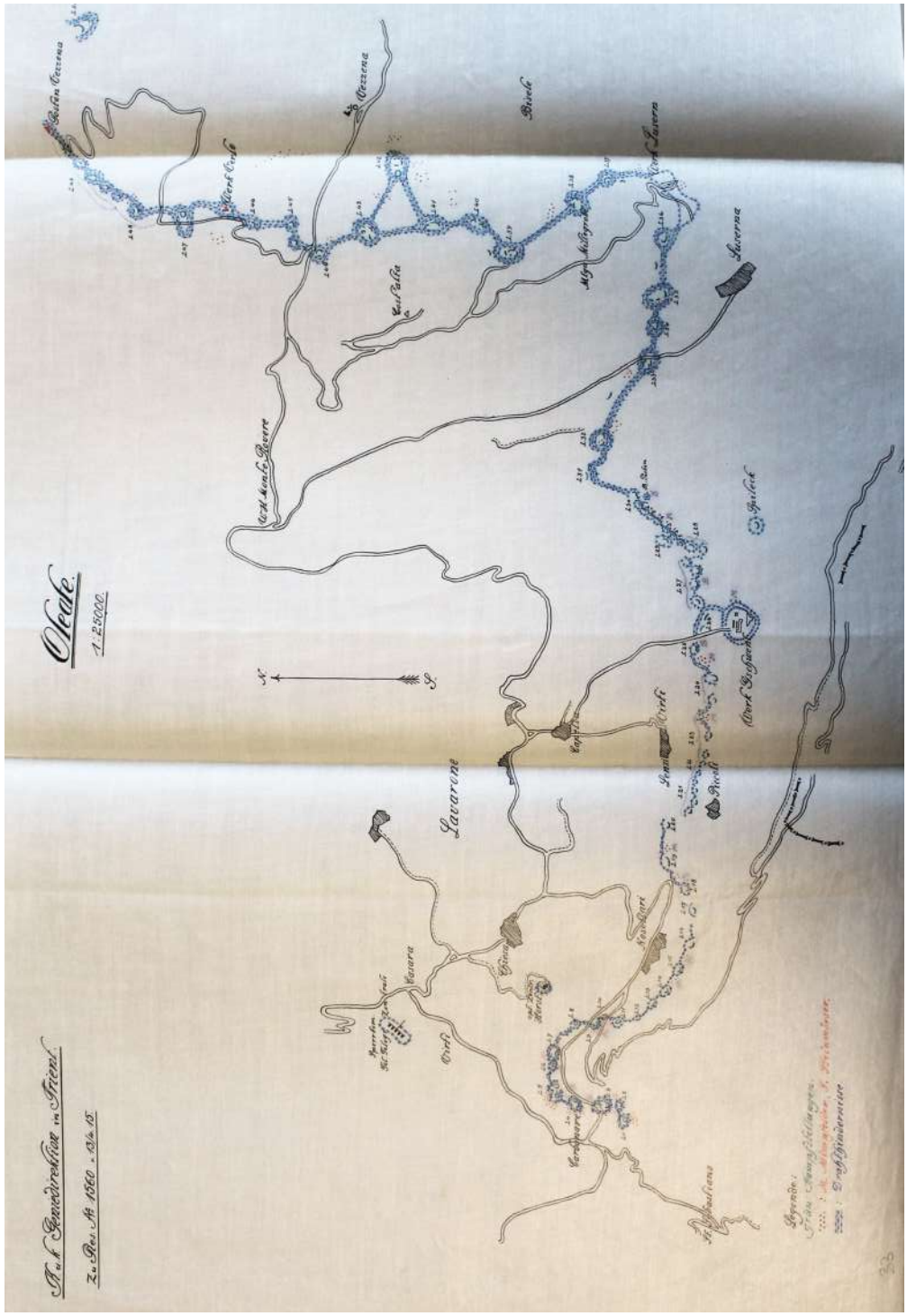
Pilote Case: the fortified system around Busa Verle Fort (TN) - Italy

As mentioned above, the preliminary phases for the application of the "Stratigraphic telescope" method concern first of all the retrieval of all the primary documentary sources available regarding the territorial area under analysis, through in-depth archival research of the militarisation plans, the written and design correspondence of the individual fortified works and period photographs (including aerial photographs of military reconnaissance) kept in museums, archives or private collections. To these historical sources must be added the territorial datasets that refer to the current situation of the territory, which are of fundamental importance for the future diachronic comparison through which the evolutionary biography of the specific warscape under analysis can be reconstructed. As far as the Trentino-Tyrolese Salient is concerned, the reference area on which the present methodology of the investigation was tested and validated, and in particular the fortified system of the Altopiano dei Sette Forti, the central archives consulted were: the State Archives section of Trento, the Provincial Archives PAT and the collections

546 Just as an example, it should be noted that the Saliente Trentino Tirolese, in Italy, has already been fully surveyed, and the datasets are freely available and downloadable through a public WebGis. On the other hand, as far as Switzerland is concerned, remote sensing campaigns have been planned in successive steps, dividing the national territory into areas, the last of which will be surveyed during 2021.

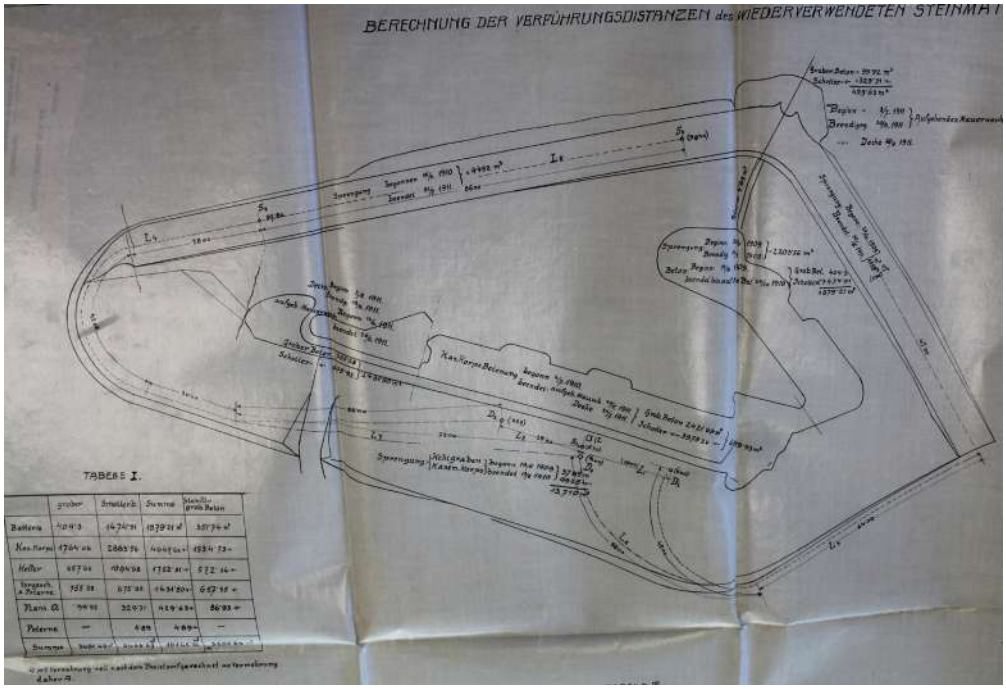
preserved at the Italian War Museum of Rovereto (TN), as far as the Italian area is concerned; the Austrian State Archives, in particular, the Kriegsarchiv of Vienna, as far as the Austro-Hungarian area is affected.[547] In the following pages, some of the project documentation (from Tab.8.2 to Tab.8.5) and photographs (from Tab.8.6 to Tab.8.21b) found in the archives mentioned above were subsequently used to develop the method itself, have been included as examples. Concerning the input datasets referring to the current situation of the sites, the digital terrain models (DTM) and surface models (DSM), derived from the raw LIDAR data, were quickly found as they were freely accessible and downloadable on the Cartographic Portal of the Autonomous Province of Trento with a Creative Commons license. Based on the UTM-WGS84 coordinate system, these datasets were acquired during remote sensing of the entire Province of Trento between October 2006 and February 2008, subsequently updated and integrated with other ASL surveys in 2014 and 2018. The raw data have been appropriately filtered to represent the surface and terrain trends, which are now available in ASCII-grid format with a 1x1 meter cell grid (type 1 areas) or 2x2 meters (type 2and three regions). As for the digital orthophotos, which can also be freely downloaded from the same online portal, the elaborations acquired between 2014 and 2016 as part of the “Project for the provision of data, systems, and services for the strengthening of the information system of the Extraordinary Remote Sensing Plan (PST_A)” of PAT were used. It is a 4-band orthophoto mosaic (RGBI) with a ground resolution of 0.2 meters, obtained through an aerophotogrammetric survey with a Vexcel Imaging GmbH camera model Ultra cam Eagle and available in the Global Reference System (ETRS89).

547 The Austrian State Archives were founded in the years 1945 - 1947 by uniting the historical sections of the Hofkammerarchiv, Kriegsarchiv, Haus-, Hof- und Staatsarchiv, Finanzarchiv und Archiv fuer Verkehrswesen and placed under governmental management. In 1947, the Hofkammerarchiv and the Finanzarchiv were merged into the Finanz- und Hofkammerarchiv. In 1984 the Archiv der Republik was founded. This association had already been partly anticipated in 1940 by the Reicharchiv, an archives organization founded in 1940 and headed by the Haus-, Hof- und Staatsarchiv, and some other state archives. Since the history of the Habsburg Empire involved large parts of Europe and overseas countries, the Austrian State Archives, with their records, became one of the largest and most important archives in Europe and the world.



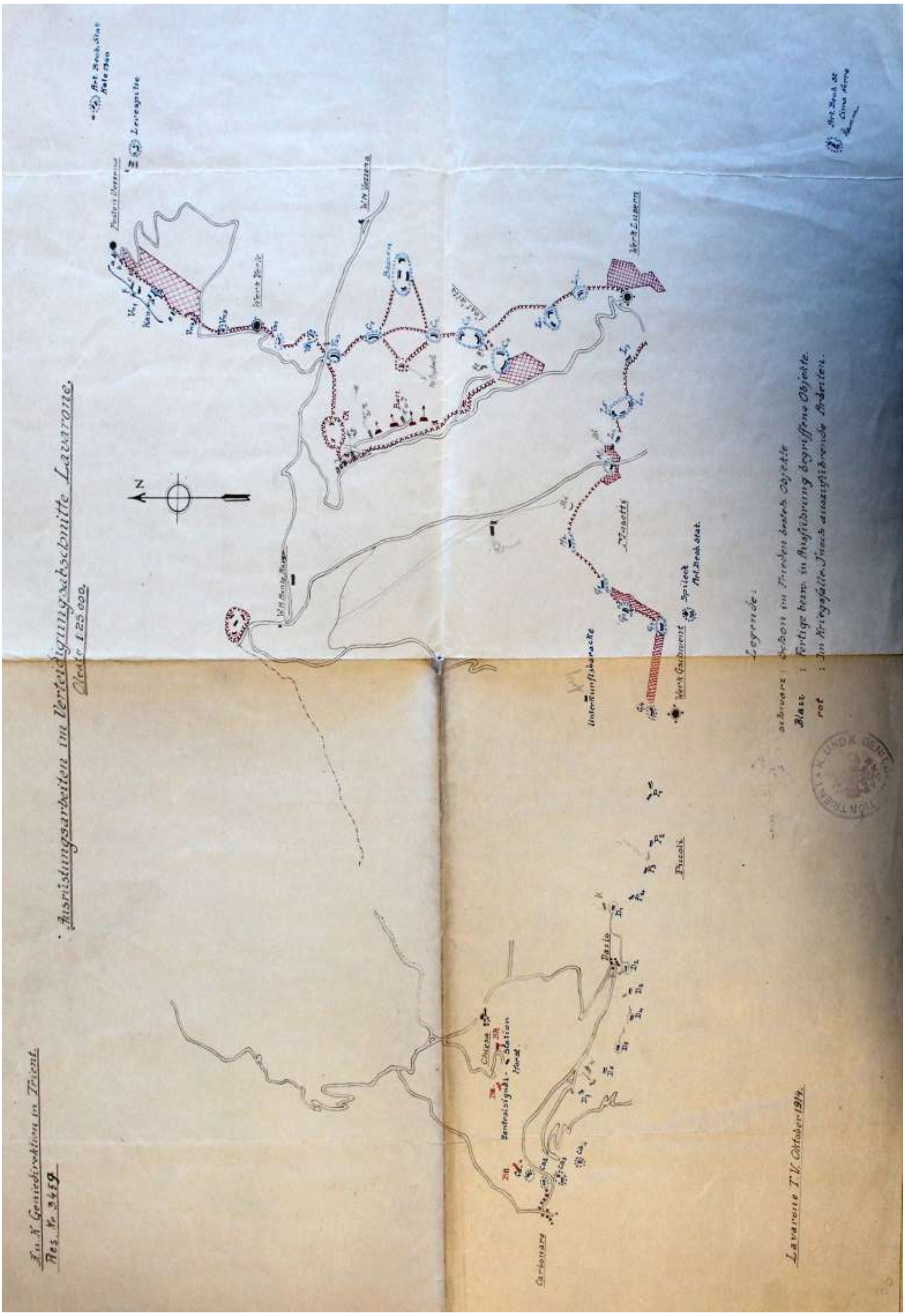
Militarization plans: Lavarone and Vezzena Plateau, 1915.
Archivio di Stato, Trento

Militarization plans: Lavarone and Vezzena Plateau, 1916.
Archivio di Stato, Trento

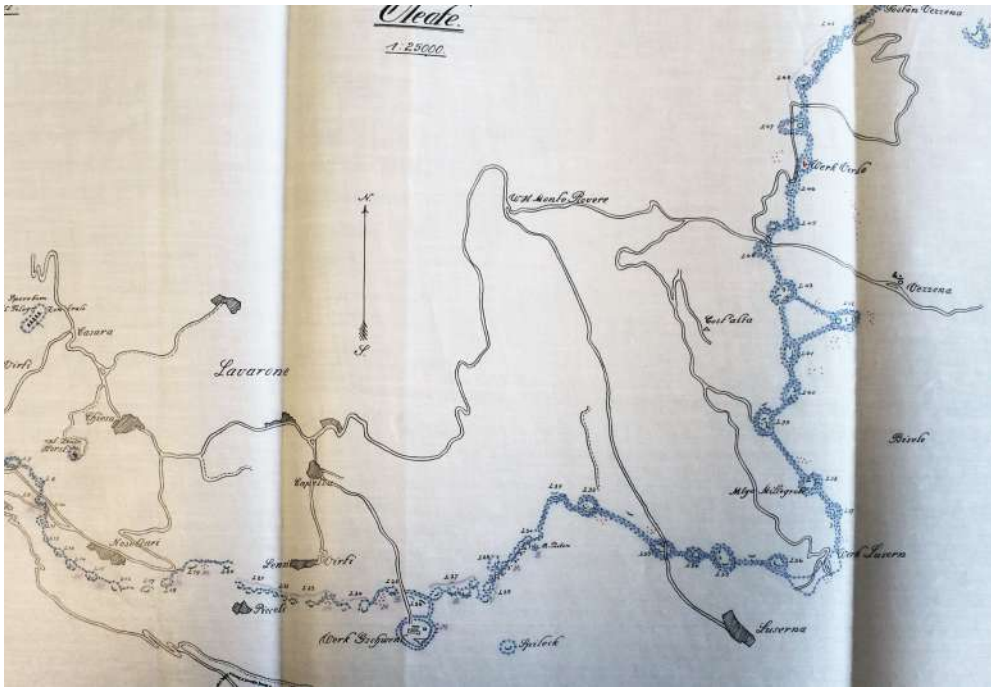


Verle fort: project and site organization
Archivio di Stato, Trento

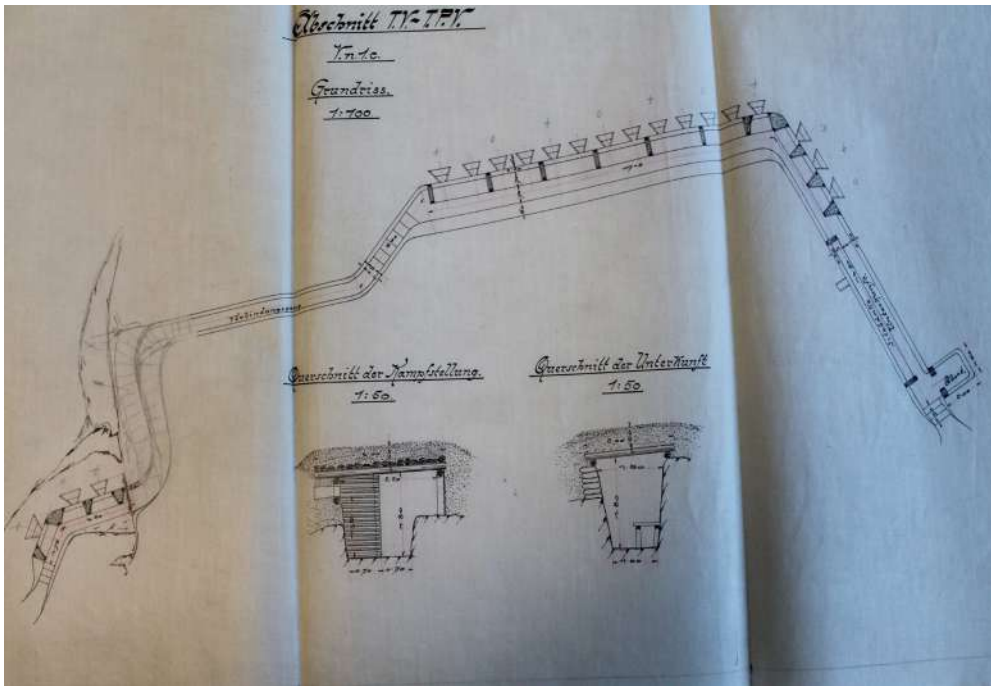
Tab.8.4 | DOCUMENTARY SOURCES - Militarization projects



Militarization plan, progress of work, 1914.
Archivio di Stato, Trento

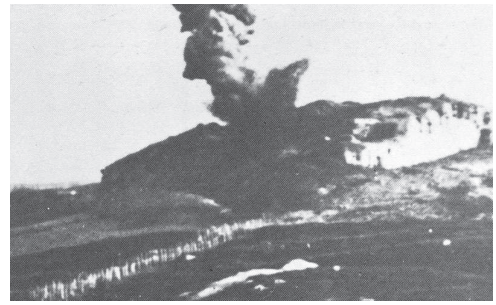


Lavarone and Vezzena Plateau: entrenched systems.
Archivio di Stato, Trento



Entrenched systems around Cima Vezzena Fort.
Archivio di Stato, Trento

Verle Fort, 1916.
Museo Storico Italiano della Guerra, Rovereto (TN), Italy

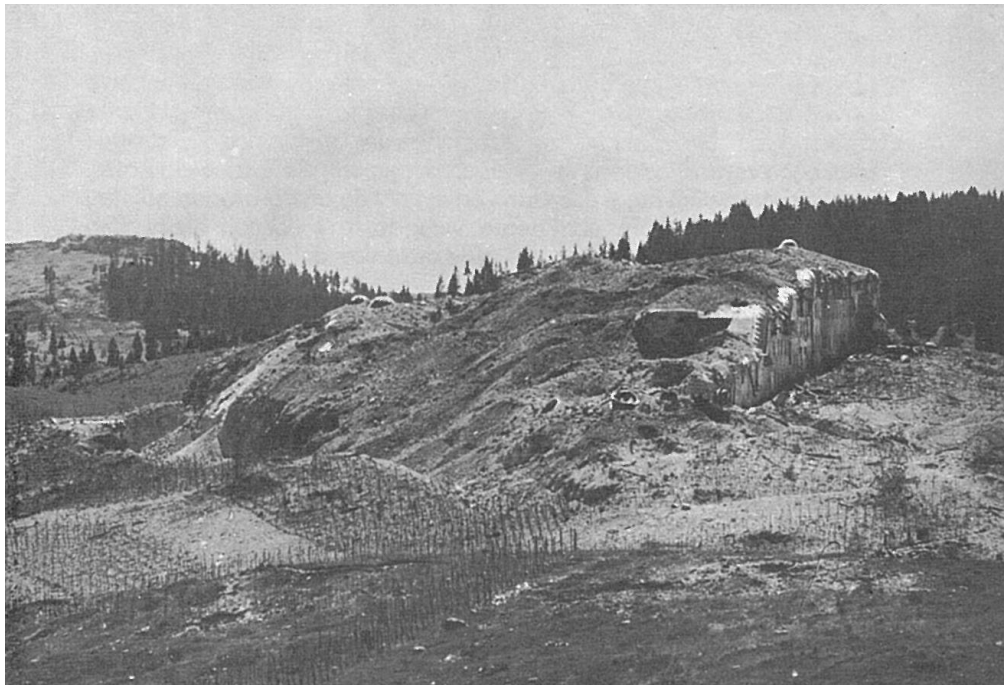


Verle Fort, 1915.
Museo Storico Italiano della Guerra, Rovereto (TN), Italy

Verle Fort, 1915.
Museo Storico Italiano della Guerra, Rovereto (TN), Italy

Verle Fort, 1915.
Museo Storico Italiano della Guerra, Rovereto (TN), Italy

Entrenched systems around Verle Fort, 1915.
Museo Storico Italiano della Guerra, Rovereto (TN), Italy



Entrenched systems around Verle Fort, 1915.
Museo Storico Italiano della Guerra, Rovereto (TN), Italy

Entrenched systems around Verle Fort, 1915.
Museo Storico Italiano della Guerra, Rovereto (TN), Italy

Vezzena Plateau from Cima Vezzena Fort, wartime.
Museo Storico Italiano della Guerra, Rovereto (TN), Italy

Tab.8.9 | BUSA VERLE FORT - Austro Hungarian fort - Historical photographs — Wartime

Tab.8.10 | CAMPO LUSERNA FORT - Austro Hungarian fort - Historical photographs __ Wartime

Campo Luserna Fort, 1916.
Historical Photo Archive, Kriegsarchiv, Wien, Austria.

Campo Luserna Fort, 1916.
Historical Photo Archive, Kriegsarchiv, Wien, Austria.

Campo Luserna Fort, 1916.
Historical Photo Archive, Kriegsarchiv, Wien, Austria.

Campo Luserna Fort, 1916.
Historical Photo Archive, Kriegsarchiv, Wien, Austria.

Tab.8.12 | CAMPO LUSERNA FORT - Austro Hungarian fort - Historical photographs __ Wartime

Campo Luserna Fort, 1916.
Historical Photo Archive, Kriegsarchiv, Wien, Austria.

Campo Luserna Fort, 1916.
Historical Photo Archive, Kriegsarchiv, Wien, Austria.

Campo Luserna Fort, 1916.
Historical Photo Archive, Kriegsarchiv, Wien, Austria.

Campo Luserna Fort, 1916.
Historical Photo Archive, Kriegsarchiv, Wien, Austria.

Tab.8.13 | CAMPO LUSERNA FORT - Austro Hungarian fort - Historical photographs __ Wartime

Tab.8.14 | SPITZ VEZZENA FORT - Austro Hungarian fort - Historical photographs __ Wartime

Cima Vezzena Fort, wartime.
Historical Photo Archive, Kriegsarchiv, Wien, Austria.

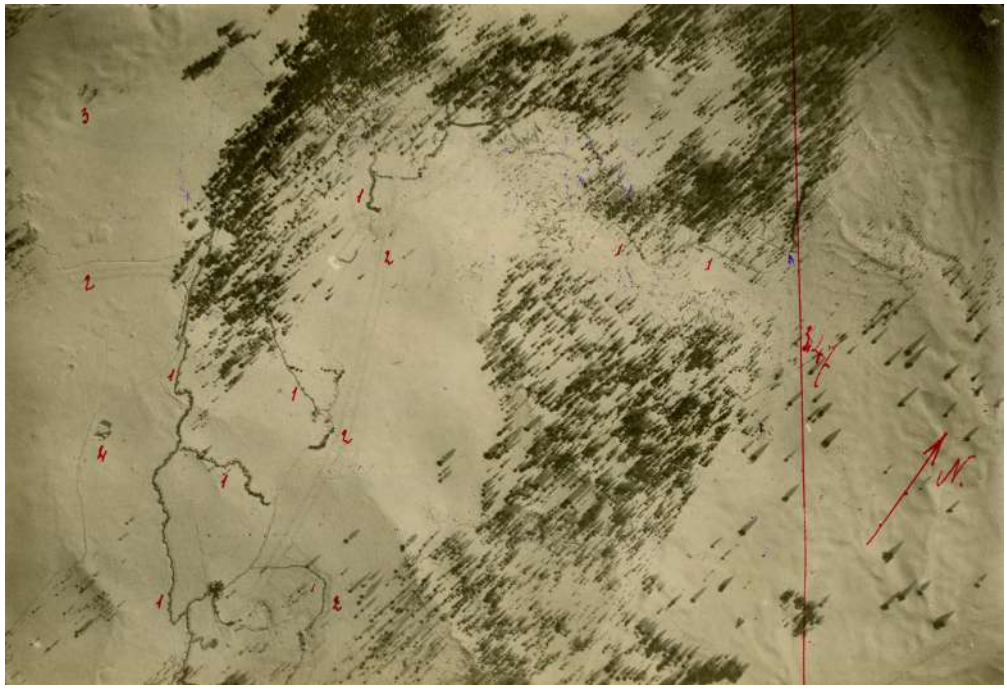
Cima Vezzena Fort, wartime.
Historical Photo Archive, Kriegsarchiv, Wien, Austria.

Cima Vezzena Fort, wartime.
Historical Photo Archive, Kriegsarchiv, Wien, Austria.

Cima Vezzena Fort, wartime.
Historical Photo Archive, Kriegsarchiv, Wien, Austria.

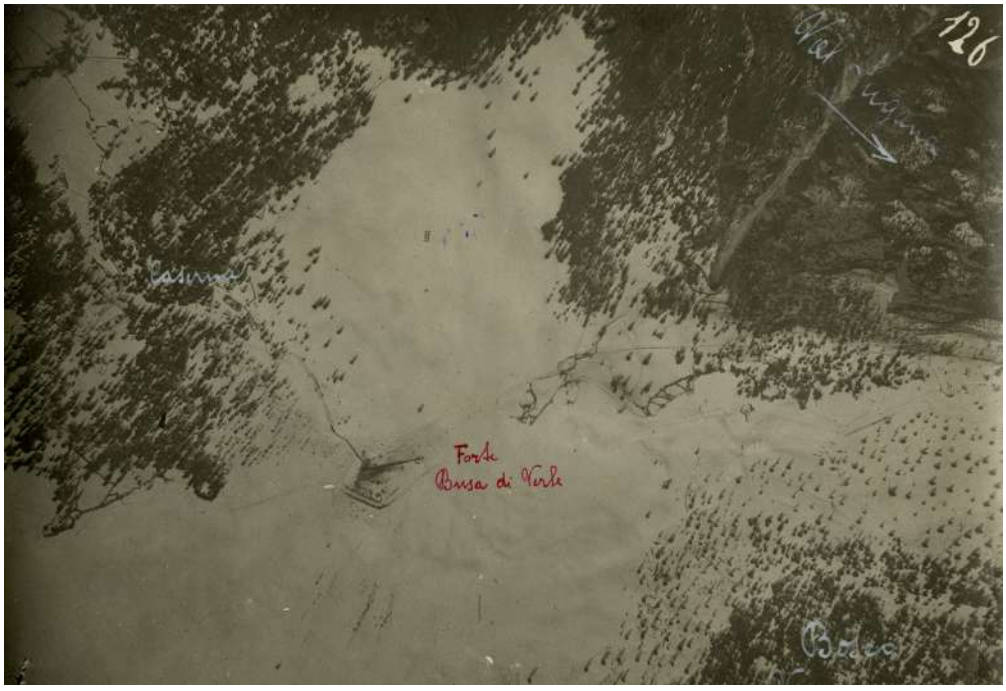
Tab.8.15 | SPITZ VEZZENA FORT - Austro Hungarian fort - Historical photographs __ Wartime

Period aerial photography, area around Verle Fort, wartime.
Museo Storico Italiano della Guerra, Rovereto (TN), Italy



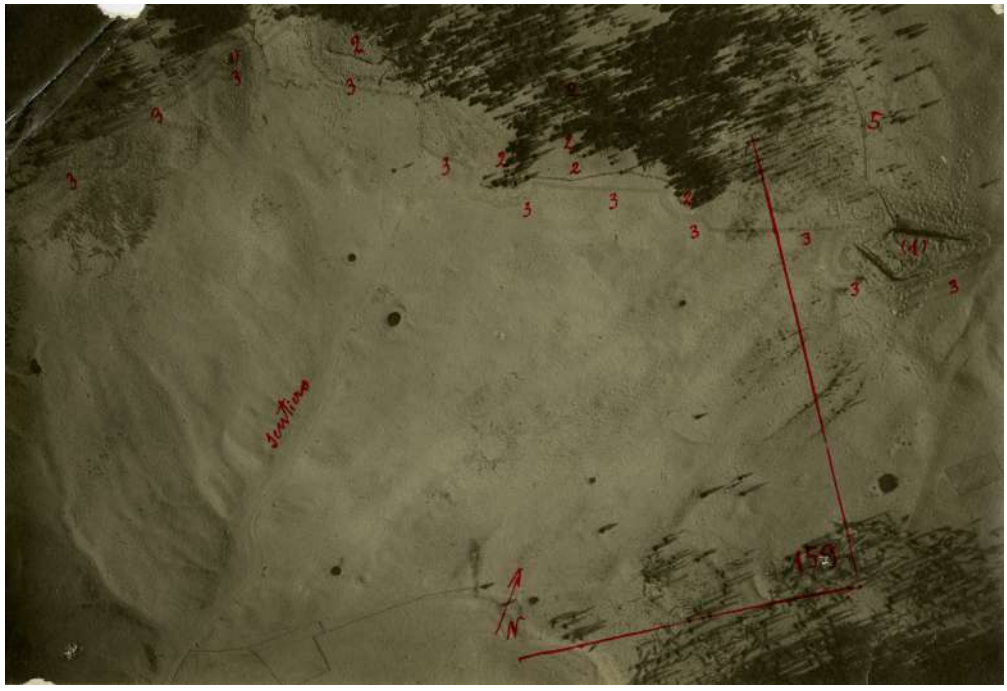
Period aerial photography, area around Verle Fort, wartime.
Museo Storico Italiano della Guerra, Rovereto (TN), Italy

Period aerial photography, area around Verle Fort, wartime.
Museo Storico Italiano della Guerra, Rovereto (TN), Italy

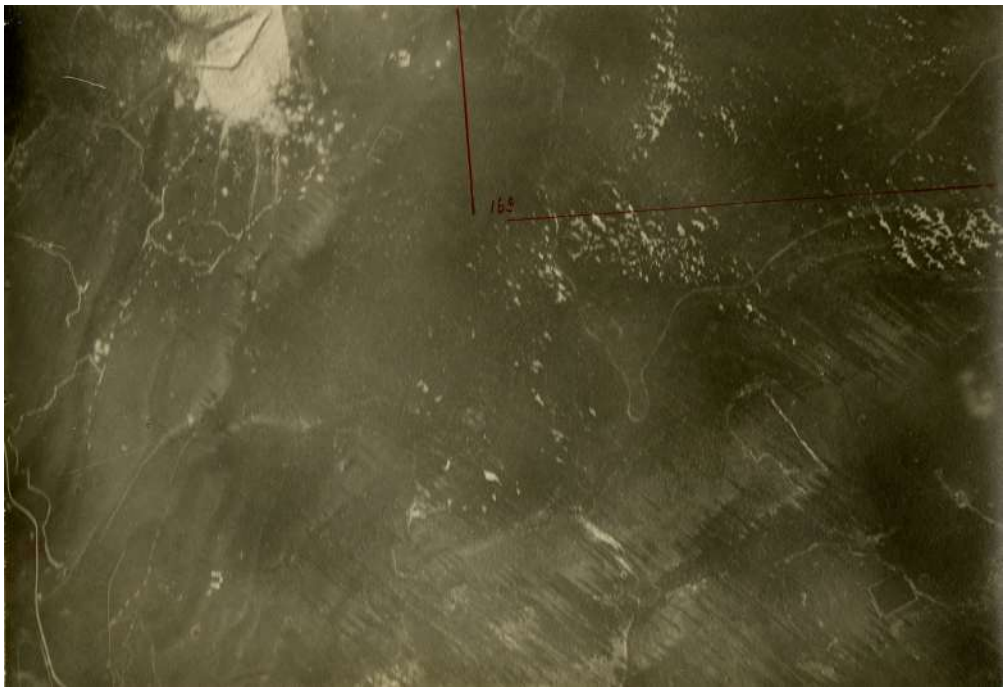


Period aerial photography, area around Verle Fort, wartime.
Museo Storico Italiano della Guerra, Rovereto (TN), Italy

Period aerial photography, area around Verle Fort, wartime.
Museo Storico Italiano della Guerra, Rovereto (TN), Italy



Period aerial photography, area around Verle Fort, wartime.
Museo Storico Italiano della Guerra, Rovereto (TN), Italy

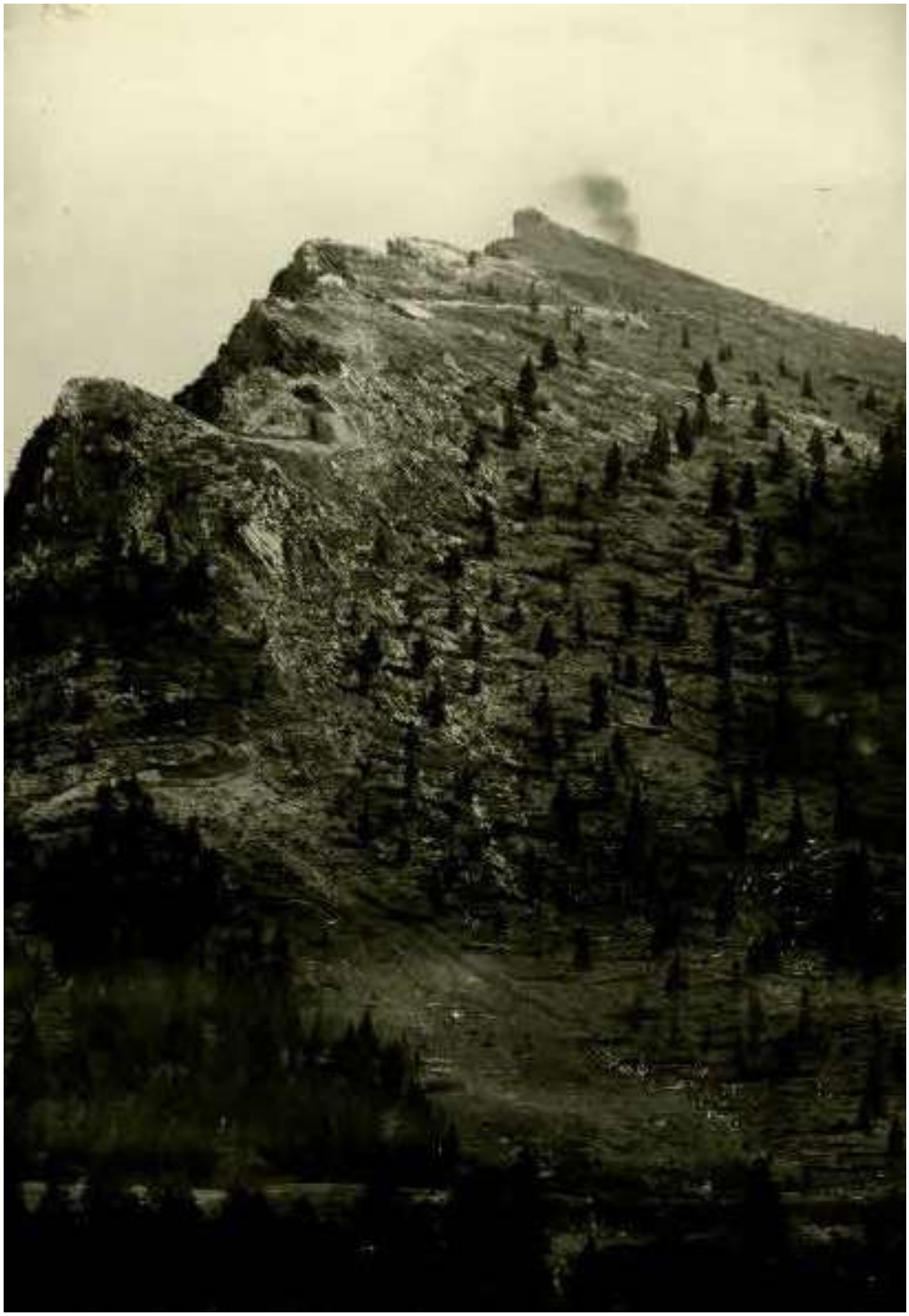


Period aerial photography, area around Verle Fort, wartime.
Museo Storico Italiano della Guerra, Rovereto (TN), Italy

Period aerial photography, area around Verle Fort, wartime.
Museo Storico Italiano della Guerra, Rovereto (TN), Italy

Tab.8.19 | ENTRENCHED SYSTEMS - Around Busa Verle, Vezzena and Luserna Forts __ military recognition

Period aerial photography, area around Campo Luserna Fort, wartime.
Museo Storico Italiano della Guerra, Rovereto (TN), Italy



Cima Vezzena Fort, wartime.
Historical Photo Archive, Kriegsarchiv, Wien, Austria.

Tab.8.21 a| ENTRENCHED SYSTEMS - Around Busa Verle, Vezzena and Luserna Forts __ military recognition

Tab.8.21b | ENTRENCHED SYSTEMS - Around Busa Verle, Vezzena and Luserna Forts ___ military recognition

Period aerial photography, area around Campo Luserna Fort, wartime.
Museo Storico Italiano della Guerra, Rovereto (TN), Italy

8.2.2 Step 1. Signs designed for war: first identifications

Just as every observation through a telescope requires an initial general “focusing” to reduce any external “noise,” in the same way the first phase of the proposed methodology consists of a sort of broad interpretation of the warscape in question on a territorial scale, through a comparison between period images and current photographs, and a detailed study of military maps to be able to make an initial precise localization of the vestiges designed in anticipation of the conflict. Such a wide-ranging view makes it possible to filter the various layers that make up the contemporary landscape, not only to bring out the “signs” designed for the Great War that are still visible, or at least partially recognizable, but above all to identify the areas affected by these militarisation plans, within which the remains can potentially be found, even “submerged.”

Methodology

From an operational point of view, the first methodological step consists in digitizing all the cartographic and photographic documentation found during the preliminary reconnaissance phase, to form a homogeneous database through which such data can be quickly processed, and to be able to compare different sources, heterogeneous in time and space. In this regard, a necessary consideration is the uneven resolution and quality of these images due to chronological differences and the rapid evolution of photographic techniques. For example, black-and-white aerial and bird’s-eye photographs taken during the conflict usually show significantly different levels of sharpness and detail between the other sources. They are always inferior to the latest orthophotos, which are systematically recorded in color and high resolution. This observation is important because it determines the level of detail to be adopted in the processing of the entire method, which, for analytical uniformity, must therefore choose as the minimum mappable unit of analysis the maximum resolution of detail familiar to all the different inputs, precisely that of the period photographs. Even if not directly useful in this first phase, the availability of materials with higher definition and precision regarding the current morphology of the territories will be of fundamental importance for the development of the subsequent methodological steps regarding more specific investigations at a more detailed scale.

The acquisition of the historical documentation from the original paper support to the digital form is propaedeutic to the subsequent methodological steps as it allows the insertion and management within Geographic Information Systems (GIS), thus allowing the conversion into a language directly comparable with the spatial datasets provided by remote sensings, such as DTM, DSM, and orthophotos. To translate the metric and topological content of the ancient maps

into a quantitative and not only qualitative-descriptive perspective, but the proposed method also provides for the subsequent georeferencing of the historical cartographies through the use of specific software for the management and analysis of spatial data, such as ArcGIS and QuantumGis.[548]

From an operational perspective, georeferencing consists of projecting geographical coordinates on each pixel of the raster image in question to make it perfectly superimposable on topographic maps. This operation is achieved through digital processes of geometric transformation and relative resampling. The raster data of the original image are transformed into a new grid, whose pixels are assigned radiometric values according to the importance of the actual pixels.[549] The process of geometric transformation, global and local, takes place by identifying multiple "control points" that can be obtained from a specific dataset containing the Cartesian reference system.[550]

In the light of these considerations, it is easy to understand how military plans can be georeferenced, for example, in the QGis work environment, using current orthophotos as reference maps, which are intrinsically georeferenced from the moment of their acquisition. The degree of accuracy of this geographic characterization process depends essentially on the precision with which the various "control points" are identified on which the resampling and geometric transformation will be carried out. To this end, it is adequate to proceed step by step, firstly identifying the recognizable elements on both maps as the main "control points," such as permanent fortifications and infrastructural systems, and only then proceeding with subsequent refinements through localized geometric transformations. Furthermore, to perform correct and precise global georeferencing, avoiding distortions that

548 QGIS (until 2013 known as Quantum GIS) is an open-source desktop GIS application for visualizing, organizing, analyzing, and representing spatial data. It is currently the most widely used open-source GIS software in the world.

549 BALLETTI, GUERRA, 2002.

550 More specifically, the geometric transformations applicable to a cartographic image can be classified into two categories: global and local changes. Global transformations are those whose parameters, once the modeling of the deformations present in the map to be georeferenced has been chosen, are valid for any point in the image. Will calculate the position of each issue by applying the parameters calculated based on the control points. These are the traditional plane transformations that make a set of points correspond univocally to another set of issues, thus realizing the passage from the system (o, x, y) to the system (O, X, Y). On the other hand, local transformations are those in which the parameters are calculated for every single point of the image and have local validity. The aim is to deform only a part of the image without significantly changing the rest. The regional approach has the advantage of allowing an excellent adaptation of the image to be modified concerning the reference points against a more difficult mapping. For more details on the subject, see also BIALETTI, GUERRA, 2002; BOEMI, MOGOROVICH, MAZZOCCHI, 2010.

are too accentuated and unrealistic, it is advisable to identify a grid of “control points” distributed homogeneously over the entire surface to be processed. Operationally, it is a question of associating each point placed on the input raster image with the corresponding point located on the orthophotos. In this way, the program automatically records in a table the three-dimensional geographical coordinates acquired from the Cartesian reference system of the georeferenced orthophoto and associates them with the same point on the original image.

The importance and usefulness of these cartographic transformation processes become evident when the ‘new’ historical cartographies, thanks to the planimetric and altimetric information automatically transferred during georeferencing, can be rapidly superimposed with precision on the Digital Terrain Model (DTM) and current orthophotos. In this way, the diachronic comparison between the documentary sources does not remain exclusively qualitative-descriptive. Still, it allows accurate localization of the “signs” designed for the conflict on the morphology of the contemporary landscape. Suppose the accuracy of the elaborations obtained is confirmed by the permanent works’ correct location and some military infrastructural systems that are still clearly visible today. In that case, the most exciting contribution of these superimpositions concerns the possibility of assigning absolute geographical location coordinates to each constituent element of the different warscapes present on the militarization plans to be able to identify and possibly recognize their degree of permanence within the contemporary landscape.

Regardless of the current degree of visibility, this cognitive method makes it possible to begin to identify the specific areas in which not only the permanent structures were built but also the temporary and field support structures, which, being fragile by nature, are more prone to being reabsorbed into the dynamics of landscape modification, and therefore more exposed to the ‘risk of loss. The possibility of precisely recognizing these areas implies the need to investigate them more closely, “focusing” the “stratigraphic telescope” at a more detailed scale.

First of all, it is necessary to identify the possible existence of period photographic documentation regarding these contexts and, if present, to observe them through this new investigative lens, comparing their contents with the data obtained from the current photographs and any on-site inspections. To this end, an in-depth analysis of the period photographic apparatus and a comparison with the current state of the sites can provide an essential initial contribution. In this way, it is possible to identify in simple depressions, small clearings, fragments of paths, the wall remains, and signs in the ground, some “traces of history” which, precisely because they are recognized as

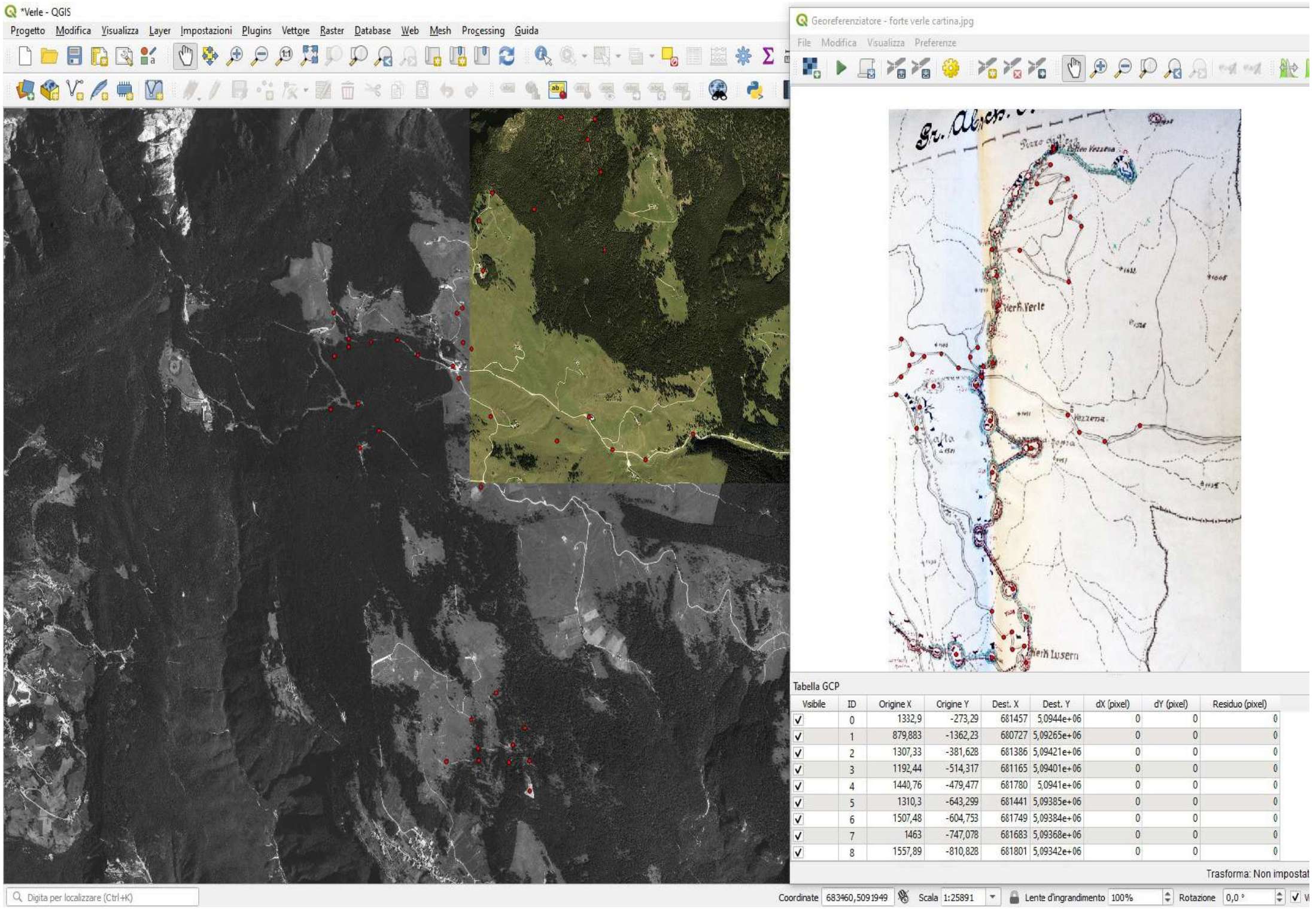
such, acquire particular significance as "storytelling possibilities." In short, the georeferencing of the various documentary sources and the relative comparison with period and current photographs constitute practical methodological tools to begin to recognize the watermark of the permanence of the imprint of the Great War in the contemporary landscape virtually decomposing the constituent wefts to allow for easier recognition.

Pilot case

To apply the above to the fortified system on the Vezzena Plateau, the numerous project documents previously identified were digitized and processed in the QuantumGIS environment using resampling and geometric transformation processes set up with "control points" fixed on the visible material evidence, such as the permanent fortifications and some road infrastructures still recognizable today, as exemplified in Table 8.22.

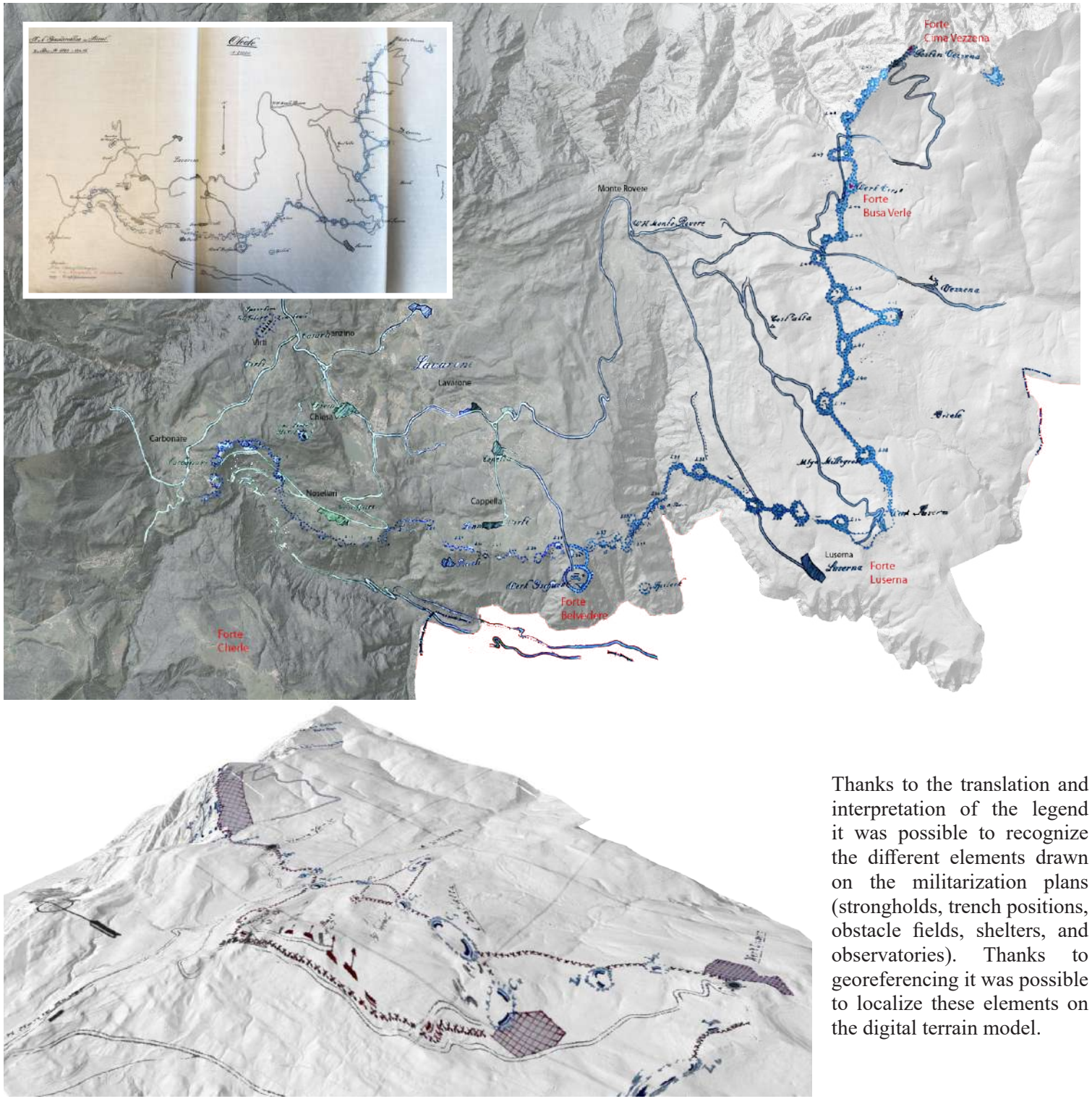
Through these georeferencing processes, it was possible to superimpose the original maps precisely on the current cartographies (orthophotos) and the Digital Terrain Model to precisely locate the various areas affected by the militarisation plans drawn up in anticipation of the war. The use of QuantumGis software made it possible to obtain practical graphic elaborations, including three-dimensional ones, particularly eloquent in narrative terms, as shown in Tab.8.23.

Through these comparisons, it was, therefore, possible to begin to recognize some of the 'traces of history' in what appear to be simple depressions, small clearings, fragments of paths, remains of walls and signs in the ground, thus reconstructing the different layers underlying the process of transformation of this territory (see Tab.8.24).



Tab. 8.22 | STRATIGRAPHIC TELESCOPE: Step 1. __ Georeferencing processes in QuantumGis Environment

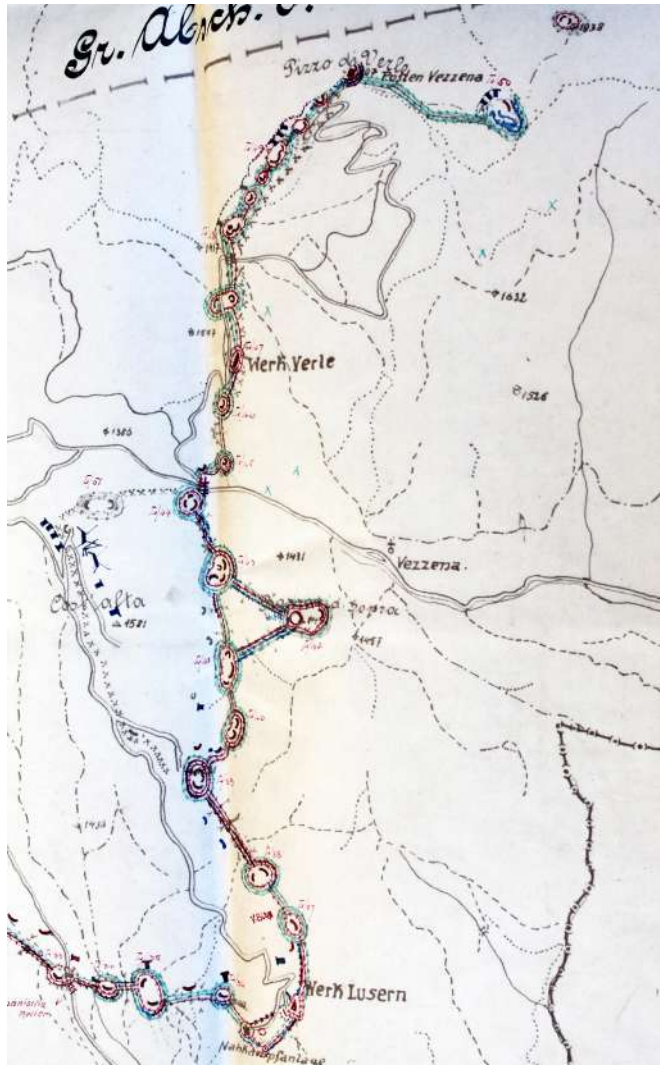
Tab. 8.23 | STRATIGRAPHIC TELESCOPE: Step 1. __*Overlapping georeferred maps on DTM and comparisons*



Legend

Stützpunkte	Caposaldo
Infanterielinien	Postazioni di fanteria
Batterie	Batteria
Hindernis	Ostacoli
Verhau	Puntellamenti
Spanische Reiter	Cavalli Spagnoli
Durchgänge f. Patr.	Passaggi secondari
-.- -.- f. groß. Trupp.	Passaggi per grosse truppe
Baracken	Baraccamenti
Unterstände	Rifugi sotterranei
Granatensichere Unterst.	Rifugi antigranate
Kavernen	Caverne
Beobachter	Osservatori

Thanks to the translation and interpretation of the legend it was possible to recognize the different elements drawn on the militarization plans (strongholds, trench positions, obstacle fields, shelters, and observatories). Thanks to georeferencing it was possible to localize these elements on the digital terrain model.



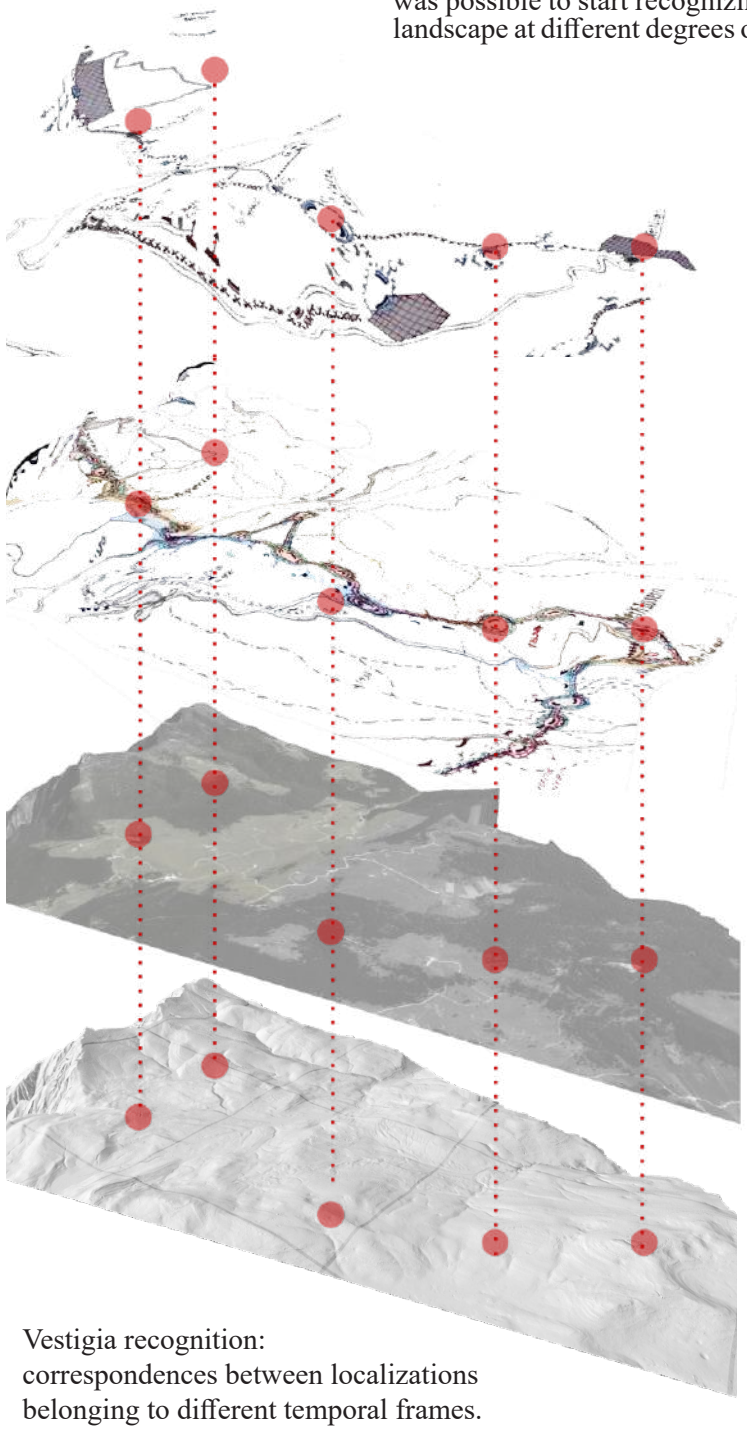
Cima Vezzena Fort - *present time*

Bombing traces Verle Fort - *present time*

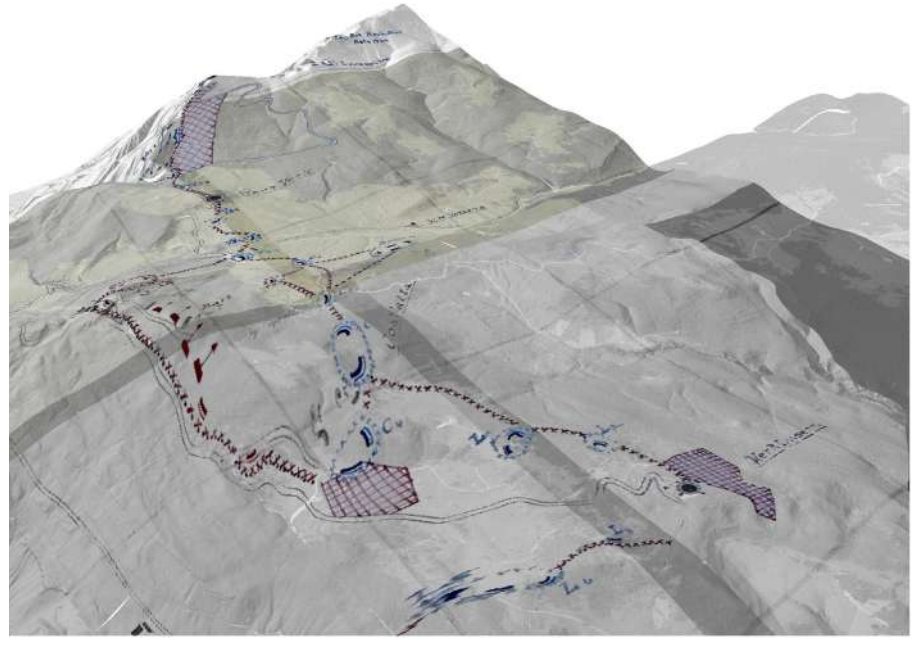
Entrenched system Basson - *present time*

Campo Luserna Fort - *present time*

After georeferencing the historical maps and superimposing them on the tridimensional models of the current terrain, it was possible to identify the numerous “signs” built in anticipation of the conflict and to localize their geographical position. By identifying the same positions on the current morphology of the territory, it was possible to start recognizing some faint permanences of those vestiges, which persist in the contemporary landscape at different degrees of visibility (on the left band, the photographs show some of those permanences).

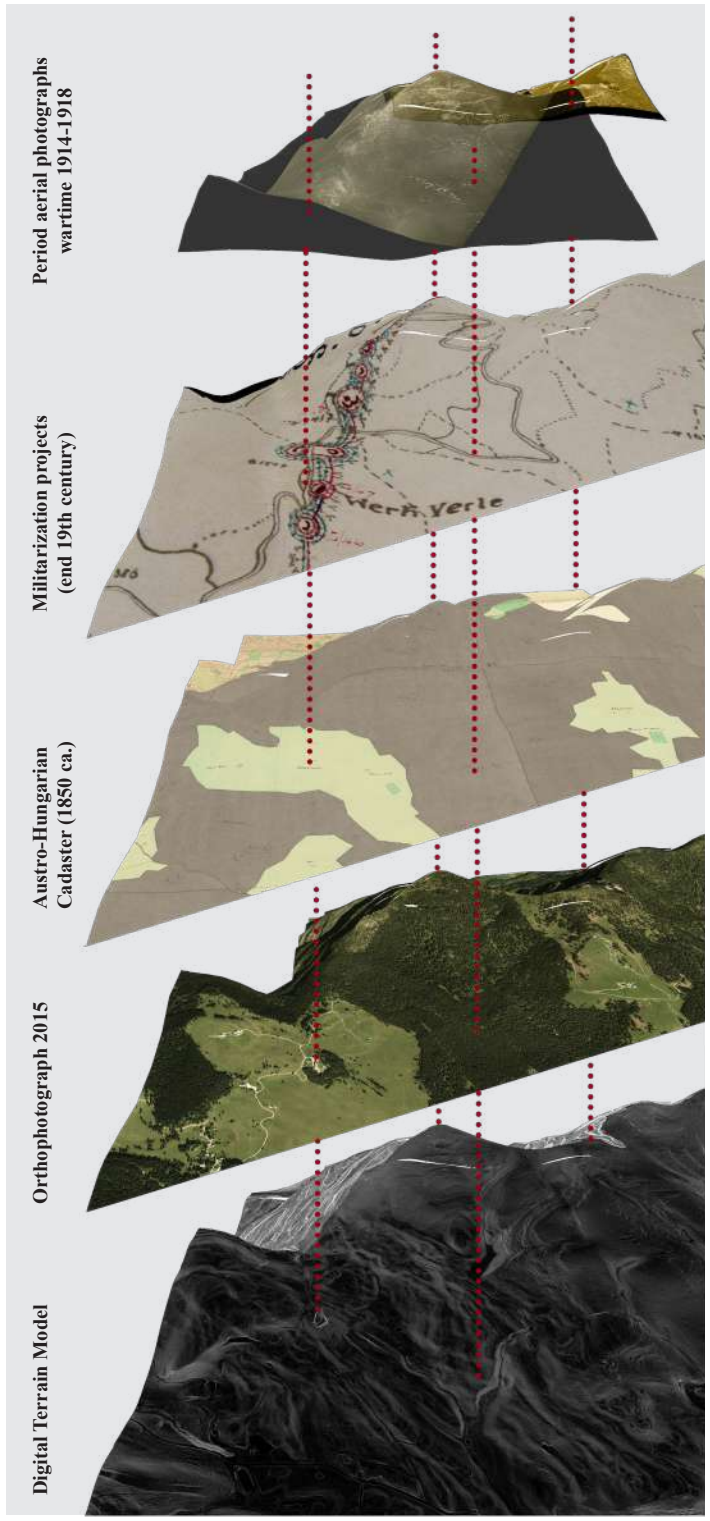


Vestigia recognition:
correspondences between localizations
belonging to different temporal frames.



Tab. 8.24 | STRATIGRAPHIC TELESCOPE: Step 1. *__ Overlapping georeferred maps on DTM and comparisons*

Tab. 8.24b | STRATIGRAPHIC TELESCOPE: Step 1. *__Overlapping georeferred maps on DTM and comparisons*

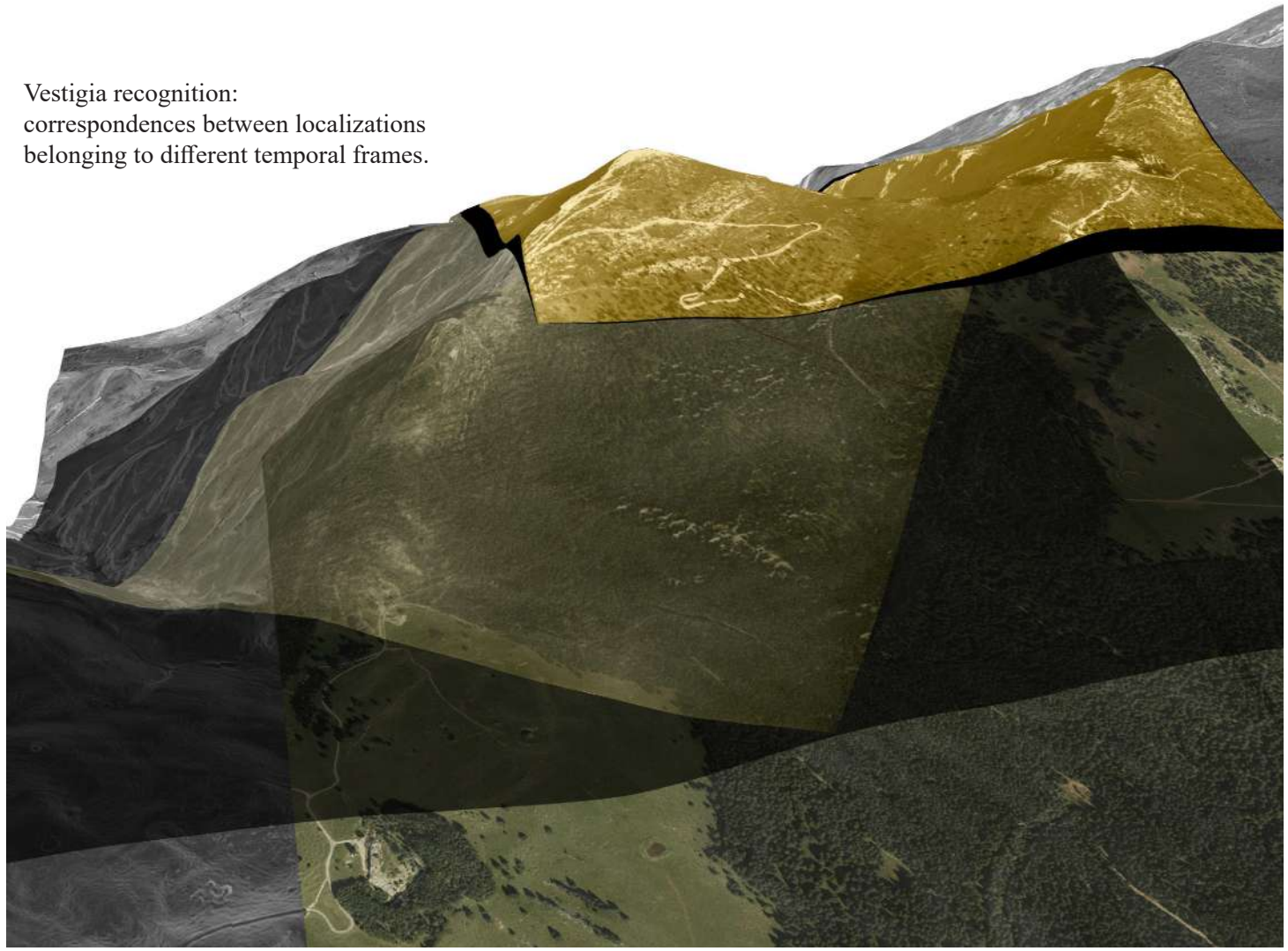


Panorama from Cima Vezzena Fort
present time

Temporary shelter
present time

Cima Vezzena Fort
present time

Vestigia recognition:
correspondences between localizations
belonging to different temporal frames.



Criticalities/issues

Given the significant contribution to the recognition, direct and indirect, of the permanence of vestiges within the contemporary multi-layered landscape, the operational application of the proposed methodology highlights some important issues worthy of note.

A first consideration, strictly operational, concerns the digitization of historical military cartography: the study of militarisation plans and projects found in the Archives must take into account the degree of approximation in their accuracy since they were drawn up based on surveys that were undoubtedly very precise, but not as accurate as the point clouds recorded by contemporary non-invasive aerial and photogrammetric remote sensing techniques. They are projects on a territorial scale drawn manually, very often in pencil, which can be compared with each other and with more detailed documents only after appropriate enlargements and scale adjustments. Since they are not vector drawings but simple raster scans, such enlargements also imply relative dilatations of line thicknesses which, when superimposed on the DTM, can generate inaccuracies in the specific location of the tracks. To overcome this, a good approximation consists of adopting the average points of these lines as a reference and comparing whether their projection is congruent with what emerges from the terrain's morphology. The subsequent methodological steps will also help define the analysis at a more detailed scale, also making it possible to correct any necessary approximations made in this first step.

A second question concerns the comparison between the historical photographic documentation and the current images of the sites: on the one hand, the georeferencing of the military projects facilitates the recognition of the "signs" built for the conflict and still clearly visible; on the other hand, in the areas identified as potentially dense with material remains, the proposed method does not contribute to the immediate recognition of the fabric of more minute but pervasive "signs," clearly visible in the photographs of the time but no longer so evident, such as entrenched systems, excavations, shelters, firing positions. It is, therefore, natural to wonder how much of these works remain, which, although fragile by nature, substantiated the functioning of the entire war machine. Based on these considerations, a further refinement of the proposed methodology is necessary to investigate these areas better that are not clearly understood.

In addition, there is a third consideration, which is in a sense intrinsically linked to the previous one. In this first methodological phase, the interpretative focus is concentrated on the recognition within the current landscape of the permanence of the many "signs" designed in anticipation of the conflict, but the "condenser of high-potential values" that is the heritage of the remains is not only made up of the

works designed for the war, but also of all those "wounds" directly impressed by the conflict on the various warscapes, which have shaped their appearance and permeated their auratic dimension.

Although well documented in period photographs, the "signs of destruction" are not identifiable in any cartographic document or any militarisation plan, and therefore cannot be identified through this first methodological step. The only and last witness that preserves their "narrative possibilities" is the landscape itself, on whose morphology these "signs" have left traces of their passage, such as the craters left by the explosion of bombs or mines. Their intrinsic fragility has made them more prone to being reabsorbed in transformative processes, to the point of often being "submerged" by new post-depositional layers or partially erased by other rewritings. Despite this, the evocative potential and significant charge embodied in them underlines their "testimonial value" and thus poses the need to develop further methodological steps to investigate better the accumulation basin in which these "signs" have been deposited, that space-threshold between the visible and the "submerged" that opens the reflection to the healthy interdisciplinary contamination previously introduced.

8.2.3 Step 2. Landscape Transformation Dynamics: LCLU Analysis and War Impact Factor

To facilitate the recognition of the remains of the most fragile relics in terms of permanence and also of the "signs" directly imprinted by the war on the landscape, the second phase of the proposed methodology focuses on the study of the evolutionary dynamics of the warscapes through investigations at a higher level of detail and by expanding the interpretative code of archaeological and stratigraphic investigations to the landscape scale. In other words, it is a question of refining the "gaze" to identify what remains of the imprint of the Great War on the current morphological conformation of the territories, starting from a reinterpretation of the processes of addition, subtraction, and transformation that has determined their biographical evolution. This is achieved by combining previously acquired knowledge with the critical contribution of using specific, completely non-invasive geographical and territorial analysis techniques.

Thanks to these analytical methodologies, it is, in fact, possible to better understand the physical impact determined by the conflict on the morphology of the different warscapes, not only from a qualitative-descriptive point of view but also quantitatively, in both absolute and relative terms. In this specific regard, the "stratigraphic telescope" method proposes two different lines of investigation to be carried out in parallel: the first one aims at characterizing the other land uses in different time frames to understand the changes caused by the war; the

second one focuses on the specific mapping of the "signs of destruction" inflicted by the conflict itself and documented in the previously found historical photographs.

From the operational point of view, as explained in the following paragraph, the mapping of these different analyses can be easily managed simultaneously in GIS working environments through the characterization of the single perimeter polygons using other attributes, concerning both the specific land use and the degree of influence/ impact derived from the conflict. The different ways of displaying these attributes will then make it possible to obtain particular mappings of the two areas of investigation and compare and integrate such mappings to get a more refined analysis according to which to recognize the permanence of the remains precisely. The proposed method is nothing more than an operational declination of the holistic approach already introduced in chapter 3, which integrates analytical techniques and different "knowledge," breaking down complexity to better understand it without inducing reductive simplifications.

Methodology

Within the broad spectrum of geographical and spatial analyses, surveys of land use and land cover in different periods are necessary bases for the definition of an overall knowledge framework of the biography of a given landscape[551]. If change constitutes its intrinsic character and can be defined as the perception of a different form of the landscape itself between two distinct temporal phases.[552] If change is its intrinsic character and can be defined as the perception of a different form of the landscape itself between two distinct temporal phases, the mapping of land uses referring to these phases represents the privileged method to understand the real effects of these transformations. Extending this analytical method to the study of the transformative dynamics of the different warscapes also means recognizing the war event as the main driving force for change, as already stated and discussed in chapter 3, and assessing, also from a quantitative point of view, the degree of impact on the landscape.

551 The investigations carried out at Ghent University regarding the recognition of the traces still present of the Great War within the contemporary landscape have contributed to the development of the current analytical methodology. For further information on this, see also ANTROP, VAN EETVELDE, 2009; STICHELBAUT, SAEY, MEEUWS, BOURGEOIS, VAN MAIRVENNE, 2011; STICHELBAUT, GHEYLE, SAEY, VAN EETVELDE, VAN MEIRVENNE, NOTES, VAN DER BERGHE, BOURGOIS, 2016; STICHELBAUT, GHEYLE, VAN EETVELDE, VAN MEIRVENNE, SAEY, NOTE, VAN DER BERGHE, BOURGOIS, 2017; STICHELBAUT, CHIELENS, BOURGEOIS, 2018; STICHELBAUT, 2020.

552 ANTROP, VAN EETVELDE, 2009.

First of all, it is necessary to identify the different temporal frames against which to set up the mapping and the relative comparisons and the basic materials to obtain the required informative data for the investigation. About the latter, the input data on which the entire methodological step is based are essentially the photographic documentation belonging to the different time frames established, as they record an overall synoptic vision of the contexts under study. In addition to these, other valuable materials in this phase can be specific thematic maps containing precise information about land uses in particular time frames of interest for example, the Austro-Hungarian Cadastre of the mid-nineteenth century[553], The maps of these areas, in addition to representing the boundaries of the parcels of land, are thematic maps of land use and of the main buildings, in which woodland areas, cultivated fields, pastures, road infrastructures, watercourses, and types of buildings have been differentiated using watercolors, symbols, and conventional signs. As will be explained later, this documentation will be particularly useful in applying the methodology to the case study in question.

As far as the identification of time frames are concerned, since the main objective of this study involves the degree of transformation of land uses concerning the preparation and development of the conflict, the method developed proposes to set up the analyses in three distinct time phases: the situation of the areas under study before they were affected by the fortification projects in anticipation of the war (approximately around 1850), the wartime itself "marked" by the "wounds" of the conflict, and the current condition of the places following the transformation processes linked to the passage of time. Although the choice of these three temporal frames represents a sufficient condition to define an overall picture of the degree of transformation of the landscapes concerning the Great War phenomenon, it is a "minimum" choice that can be refined and made more precise by inserting further intermediate temporal fields of analysis. In reality, this possibility is strictly determined by the availability of the primary material on which to carry out the investigations: if further photographic documentation

553 The Land Register of the autonomous region of Trentino-Alto Adige differs from that of the other Italian areas. Until 1918, this region was part of the Austro-Hungarian Empire and precisely of the Land Tirol. The Austrian Land Registry is still in force in the region. It was established by sovereign decree of Franz I of Austria on 23 December 1817 to equalize land taxation "... given the disproportion which has arisen to the detriment of entire provinces, districts, municipalities and individual taxpayers in the distribution of land tax according to the rules currently in force". The aim was to create a geometric, parcel-based cadastre based on the measurement and a 'stable estimate.' The perpetual taxable value, i.e., the net income concerning years of average productivity, was determined for each plot of land using a direct appraisal. Formation work began in 1817 and continued until 1861 (in the Tyrol from 1851 to 1861). For further details, see footnote 31 and the website of the Cadastre Service of the Autonomous Province of Trento.

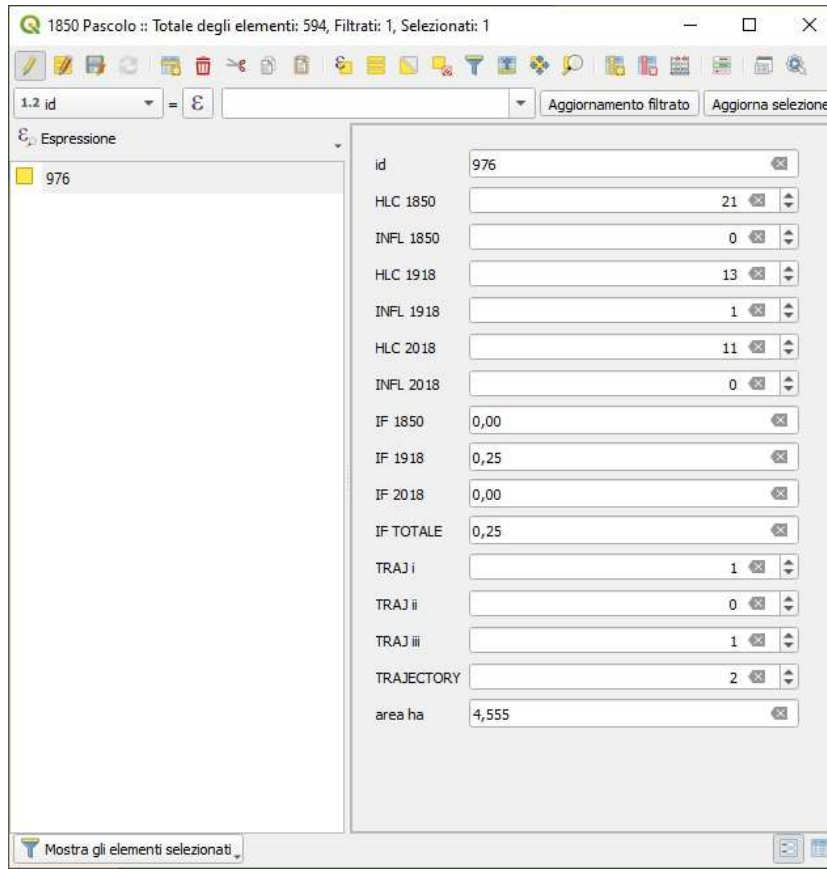
were available for a given area of study, relating for example, to periods between the first post-war period and the present day, this would be of particular importance for defining the observations following a homogeneous temporal interval according to which to map transformations, preservation and restoration of land uses and cover from the mid-19th century to the present day.

After establishing the temporal reference frames, the method provides for the georeferencing of the input materials following the same modalities adopted in the previous phase. Operating in specific work environments to manage spatial datasets, such as QuantumGis, the period photographs can then be processed and geographically characterized concerning the same reference system of the LIDAR data. The military plans were also georeferenced. In this way, the qualitative diachronic comparison between documentary sources belonging to different periods translates into the possibility of obtaining precise and relative overlaps between them, providing an essential contribution to the characterization, both geometrically and quantitatively in terms of surface areas, of land uses and land cover in the various temporal reference frames.

At the end of the georeferencing processes, always in the same work environment, the categorization phase takes the perimeter in closed polygons of the different land uses referred to the first temporal phase of analysis and the subsequent comparison of these same areas following reference frames. This is a “manual” mode of study, based on the critical observation and interpretation of the documentary sources, which follows an operative method similar to the approach adopted in the perimeter of the different stratigraphic-constructive units of an archaeological wall section.

The association of the information data belonging to the various temporal scopes, relative to each identified area, takes place through the compilation of a specific table of attributes (see Pic.8.4) linked to each polygon and specifically designed to simultaneously assign to the areas in question both information regarding land use (HLC, Historical Landscape Characterization) and the degree of influence of the war event (INFL), as well as some relative interpretations.

Going into detail, it is fundamental to establish the categories of land use and land cover characterization, better defining the lens through which to analyze the attributes of the historical landscape, bringing together aspects of both the natural environment and the built and human-modified environment: in this way, woodland cover, pastures, cultivated fields, grassland areas, the appurtenances of dwellings, the buildings themselves, rivers and lakes can be easily identified. The “stratigraphic telescope” method proposes to update this classification, which derives from the Historic Landscape Characterisation (HLC) already codified in the 1990s, concerning the



Pic.8.4

degree of influence determined by the processes of militarization and the war event itself, even before the level of impact itself. In this sense, the elaborated methodology suggests a more excellent specification of the previously listed land uses concerning the presence of relics within them and to the relative degree of recognisability, which is declined in the insertion of further specific fields called INFL_1850, INFL_1918, and INFL_2018 to be compiled according to a simple binary numerical system (0-absence; 1-presence), as listed in Pic.8.1. In addition to this, in the awareness that war has conformed to the morphology of the landscape also through its destructive effects, different classes of use have been added relating to the presence, more or less consistent, of the "signs" linked adequately to these "wounds," referring above all to the mappings concerning wartime and permanence within the contemporary landscape.

As indicated in Pic.8.5, each of the identified classes of use is assigned a numerical label to allow an accessible compilation of the respective attributes regarding the HLC in the different time frames (HLC_1850 - HLC_1918 - HLC_2018) referred to the single perimeter areas, making

the most of the potential of the territorial data management programs which allow the assignment of multiple information to single mapped polygons.

At the same time as these operations, for the areas within which the more or less visible presence of relics is recognized (i.e., those in which the INFL_1850, INFL_1918, and INFL_2018 fields are not zero), the proposed method also provides for the quantitative characterization of the degree of impact of the war itself. As can be seen in Pic. 8.2, this translates into the assignment of a numerical value, normalized on a scale from 0.25 to 1, resulting from the observation of the physical “signs” linked to the offense and defense and recognizable on photographic documentation. Since these parameters are the result of a qualitative analysis based on the observation of historical documentation, the maximum unit values are associated exclusively with the areas that perimeter fully recognizable vestiges (such as permanent fortifications whether in a state of abandonment, ruins/ruins, or restored), while for the remaining categories ranges of values are proposed on which to calibrate the impact “case by case” and concerning the type of land use indicated. To be more apparent, it is evident that in those areas where the “wounds” impressed by the conflict on the landscape are present (such as bombings or entrenched systems), a higher impact value can be correctly assumed than in those contexts which were never directly involved in the war operations but were affected by the militarization projects. As shown in the table, if in the first case the range of values

Label	Land use	Great War Impact
11	Dense Woodland without vestigia [ha]	0
12	Sparse Woodland without vestigia [ha]	0
13	Dense Woodland with vestigia [ha]	0.50 - 0.75
21	Pasture without vestigia [ha]	0.00
22	Pasture with vestigia [ha]	0.50 - 0.75
23	Pasture with traces of vestigia [ha]	0.25 - 0.50
31	Meadow without vestigia [ha]	0.00
32	Meadow with vestigia [ha]	0.50 - 0.75
33	Meadow with traces of vestigia [ha]	0.25 - 0.50
41	Arable land [mq]	0.00
51	Buildings [mq]	0.00
61	Private courtyard [mq]	0.00
71	Lakes	0.00
81	Totally destroyes areas [ha]	1.00
82	Areas with high concentration of bombings [ha]	0.75 - 1.00
83	Areas with low concentration of bombings [ha]	0.50 - 0.75
91	Defense systems [ha]	0.50 - 0.75
101	Fortification "rudere"	1.00
102	Recovered forts	1.00

Pic.8.5

can be between 0.50 and 1, in the second case, it is plausible to propose a range between 0.25 and 0.75.

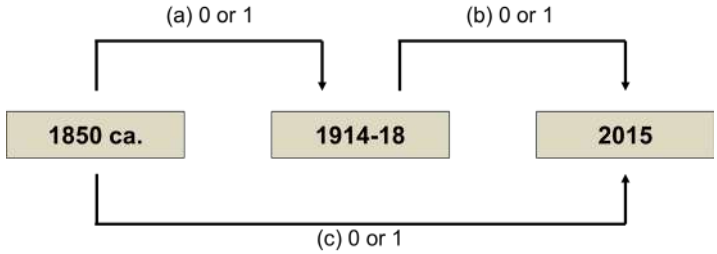
Following the indications presented above, it is possible to compile the fields concerning the Impact Factor relative to the different temporal frames, continuously implementing the same table of attributes, exactly as was done for the other land uses (HLC). In addition to these fields of analysis, the elaborated methodology proposes the insertion of a further string in which the total impact factor is calculated, obtained from the sum of the partial IFs relative to the different temporal frames: thanks to the visualizations thus obtained, it is, therefore, possible to identify the areas most profoundly "signed" by the war, providing an essential contribution to the understanding of the evolutionary dynamics of the different warscapes.

Following the phases described above and the appropriate settings in the processing settings of the software used, it is possible to interrogate the model constructed to process the information and obtain visualizations that are very interesting in terms of narrative potential. These synthesis elaborations concern the two different lines of investigation already introduced previously, which consist in the specific mapping of the foreign land uses and the degree of impact of the war event concerning the pre-established space-time intervals.

Concerning the investigation of changes in land use and land cover, in addition to the visualizations concerning the different mappings referred to the particular periods, the method developed proposes an interpolation of the data obtained to set up an analysis of the main trajectories of landscape change. The integration of temporal variability in spatial and territorial analyses is one of the most critical challenges in landscape ecology, which in this specific methodological proposal is declined in the study of the evolutionary dynamics of the different warscapes to understand the different levels of "attitude to change" of the other areas in question, and the consequent greater or lesser likelihood of finding permanent vestiges[554].

From an operational point of view, this investigation is based on the reciprocal comparison between the use classes of a specific area concerning two determined temporal frames through binary numerical analysis. As clearly schematized in Pic.8.6, change trajectories (a) and (b) concern comparisons between pre-conflict-wartime and wartime-current situations, respectively. If the use classes do not change (value 0), it means that, concerning that specific time comparison, the same

554 The elaboration of "trajectories of change" in wartime landscapes was inspired by the work of Van den Berghe (2019) during her research period at Ghent University under the guidance of Professor Van Eetvelde. For specific insights on the topic, see also VAN DEN BERGHE (2019).



(a)	(b)	(c)	Landscape change trajectories	Chance to find Great War remains	
0	0	0	*no changes*	-	*No GW impact*
0	1	1	*intermediate level*	-	*New use (no links to GW)*
1	0	1	*intermediate level*	+	*Preservation remains*
1	1	1	*high level*	+/-	*Recovery (if (c) = (a))*
				+/-	*New use (if (c) ≠ (a))*

Pic.8.6

land use is preserved; if instead the categorizations show differences (value 1), it means that due to special driving forces, land use has changed over time. To complete the analysis, the trajectory of change (c) between the first temporal range and the contemporaneity allows making manifest the sense and usefulness of this type of analytical approach by declination of the synthesis matrix presented in Pic.8.6. By comparing the different trajectories, it is possible to understand whether the landscape structure of a given area has been influenced by the war event and to what extent such tangible influences have been ‘dealt with’ since the post-war period. For example, suppose the trajectories of change are of the type 1-0-1. In that case, it can be understood how the war event caused a degree of impact on the area under examination (the value of which is indicated in the INFL_1918 field of the attributes table), depositing its “imprint” on the landscape during the wartime, but also how this imprint has not been the object of precise transformative actions from the first post-war period until today. This means that there is a greater probability of permanence of the “signs” of the war in that specific area, subject only to the natural action of the passing of time. However, the situation is different when the LCTA is of the 1-1-1 type, i.e., when the current land use has not remained unaltered concerning the wartime categorization. In this specific case, it is interesting to compare the historical landscape characterizations of the pre-militarisation period and the current one: if HLC_1850 and HLC_2018 coincide, the hypothesis of a sort of “restoration” of the original land use occurred after the war can be supported; on the contrary, if the current service is different from the pre-militarisation situation, it means that the areas under consideration have been subject to further transformation dynamics that have indeed stratified new “signs,” possible overwriting

or erasing of the vestiges themselves, weakening their strength and legibility.

As explained in Pic.8.4, in the table of attributes associated with each perimeter area, fields specifically designed to insert the values relative to the trajectories of change of the landscape just described. To understand the overall 'attitude to change' of each specific survey area, the method proposes the insertion of a further field that quantifies this attitude in the sum of the values relative to the individual trajectories of change (the areas identified by a higher value constitute the areas most subject to change).

Ultimately, therefore, the characterization of different land uses in different temporal frames (HLC), integrated with the relative analysis of trajectories of landscape change (LCTA), represents an effective method of accounting for identifying, within the contemporary multi-layered landscape, the areas in which the probability of finding vestige permanence is concretely greater.

However, the correctness of these identifications must be verified and proven concerning the second type of elaboration that can be obtained through this methodological approach, namely the mapping of the degree of impact deposited by the conflict on the morphology of the landscape.

Through the association of graduated colors concerning the greater or lesser density of 'war signs' in the landscape, it is easy to elaborate interesting visualizations concerning the quantitative characterization of the degree of impact of the war, both total and relative, concerning the different temporal contexts. The specific interrogation of the software concerning the fields IF_1850, IF_1918, and IF_2018 allows the creation of easy-to-understand "concentration maps," overlapping with the respective mapping of land uses for the same time frames allows a correct calibration of the information obtained. Critical are the visualizations concerning the total Impact Factor, produced through the sum of the partial factors to return a synthesis image of the "hottest" areas, in other words, the areas in which the processes of militarisation and the event of war itself have most strongly impressed the imprint of their passage.

In the light of the preceding considerations, it is clear how the overlapping of these last mappings with the graphical analysis of the trajectories of change in the landscape can contribute to stabilize the results and facilitate the identification of the areas in which the remains are potentially most present, albeit at different degrees of recognisability.

In conclusion, thanks to creating this Spatio-temporal database based on the diachronic interpretation of photographic documentation, it is possible to better interpret the traces of vestiges within the contemporary

landscape at different levels of depth and identify the main “characters” and the most evident permanences. Thanks to this methodological step, in fact, the “stratigraphic telescope” makes it possible to investigate the palimpsest of evidence present in today’s landscape through a cognitive lens capable of declining such complexity by highlighting areas in which the “signs” of war are visible at different degrees of visibility.

In other words, it is a question of “knowing the past to understand the present” by adopting an interdisciplinary approach capable of coherently managing the different scales of observation. The cognitive survey, therefore, translates, at an operational level, into a fundamental contribution to facilitating the recognition of these traces, which represents a condition that is today somewhat problematic and little investigated, but necessary, as emerged in chapter 4.3, for the definition of a broad and deep knowledge base on which to base subsequent considerations regarding the various possibilities of “caring” for this heritage, as already explained in chapter 6.

The binomial “to know to conserve” nicely sums up the intention of firmly connecting knowledge that is the knowledge of the various written and photographic documentary sources, with the ability to see such cognitive data within the contemporary landscape, declining the seeing in the ability to adopt that poetic gaze mentioned in chapters 3 and 6, to better focus on the know-how, the modes of action through which to operate in terms of protection and eventual transformation, for which the contemporary world is, necessarily but also ethically, responsible.

Pilot case

The application of these methodological steps to the fortified system insisting on the Austro-Hungarian forts of the Altopiano di Vezzena made it possible to implement the partial recognition of the permanence of vestiges built in anticipation of the conflict, partially brought to light through the previous comparison and overlapping of historical and current cartographies, and also to begin to unveil that heritage of more fragile but equally significant “signs” impressed by the conflict itself on the morphology of the territory, and still present in the contemporary landscape.

Following the proposed methodology, a careful analysis of the transformations in land use and land cover concerning the three predefined temporal frames (mid-nineteenth century, wartime, current situation) was carried out to understand the trajectories of change of the landscape under analysis through the specific mapping of how land uses have changed concerning both the influence of the conflict and the subsequent dynamics of post-war transformation/reconstruction.

Concerning the transect under analysis, to obtain a precise mapping of land use before the militarisation plans influenced these areas, reference was made to the "Historical planting maps" dating back to the mid-19th century, also known as the "Austro-Hungarian Cadastre," freely available for the entire Autonomous Province of Trento and already appropriately georeferenced and therefore processable in the QuantumGis environment.[555] These records provided exact information

555 The surveys of the Austro-Hungarian Cadastre were based on a triangulation covering the entire territory of the former Austro-Hungarian monarchy, which was linked to that carried out by the Military Geographical Institute, whose leading observed geodetic network from 1806. To represent this territory, consisting of thirteen Crown Domains and having a total area of 300,000 square kilometers, the Empire was divided into seven zones taking into account the political-administrative order. Each of these zones has its plane coordinate system with an appropriately chosen trigonometric vertex as its origin. For the Tyrol, chose the bell tower of the Innsbruck parish church. Carried out the geodetic operations separately for each coordinate system, and a base and the azimuth of one side were measured directly on the ground. The triangulation, measured from 1851 to 1858, divided into first-, second-and third-order points according to the accuracy of the coordinates and the distance between the vertices of the same order, was refined to a density of three vertices per square mile (triangulation sheet). The fourth-order triangulation, intended to define the cornerstones for the detailed surveys, was carried out graphically with the praetorian tablet on the 1:14400 triangulation sheets comprising the twenty map sections. Other points (graphic vertices) were graphically determined on each map sheet, namely three for each team, to have 57 support points per square mile in addition to the three trigonometric vertices. The south direction of the projection, parallel to the meridian, was chosen as the positive direction of the x-axis and the west direction as the positive direction of the y-axis. Each coordinate system is divided into vertical columns and horizontal layers with a width of one Austrian mile (4000 Klafter) equal to 7585.94 meters, which represents the so-called "triangulation sheet" (1 Klafter = 1.896484 meters). This one square mile quadrature turned out to be too large for the representation of the parcels; therefore, the triangulation sheet was further divided into four longitudinal and five transversal strips, resulting in twenty sections or map sheets with a width of 1000 klafter (1896.48 meters) and a height of 800 klafter (1517.19 meters). Considering that the Klafter is 72 inches and considering that in cartographic representation, one inch is equal to 40 Klafter on the ground, the scale ratio is 1:2880 (72 x 40). The maps have 20 x 25 inches, equivalent to 52.68 x 65.85 cm, and each one covers 288 hectares. They are of the "tangential" or "open perimeter" type as opposed to the Italian Catasto Terreni where an "island" or "closed perimeter" sheet was used, i.e., kept the entire parcels within the sheet. The detailed survey was carried out with the praetorian tablet, using graphic intersections and with the system of alignments, and concerned the individual possessions distinguished by the quality of culture and class (particles) within each Cadastral Municipality, which corresponded to the ancient Century Municipalities. Once had completed the survey, outlined the dividing lines in ink, the toponymy was introduced, and the land and building parcels were numbered consecutively. In built-up areas and particularly fragmented areas, the drawing was carried out on a scale double the normal one, i.e., an "excerpt" was made on a scale of 1:1440, creating an "island" within the original sheet. The legal introduction of the metric system led to abolishing the old unit of measurement, the Klafter. From 1883, converted all numerical elements, such as trigonometric vertex coordinates, sizes, and areas, to the metric system. Based on the results of the surveys, the Land Registry was drawn up. Then in 1869, the general revision of the land tax was ordered, establishing the revision every fifteen years and regulating the procedure for

regarding the main land cover at the time of the surveys (mid-nineteenth century), summarised in particularly dense graphic tables using different types of screens and colors (e.g., forest, pasture, meadow, buildings, courtyards, to name but a few). The cataloging operations were carried out by superimposing these maps on the Digital Terrain Model already used in the previous phases and perimeter "on sight" the different land uses referring to the predefined uses as stated above. At the same time as this operation, the comparative table of attributes relative to each perimeter area was also compiled, with respect not only to the HLC but also to the degree of influence had by the war on the site in question.

The same operative procedure was adopted to obtain the *Historical Landscape Characterization* mappings for the remaining two temporal frames, using as reference materials the current orthophotos, the current situation, and the period aerial military photographs, especially those obtained through military reconnaissance, for mapping during the wartime. In the latter regard, Table 8.30 shows how the processes of georeferencing military photographs from the air and a bird's eye view have produced graphic elaborations that are particularly interesting from a narrative point of view to better understand the real impact of the war on the landscape of a hundred years ago, as well as the different land cover, for example, concerning wooded or grassland areas.[556]

At a general level, Tables 8.25-8.30 give the results obtained from the analyses carried out, both in graphic form and using some simple summary tables, which are also helpful for defining quantitatively (in hectares) the various land use categorizations. This was possible thanks to the potential of the software used, which, with simple predefined queries, made it possible to obtain multiple dimensional information regarding the polygons drawn.

Through the reciprocal comparison of the different temporal *frames* analyzed, it was possible to precisely identify the dynamics of landscape transformation, also associating quantitative values to them. In Table 8.28, for example, a comparison of the forest, pasture, and meadow coverings was carried out to better explain the degree of influence determined by the war in modifying the territory.

For example, while pasture activity was very substantial in the late 19th-century mapping, showing that the local economy was based on the primary sector, during the war, the presence of pasture areas became almost non-existent, due to the wartime need for visibility and space, which almost entirely compromised its existence in favor of

determining the valuation rates by the quality of culture and class, based on net income (taxable income). See the Catasto della Provincia Autonoma di Trento website.

556 In areas not 'covered' by historical photos, a dashed screen has been inserted as it was not possible to evaluate

the numerous regions left free, and therefore grassland. In the post-war period, on the other hand, grazing was gradually restored in many of those areas where the "signs of destruction" had become evident, thus becoming itself a partial cause of the physical alteration and cancellation of the most fragile traces of the vestiges, (photos with cows) and therefore to be restricted and monitored.

A similar argument can be deduced concerning forest cover: if in the years preceding the war the local territory was covered in woodland, the need to make the enemy visible, to guard the infrastructure, and to have large quantities of wood available to be used as building material caused a drastic reduction during the war. The outcome of the actual deforestation plans that were planned by the Austrian Army Corps of Engineers for this area, as evidenced by the methods found in the State Archives of Trento, was confirmed by the results shown in the graph of forest cover in Table 8.29, where it is visible that the hectares of forest during the war were reduced to less than a quarter of those of the previous period.

Using these reciprocal comparisons, it was possible to implement the methodological considerations expressed in the previous paragraph concerning identifying specific trajectories of landscape change. In fact, by assigning parameters relative to the conservation or transformation of land use to the various polygons and comparing the temporal frames as explained in Tables 8.28-8.29, it was also possible to elaborate a sort of map of the "attitude to change" of the various areas, highlighting where the probability of finding the permanence of vestiges is highest.

As seen in Tab.8.30, this resulted in a mapping of areas graded against three colors:

- with the very dark brown color were indicated the areas particularly prone to change, which over time have undergone continuous changes in land use (regardless of the impact from the conflict);
- with the color very light brown, instead, were identified the areas not involved either by the processes of militarization or by the direct impact of war (such as wooded areas and other contexts remained unchanged over the last two centuries);
- with the intermediate brown color, we have defined the "intermediate" areas affected by the militarization processes (between 1850 and the wartime) or by the conflict itself (during the wartime) but then altered, modified, restored, or reconfigured over time. In these areas, the impact of the conflict has undoubtedly always been decisive in the changes, but the probability of finding vestiges is higher in those contexts where no changes have been voluntarily made from the post-war period to the present (1-0-1), that is the areas near the three forts Campo Luserna, Busa Verle and

Spitz Vezzena, as well as the fortified post Basson.

This exciting analysis has made it possible to initial localize the areas where it is potentially more likely to find the permanence of works linked to the conflict, probably even partially hidden and buried under the visible layer of topsoil.

The areas identified through this first identification were compared with the second analytical investigation proposed by the “Cannocchiale Stratigrafico” methodology, i.e., the study on the impact of the conflict on the landscape.

From an operational point of view, together with the compilation of the various fields relating to “land uses” in the attribute tables associated with the different mapped polygons, the values relating to the intensity of the impact that the war has caused on the areas in question were also entered. Following what is explained in Pic.8.5, the values were associated by observing the period photographs and then the wartime land-use mappings (see Tab.8.31) and graded on an increasing scale proportion to the density of “signs” present. As shown in Tables 8.33-8.34, the mappings obtained allowed us to understand the temperature of the conflict in the different areas, obviously more robust in the vicinity of the central defensive/offensive positions and less consistent in the connecting regions.

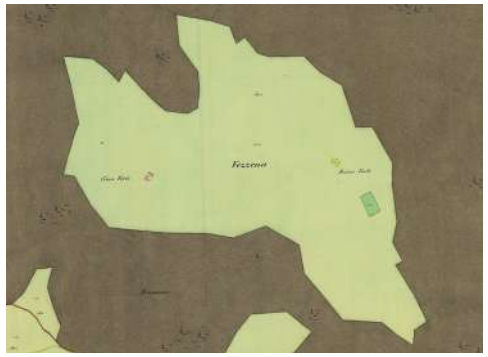
Finally, the comparison of the total *Impact Factor*, obtained from the sum of the partial values, with the elaborations received regarding the transformative dynamics of the LULC and the relative trajectories of change, has made it possible to circumscribe better the areas with the most significant probability of finding material traces of the remains, i.e., the regions in which the imprint of the war has been most impressed on the morphology of the territory and where, precisely because of this greater intensity, it can potentially still be present despite a hundred years of successive multi-layered modifications and alterations (see Tab. 8.36).

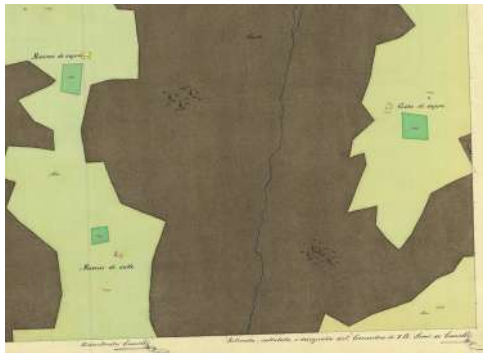
As can be seen in Table 8.37, this important methodological step made it possible to locate the areas most pregnant with “signs,” among which the area around Fort Busa Verle, which is exceptionally dense with rather evident material traces (Visibility Class 1): as summarised in Table 1, about 1761 meters of depressions and backfills were found which can be traced back to the original traces of the trenches which developed around the fort, and no. 77 circular recessions or small depressions which were traced back to the actual traces of the tracks which grew around the fort. Seventy-seven circular pits or small “holes” are referable to craters produced by repeated bombardments (in Tab.8.37, the elements referred to as Visibility Class 1 are drawn in red).

At the same time, however, this analysis method also made it possible to

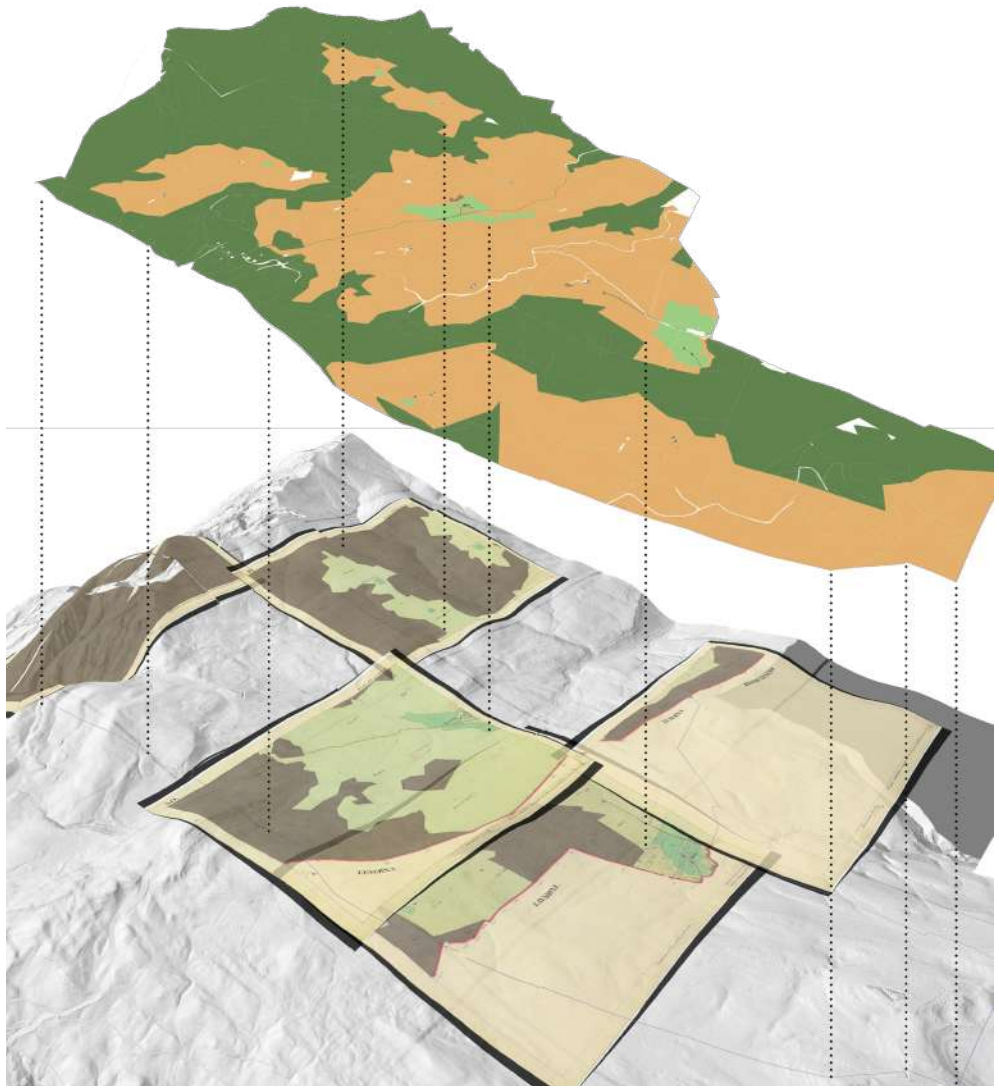
identify areas in which, although not with the same degree of visibility, the material remains of vestiges or "signs of destruction" imprinted on the ground could potentially still be present. In other words, areas potentially pregnant with permanence and therefore charged with a memorial value, but not decodifiable through the analyses carried out so far, can be identified.

Precisely concerning these areas, as explained above, the experimentation of the "stratigraphic telescope" has deepened the lens of observation to study in detail the contemporary territorial datasets to understand the absolute morphological conformation of the land and thus unveil any "latent imprint" of the conflict. For example, in this specific case, two main areas emerged in which material remains of vestiges could easily be found, namely the connecting landscape between Fort Busa Verle and Fort Vezzena and the flat area between Fort Busa Verle and the Basson post, further south. As can be seen in Table 8.38, in these areas, some irregularities in the terrain are detectable "on sight," which could easily be associated with the construction of defensive posts, trenches, and shelters, also since the specific project documentation for this area proves their presence. Still, the degree of visibility does not allow for explicit recognition and precise location.

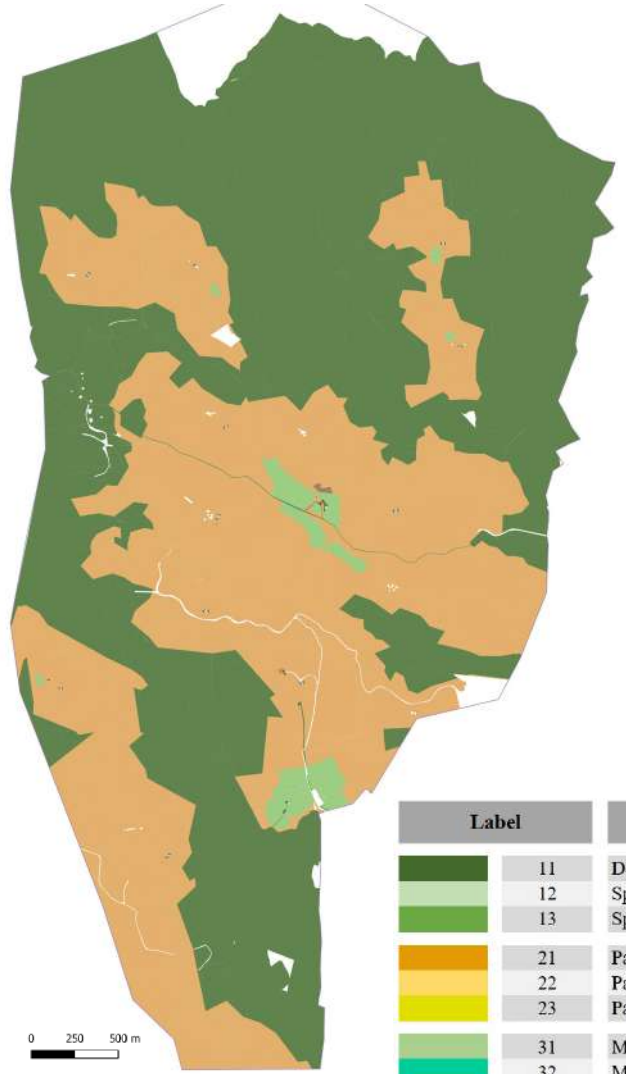




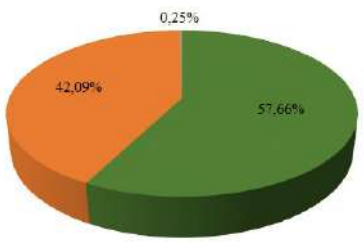
The Austro-Hungarian Cadastre, open-source documentation freely available online.



Warscape: Vezzena Plateau - Trento (Italy)



42,09% - Pasture [21]
57,66% - Woodland [11]
0,25% - Other uses [31+41+51+61]



1° temporal frame: 1850 ca.

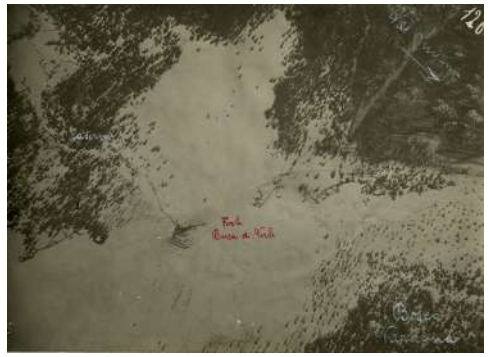
The categorization phase is declined in the perimeter in closed polygons of the different land uses indicated in the reference documentation which is, in this case, the Austro-Hungarian Cadastre, open-source documentation freely available online.

The table shows the different “land uses” with their numerical and chromatic codes and, in the right column, the relative numerical quantities (ha or sq.m.) directly obtained from the QuantumGis program.

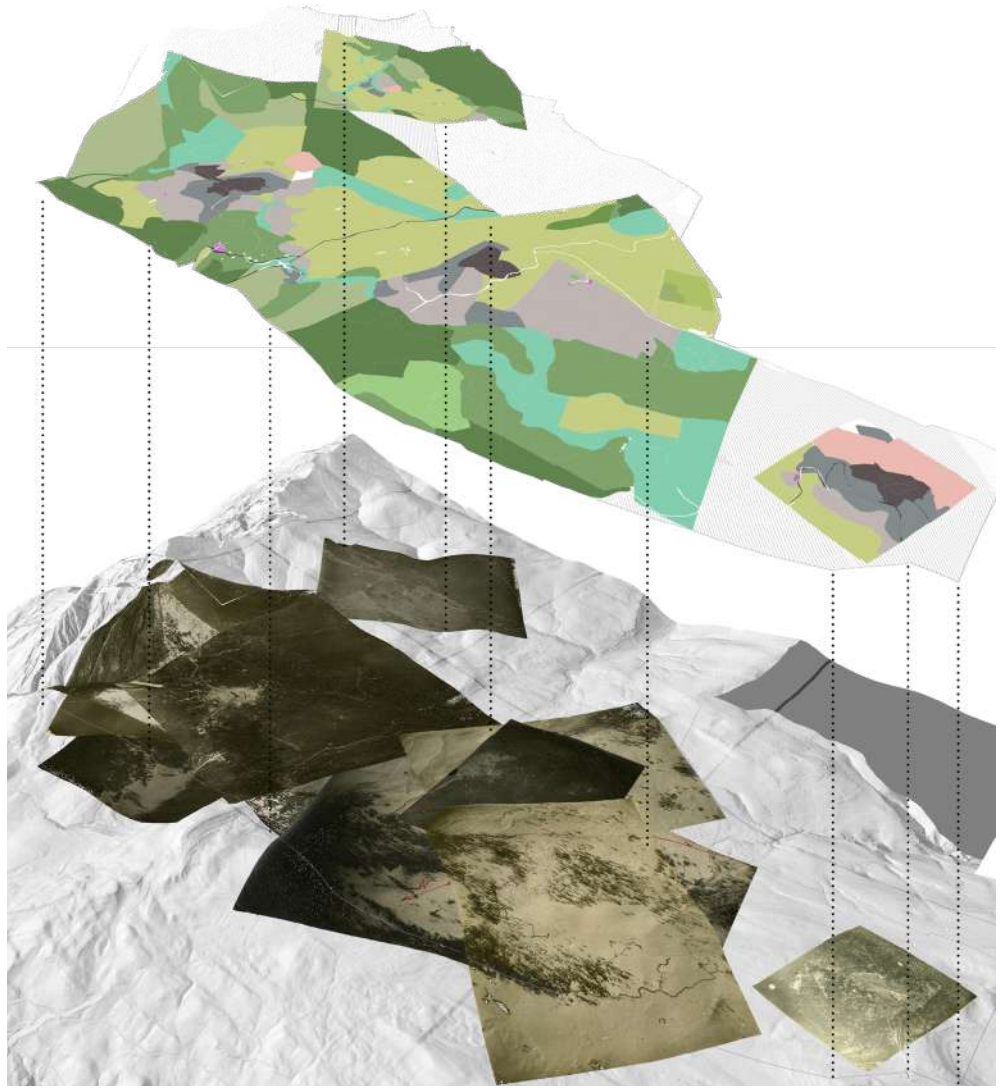
As can be seen from the graphical elaborations, in the mid-nineteenth century the entire area around Passo Vezzena was largely covered by forest (about 58% of the total), while the remaining areas were mainly used for the pasture (over 42%). All other land uses (buildings, arable lands, meadows, etc.) occupied an insignificant part of the territory.

Label		Land use	1850
	11	Dense Woodland without vestigia [ha]	858,21
	12	Sparse Woodland without vestigia [ha]	0,00
	13	Sparse Woodland with vestigia [ha]	0,00
	21	Pasture without vestigia [ha]	626,48
	22	Pasture with vestigia [ha]	0,00
	23	Pasture with traces of vestigia [ha]	0,00
	31	Meadow without vestigia [ha]	2,45
	32	Meadow with vestigia [ha]	0,00
	33	Meadow with traces of vestigia [ha]	0,00
	41	Arable land [ha]	0,41
	51	Buildings [ha]	0,44
	61	Private courtyard [ha]	0,37
	71	Lakes	0,00
	81	Totally destroyes areas [ha]	0,00
	82	Areas with high concentration of bombings [ha]	0,00
	83	Areas with low concentration of bombings [ha]	0,00
	91	Defense systems [ha]	0,00
	101	Fortification "rudere" [ha]	0,00
	102	Recovered forts [ha]	0,00

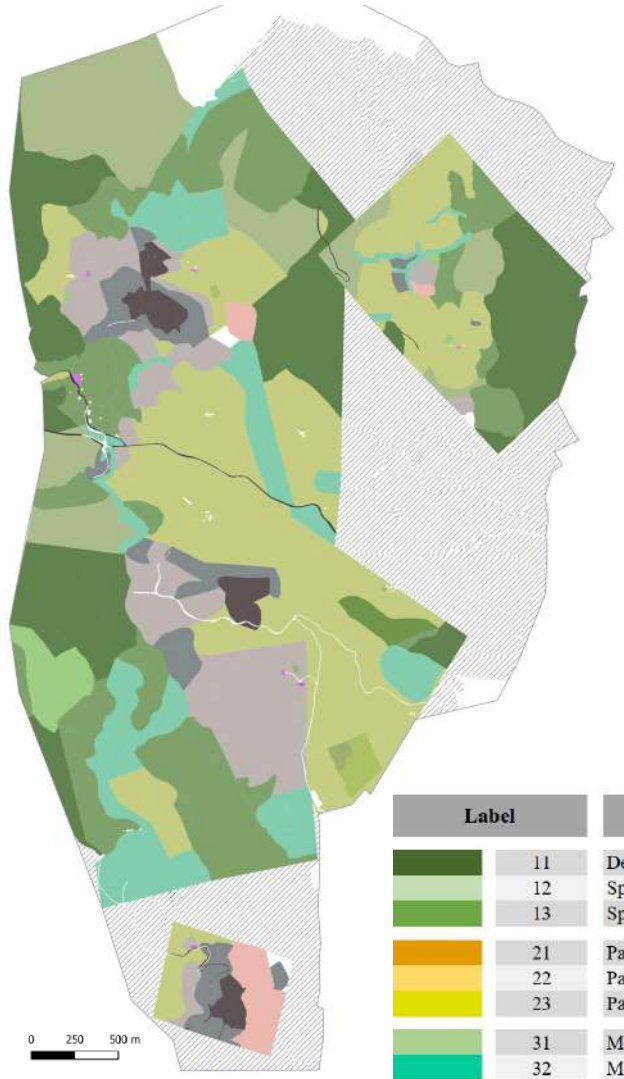
Tab. 8.25 | STRATIGRAPHIC TELESCOPE: Step 2. __*Overlapping georeferred maps on DTM and comparisons*



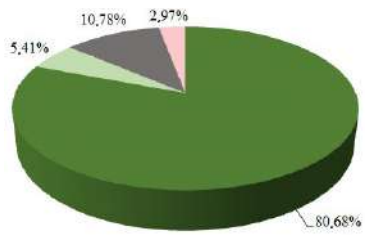
Historical photographs, gereferred in GIS-environmental.
Museo Storico Italiano della Guerra di Rovereto - Tn - Italy



Warscape: Vezzena Plateau - Trento (Italy)



10,78% - Destruction [81+82+83]
80,68% - Woodland [11+12+13]
5,41% - Meadow [31+32+33]
2,97% - Defense systems [91]



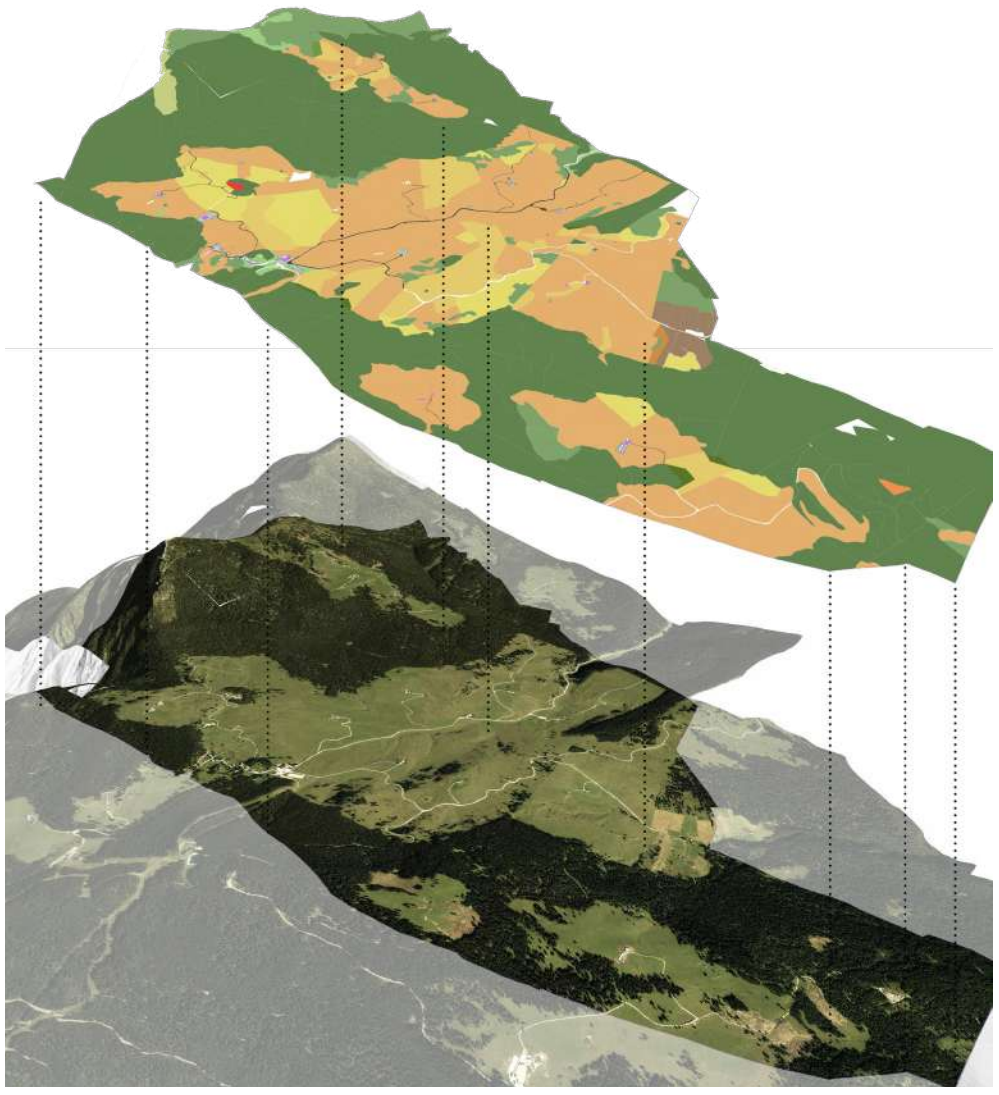
2° temporal frame: 1914-1918

The perimeters of the land use during the war period can be easily developed through the observation of period aerial photographs obtained through military reconnaissance and preserved in archives and museums. For the study area, the period photographs were found in the archives of the Museo Storico Italiano della Guerra of Rovereto (TN)-Italy. Unlike the Austro-Hungarian Cadastre (available for the whole area of interest), the historical photographs do not cover the whole area previously identified, and therefore the LCLU analysis of this temporal frame was elaborated only on the areas for which the photographic documentation was available.

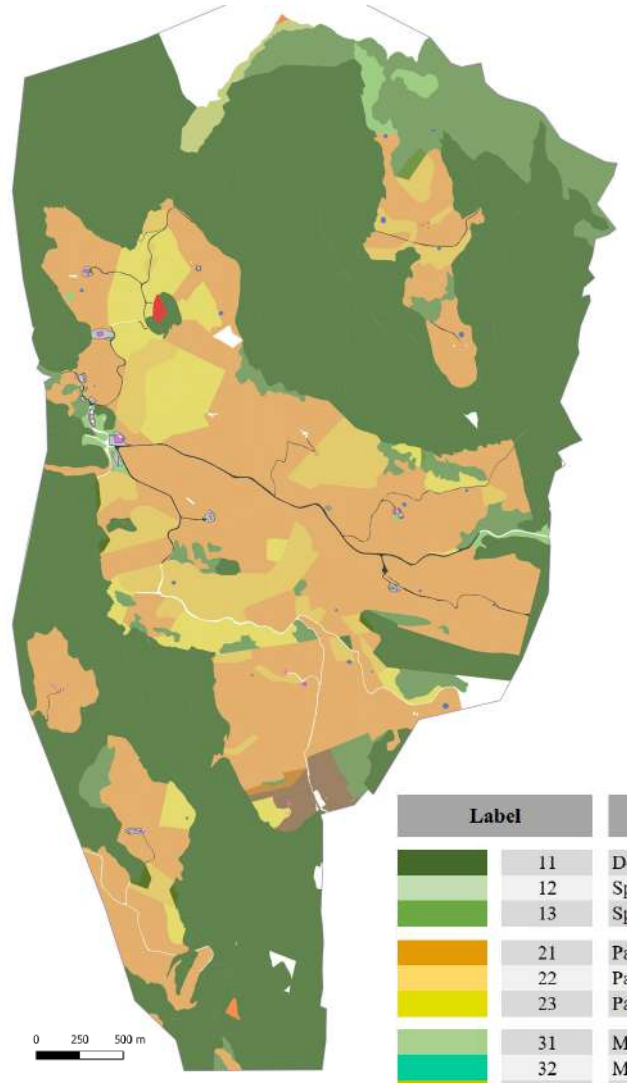
The area around Passo Vezzena became the front line when Italy entered the war: it is evident how the land uses have been distorted by the construction of defensive systems and by the destructive effects of the conflict.

Label		Land use	1914-18
	11	Dense Woodland without vestigia [ha]	179,99
	12	Sparse Woodland without vestigia [ha]	120,72
	13	Sparse Woodland with vestigia [ha]	183,22
	21	Pasture without vestigia [ha]	0,00
	22	Pasture with vestigia [ha]	0,00
	23	Pasture with traces of vestigia [ha]	0,00
	31	Meadow without vestigia [ha]	28,04
	32	Meadow with vestigia [ha]	1,10
	33	Meadow with traces of vestigia [ha]	3,31
	41	Arable land [ha]	0,00
	51	Buildings [ha]	0,95
	61	Private courtyard [ha]	0,00
	71	Lakes	0,00
	81	Totally destroyes areas [ha]	19,71
	82	Areas with high concentration of bombings [ha]	43,89
	83	Areas with low concentration of bombings [ha]	1,07
	91	Defense systems [ha]	17,80
	101	Fortification "rudere" [ha]	0,00
	102	Recovered forts [ha]	0,00

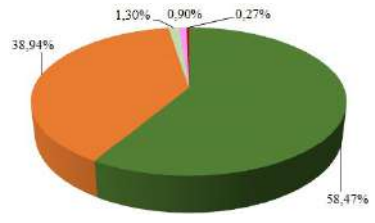
Current orthophotos, open-source documentation freely available online.



Warscape: Vezzena Plateau - Trento (Italy)



38,94% - Pasture [21+22+23]
58,47% - Woodland [11+12+13]
1,30% - Meadow [31+32+33]
0,90% - Arable land [41]
0,27% - Forts [101-102]



3° temporal frame: 2018

Through the observation of the current orthophotos, it was possible to perimeter the different “land uses” that today characterize the area around Passo Vezzena. Compared to the situation of the mid-nineteenth century, it is clear how the influence of the war has radically changed some areas, both where the permanent fortifications were built (fort Busa Verle, fort Campo Luserna, and fort Cima Vezzena) and the relational spaces “marked” by the intricate connecting infrastructures, trenches, field posts, and underground shelters. Only a small part of these vestiges are clearly visible today, while most of them have been reabsorbed in the dynamics of landscape transformation that occurred since the first post-war period. As far as land use is concerned, there has been an increase in cultivated areas and pasture land, activities that completely disappeared during the conflict.

Label		Land use	2018
	11	Dense Woodland without vestigia [ha]	760,37
	12	Sparse Woodland without vestigia [ha]	118,55
	13	Sparse Woodland with vestigia [ha]	0,00
	21	Pasture without vestigia [ha]	427,71
	22	Pasture with vestigia [ha]	88,17
	23	Pasture with traces of vestigia [ha]	69,50
	31	Meadow without vestigia [ha]	12,06
	32	Meadow with vestigia [ha]	0,00
	33	Meadow with traces of vestigia [ha]	7,52
	41	Arable land [ha]	13,60
	51	Buildings [ha]	0,88
	61	Private courtyard [ha]	3,16
	71	Lakes	0,00
	81	Totally destroyes areas [ha]	0,00
	82	Areas with high concentration of bombings [ha]	0,00
	83	Areas with low concentration of bombings [ha]	0,00
	91	Defense systems [ha]	0,00
	101	Fortification "rudere" [ha]	0,87
	102	Recovered forts [ha]	0,86

Tab. 8.25 | STRATIGRAPHIC TELESCOPE: Step 2. *__Overlapping georeferred maps on DTM and comparisons*

Tab. 8.28 | STRATIGRAPHIC TELESCOPE: Step 2. *__Overlapping georeferred maps on DTM and comparisons*

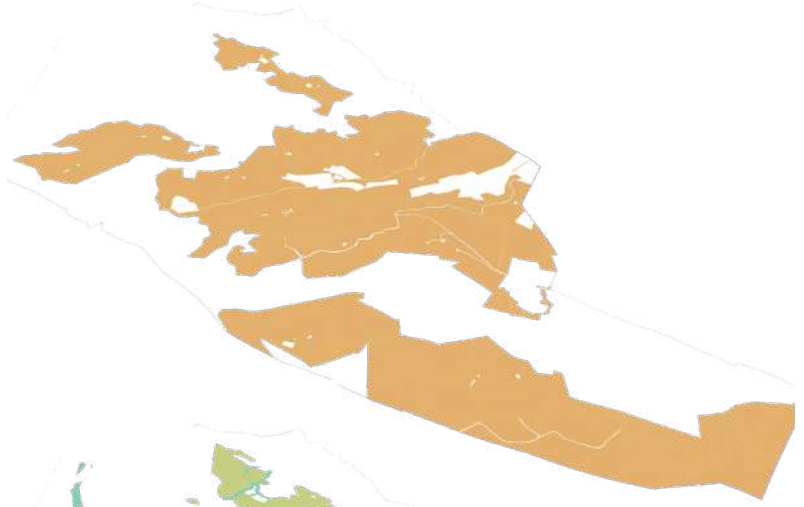
Woodland before the war - 1850/1915-18

Woodland during the war - 1915-18

Woodland after the war - 2018

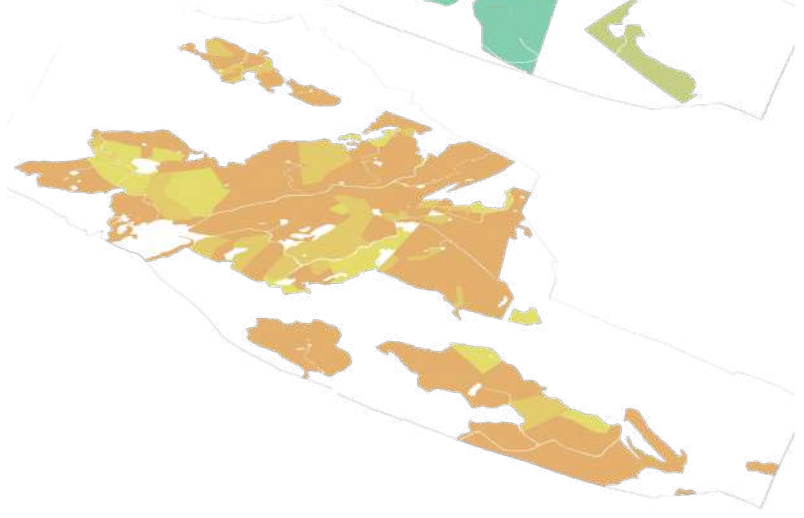
Label	Uso del suolo	1850	1914-18	2018
11	Dense Woodland without vestigia [ha]	858,21	179,99	760,37
12	Sparse Woodland without vestigia [ha]	0	120,72	118,55
13	Dense Woodland with vestigia [ha]	0	183,22	0

Pasture before the war - 1850/1915-18

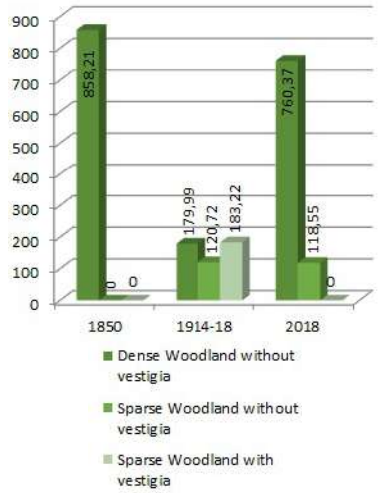


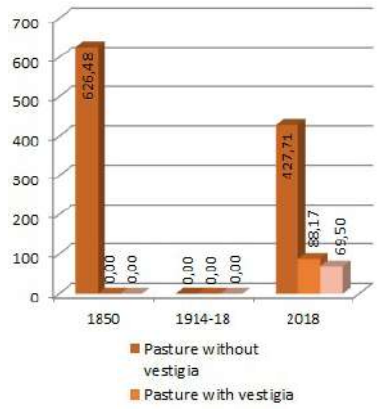
Pasture converted into meadow - 1915-18

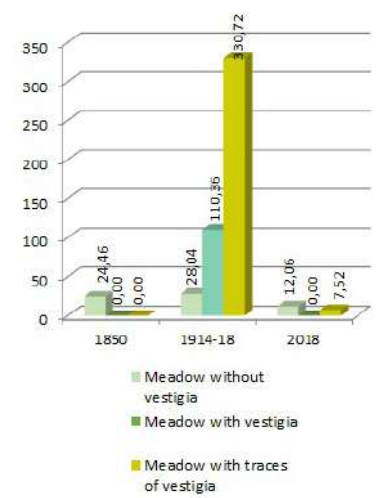
Pasture after the war - 2018



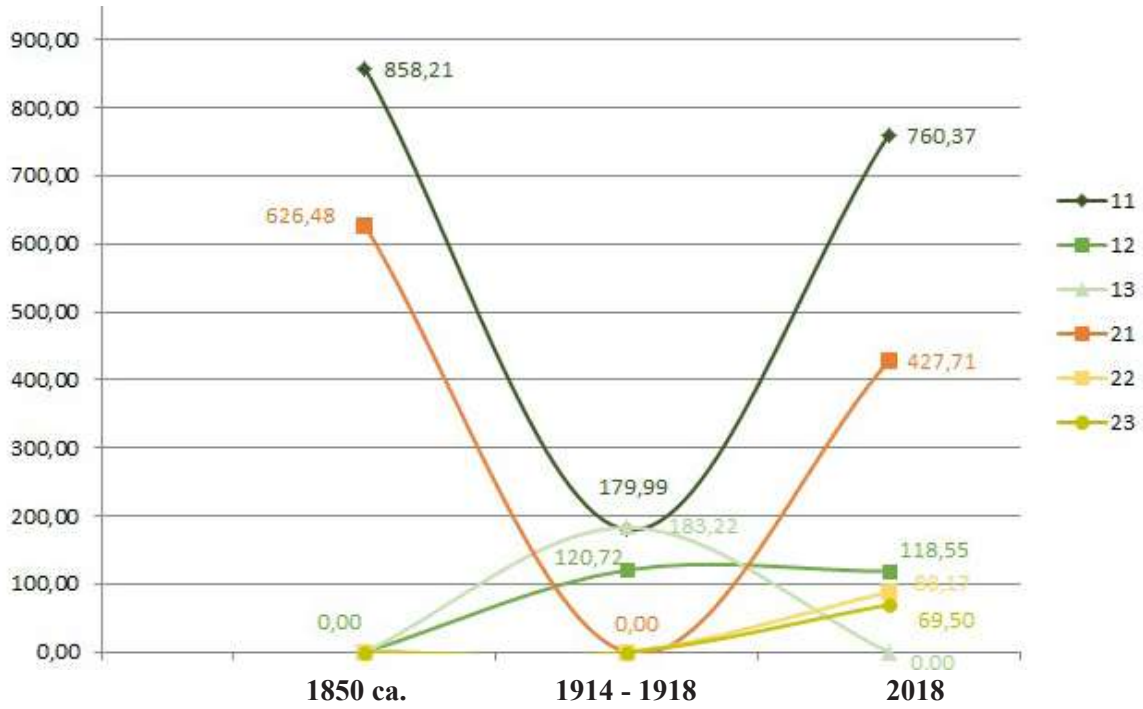
Label	Uso del suolo	1850	1914-18	2018
21	Pasture without vestigia [ha]	626,48	0	427,71
22	Pasture with vestigia [ha]	0	0	88,173
23	Pasture with traces of vestigia [ha]	0	0	69,4971
32	Meadow with vestigia [ha]	0	1,1036	0

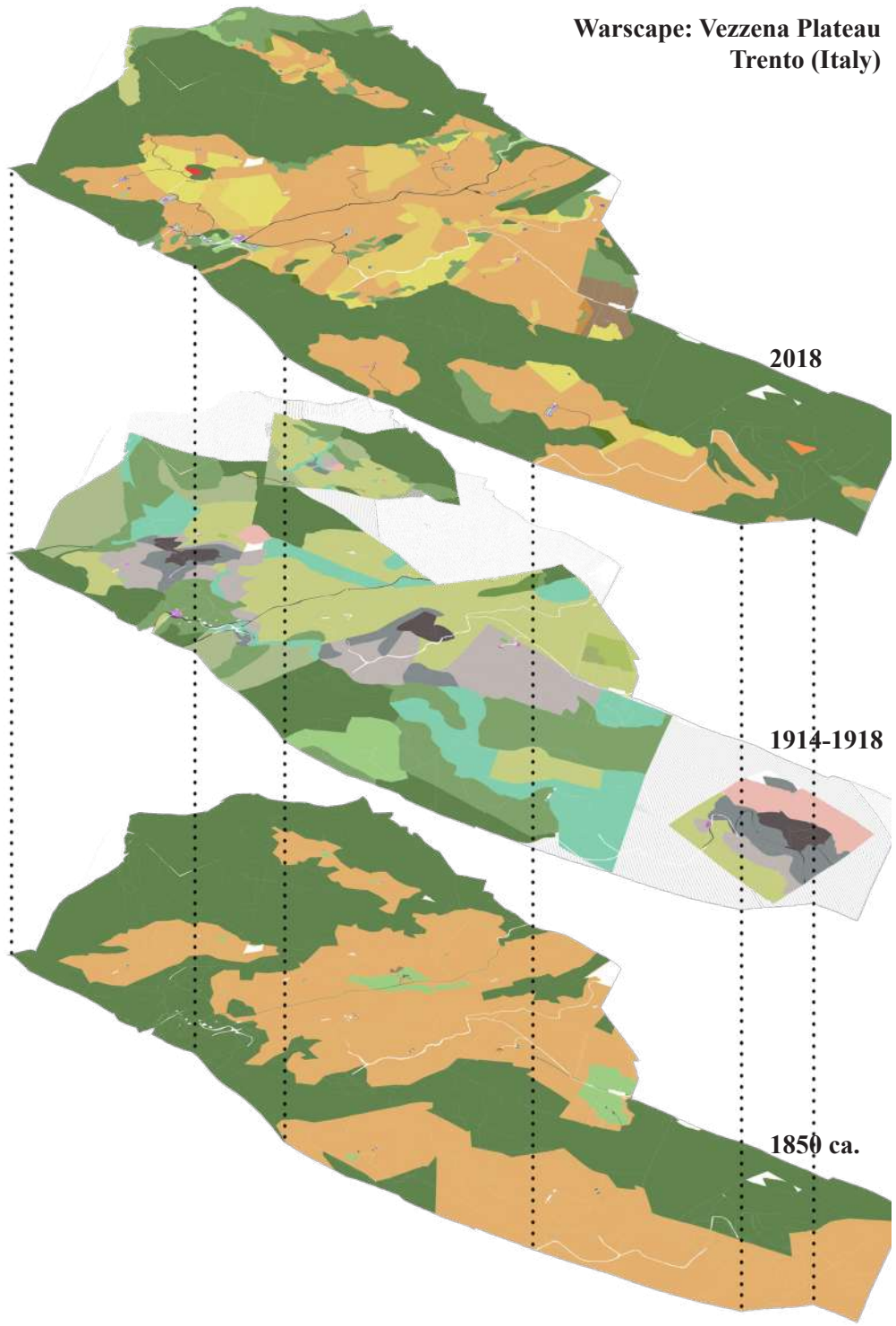






Label		Land use	1850	1914-18	2018
	11	Dense Woodland without vestigia [ha]	858,21	179,99	760,37
	12	Sparse Woodland without vestigia [ha]	0,00	120,72	118,55
	13	Sparse Woodland with vestigia [ha]	0,00	183,22	0,00
	21	Pasture without vestigia [ha]	626,48	0,00	427,71
	22	Pasture with vestigia [ha]	0,00	0,00	88,17
	23	Pasture with traces of vestigia [ha]	0,00	0,00	69,50
	31	Meadow without vestigia [ha]	2,45	28,04	12,06
	32	Meadow with vestigia [ha]	0,00	1,10	0,00
	33	Meadow with traces of vestigia [ha]	0,00	3,31	7,52
	41	Arable land [ha]	0,41	0,00	13,60
	51	Buildings [ha]	0,44	0,95	0,88
	61	Private courtyard [ha]	0,37	0,00	3,16
	71	Lakes	0,00	0,00	0,00
	81	Totally destroyes areas [ha]	0,00	19,71	0,00
	82	Areas with high concentration of bombings [ha]	0,00	43,89	0,00
	83	Areas with low concentration of bombings [ha]	0,00	1,07	0,00
	91	Defense systems [ha]	0,00	17,80	0,00
	101	Fortification "rudere" [ha]	0,00	0,00	0,87
	102	Recovered forts [ha]	0,00	0,00	0,86



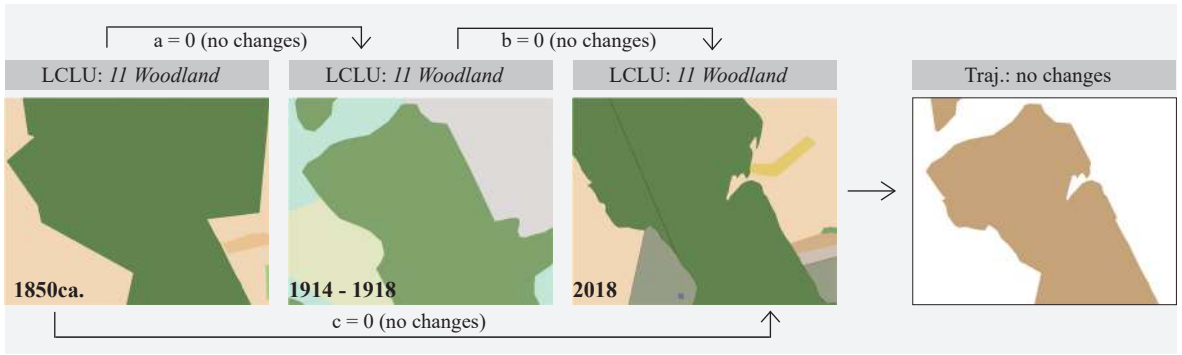


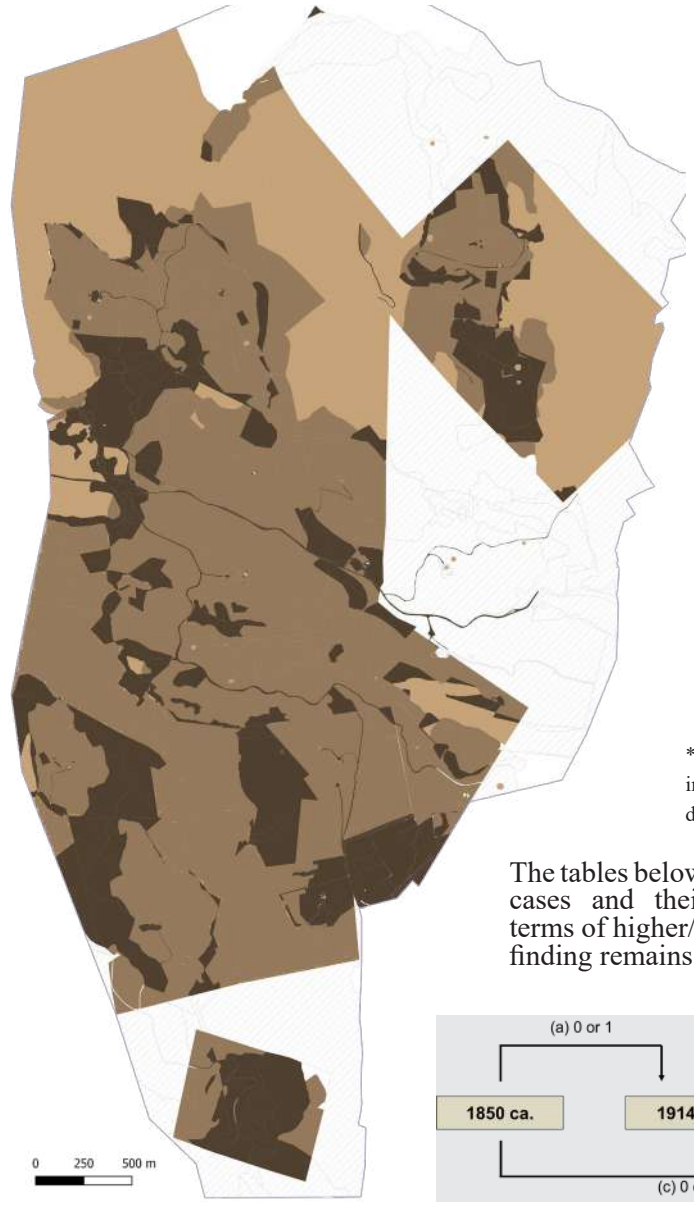
Tab. 8.29 | STRATIGRAPHIC TELESCOPE: Step 2. *__Overlapping georeferred maps on DTM and comparisons*

Tab. 8.30 | STRATIGRAPHIC TELESCOPE: Step 2. __ *The approach of the trajectories of LCLU change*

The approach of the trajectories of LCLU change *

In addition to the individual mappings regarding LCLU transformations, the data were interpolated to investigate more specifically the attitude of different areas to change. This analysis specifically concerns land uses, regardless of the degree of influence due to conflict. Through a binary numerical analysis (0: no changes - 1: changes), a reciprocal comparison is made between the use classes of a specific area with respect to two specific temporal frames, as indicated in the diagram (below). In the case in which the landscape has not been affected by any change over time (0-0-0) there is no possibility of finding remains of vestiges, while the higher probability is in cases where there have been no changes in use from wartime to the present (1-0-1), that is, in cases where the imprint of the conflict has not been voluntarily altered from the post-war period to the present. In the other cases, the analysis is more complex and in order to understand to what extent the vestiges of the war are still present in those contexts, it will be of fundamental importance to overlap these elaborations with the successive analyses on the War Impact Factor.

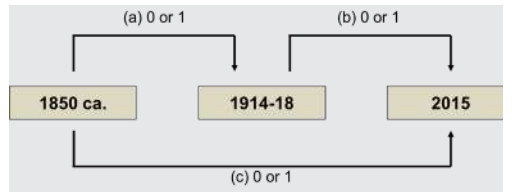




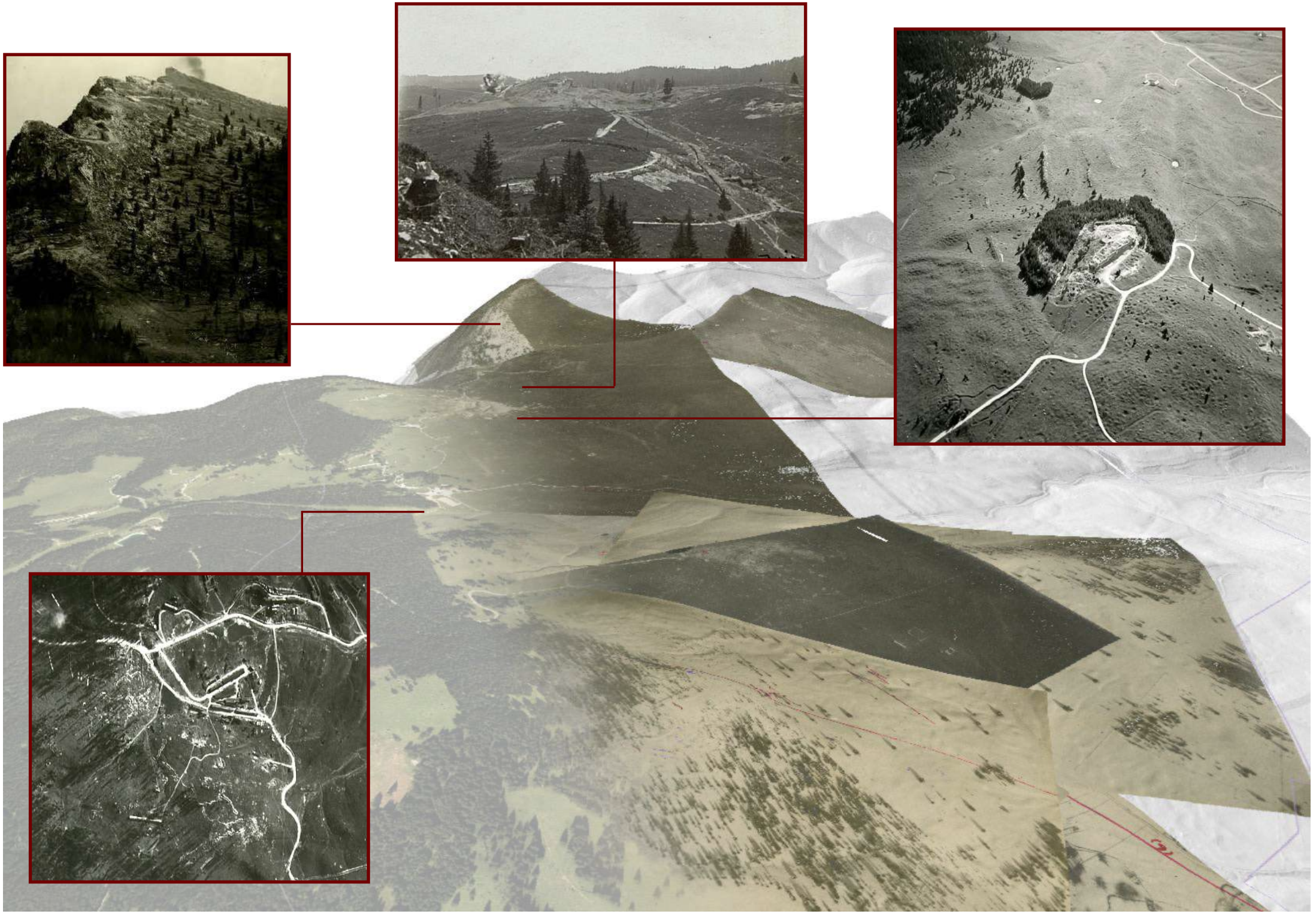
Warscape:
Vezzena Plateau
Trento (Italy)

* This approach has been inspired by the work of Van den Berghe (2019).

The tables below show the identified cases and their interpretation in terms of higher/lower probability of finding remains of the vestiges.

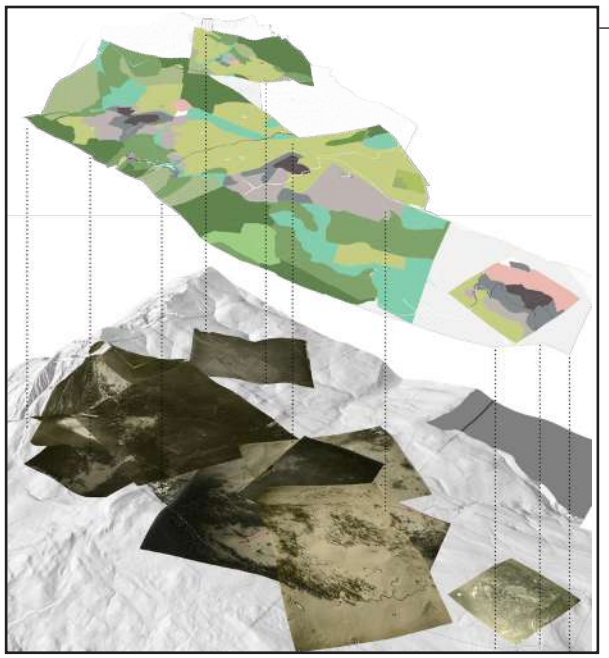


(a)	(b)	(c)	Landscape change trajectories	Chance to find Great War remains	
0	0	0	*no changes*	-	*No GW impact*
0	1	1	*intermediate level*	-	*New use (no links to GW)*
1	0	1	*intermediate level*	+	*Preservation remains*
1	1	1	*high level*	+/-	*Recovery (if (c) = (a))*
				+/-	*New use (if (c) ≠ (a))*



Tab. 8.31 | STRATIGRAPHIC TELESCOPE: Step 2. — *The overlapping of historical photographs*

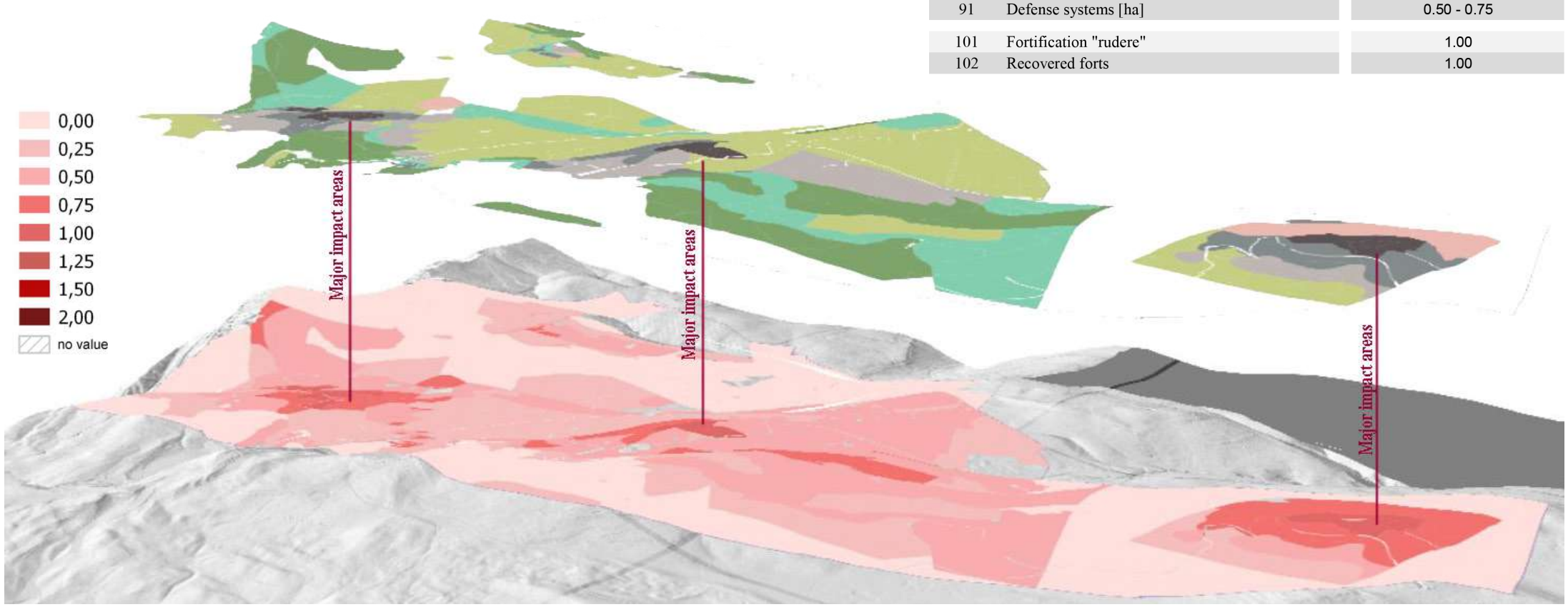
Tab. 8.32 | **STRATIGRAPHIC TELESCOPE: Step 2.** __*The analysis of the Great War Impact on the landscape*

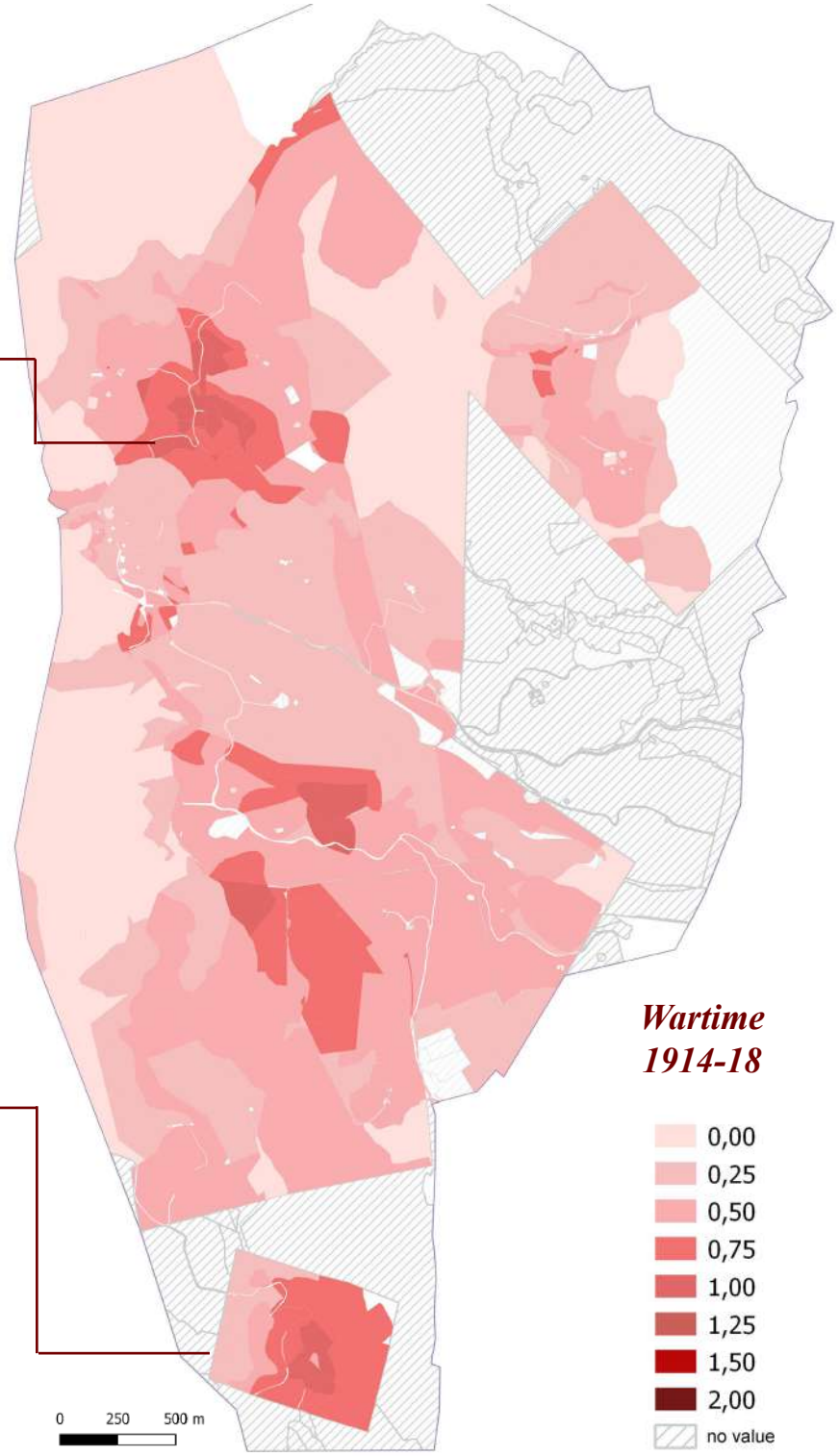


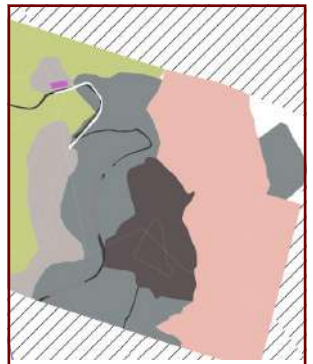
From the historical photographs to the analysis of the direct impact of the war

In the attribute tables associated with the various mapped polygons, values relating to the intensity of the impact that the war caused on the landscape in relation to the density of "signs" recognizable from historical photographs of the period were also included. The values were graded on a scale from 0 to 2 and mappings thus obtained made it possible to understand the temperature of the influence that the conflict had on the various areas.

Label	Land use	Great War Impact
11	Dense Woodland without vestigia [ha]	0
12	Sparse Woodland without vestigia [ha]	0
13	Dense Woodland with vestigia [ha]	0.50 - 0.75
21	Pasture without vestigia [ha]	0.00
22	Pasture with vestigia [ha]	0.50 - 0.75
23	Pasture with traces of vestigia [ha]	0.25 - 0.50
31	Meadow without vestigia [ha]	0.00
32	Meadow with vestigia [ha]	0.50 - 0.75
33	Meadow with traces of vestigia [ha]	0.25 - 0.50
41	Arable land [mq]	0.00
51	Buildings [mq]	0.00
61	Private courtyard [mq]	0.00
71	Lakes	0.00
81	Totally destroyes areas [ha]	1.00
82	Areas with high concentration of bombings [ha]	0.75 - 1.00
83	Areas with low concentration of bombings [ha]	0.50 - 0.75
91	Defense systems [ha]	0.50 - 0.75
101	Fortification "rudere"	1.00
102	Recovered forts	1.00



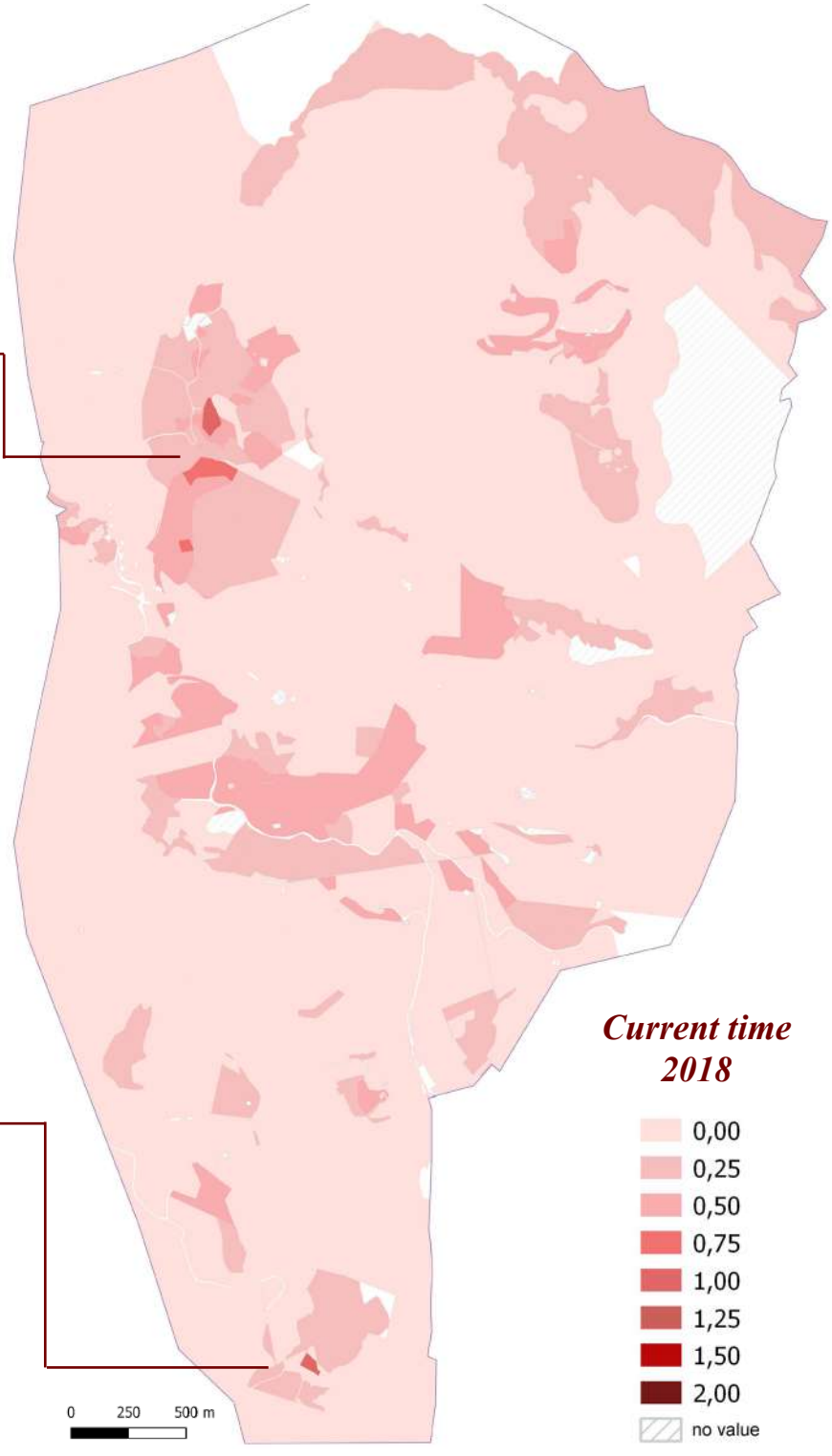




Label	Land use	Great War Impact
11	Dense Woodland without vestigia [ha]	0
12	Sparse Woodland without vestigia [ha]	0
13	Dense Woodland with vestigia [ha]	0.50 - 0.75
21	Pasture without vestigia [ha]	0.00
22	Pasture with vestigia [ha]	0.50 - 0.75
23	Pasture with traces of vestigia [ha]	0.25 - 0.50
31	Meadow without vestigia [ha]	0.00
32	Meadow with vestigia [ha]	0.50 - 0.75
33	Meadow with traces of vestigia [ha]	0.25 - 0.50
41	Arable land [mq]	0.00
51	Buildings [mq]	0.00
61	Private courtyard [mq]	0.00
71	Lakes	0.00
81	Totally destroyes areas [ha]	1.00
82	Areas with high concentration of bombings [ha]	0.75 - 1.00
83	Areas with low concentration of bombings [ha]	0.50 - 0.75
91	Defense systems [ha]	0.50 - 0.75
101	Fortification "rudere"	1.00
102	Recovered forts	1.00

Tab. 8.33 | STRATIGRAPHIC TELESCOPE: Step 2. *The analysis of the Great War Impact on the landscape*

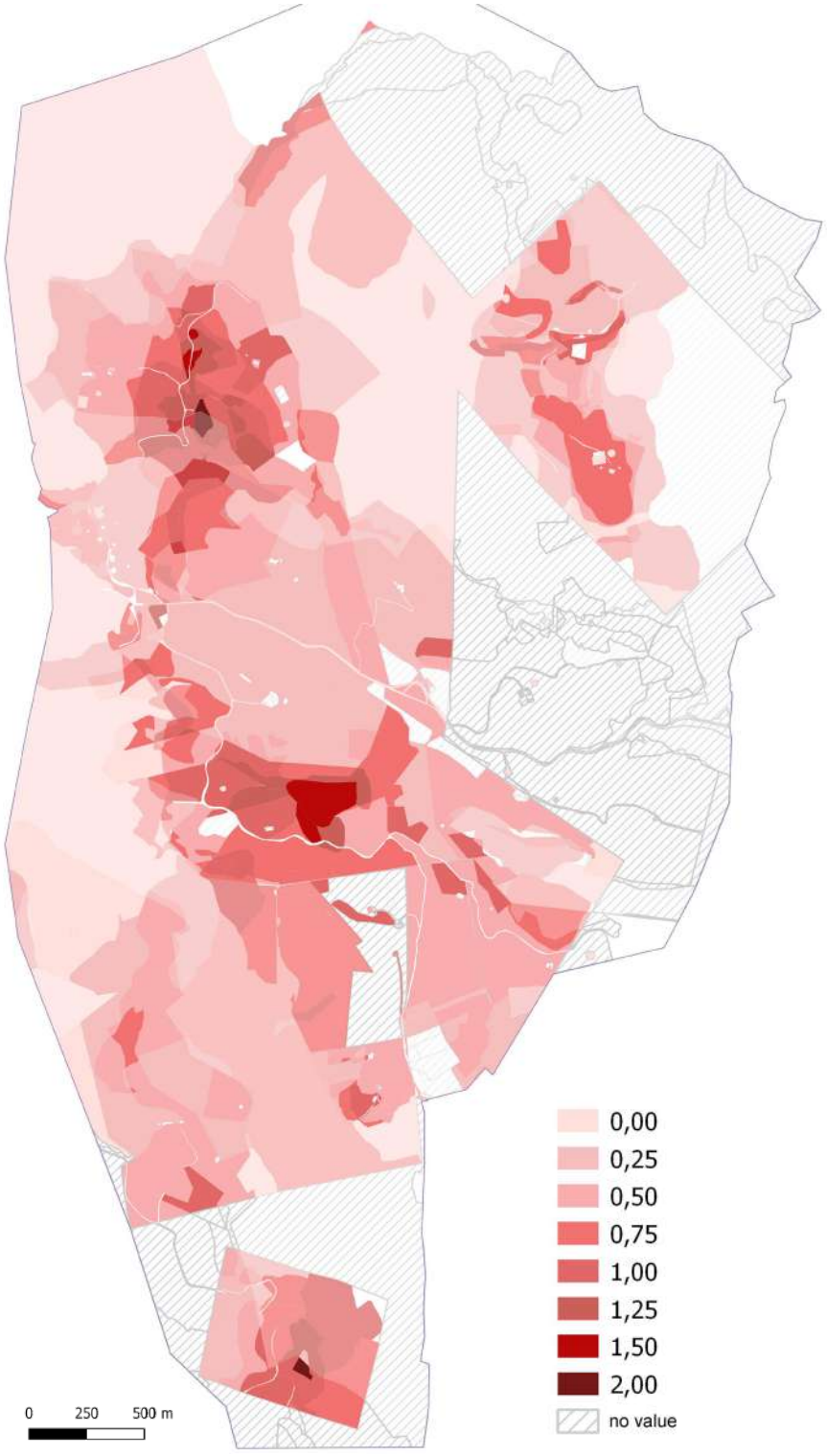
Tab. 8.34 | STRATIGRAPHIC TELESCOPE: Step 2. __The analysis of the Great War Impact on the landscape



Current time 2018

0,00
0,25
0,50
0,75
1,00
1,25
1,50
2,00
no value

Label	Land use	Great War Impact
11	Dense Woodland without vestigia [ha]	0
12	Sparse Woodland without vestigia [ha]	0
13	Dense Woodland with vestigia [ha]	0.50 - 0.75
21	Pasture without vestigia [ha]	0.00
22	Pasture with vestigia [ha]	0.50 - 0.75
23	Pasture with traces of vestigia [ha]	0.25 - 0.50
31	Meadow without vestigia [ha]	0.00
32	Meadow with vestigia [ha]	0.50 - 0.75
33	Meadow with traces of vestigia [ha]	0.25 - 0.50
41	Arable land [mq]	0.00
51	Buildings [mq]	0.00
61	Private courtyard [mq]	0.00
71	Lakes	0.00
81	Totally destroyes areas [ha]	1.00
82	Areas with high concentration of bombings [ha]	0.75 - 1.00
83	Areas with low concentration of bombings [ha]	0.50 - 0.75
91	Defense systems [ha]	0.50 - 0.75
101	Fortification "rudere"	1.00
102	Recovered forts	1.00



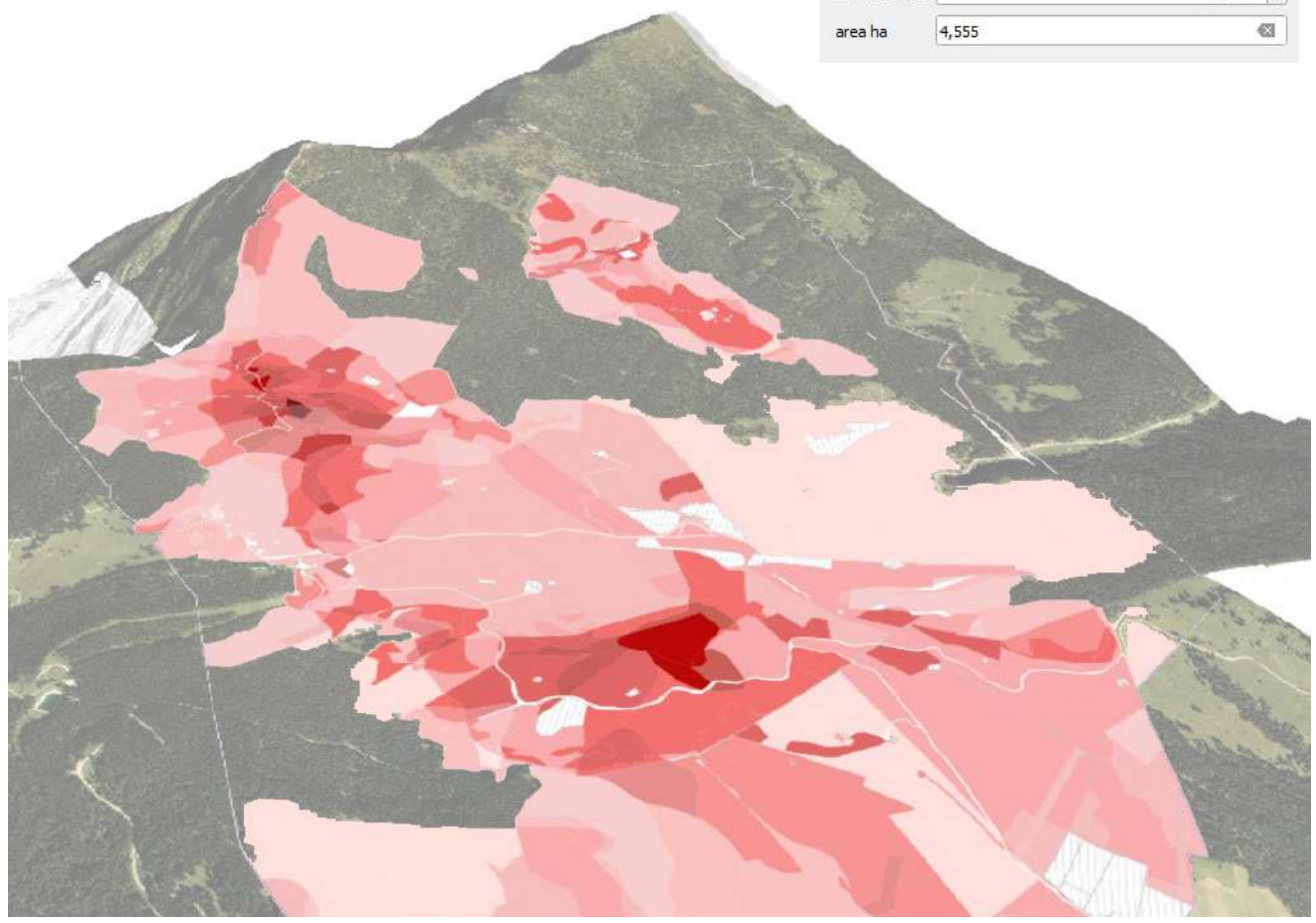
TOTAL IMPACT MAP

Adding up the impacts of the three different periods the total impact of the war was obtained.

IF1850 + IF1918 + IF2018 = IF total

To map the red zones, where the ***imprint of the Great War*** was more strong.

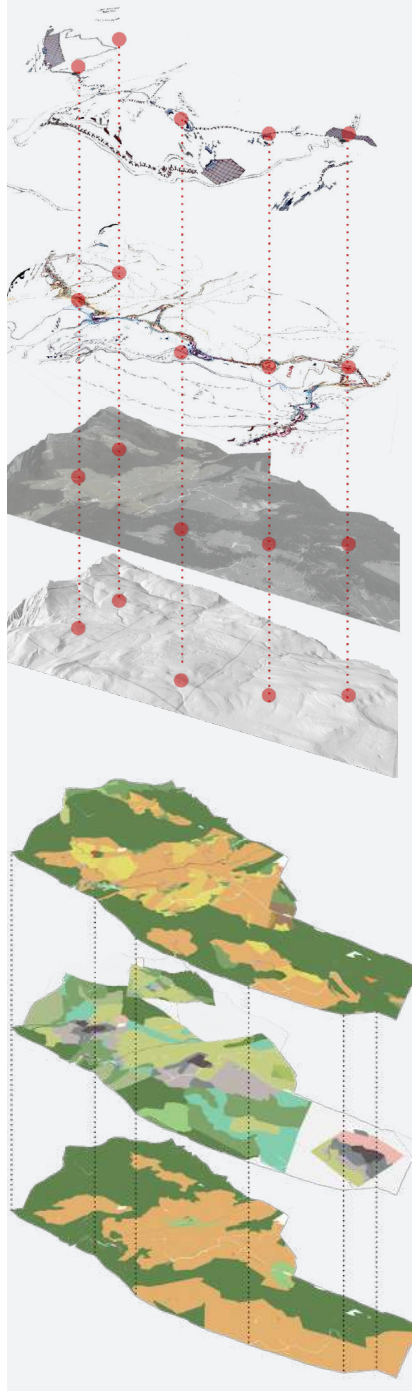
id	976
HLC 1850	21
INFL 1850	0
HLC 1918	13
INFL 1918	1
HLC 2018	11
INFL 2018	0
IF 1850	0,00
IF 1918	0,25
IF 2018	0,00
IF TOTALE	0,25
TRAJ i	1
TRAJ ii	0
TRAJ iii	1
TRAJECTORY	2
area ha	4,555



Tab. 8.35 | STRATIGRAPHIC TELESCOPE: Step 2. *__The analysis of the Great War Impact on the landscape*

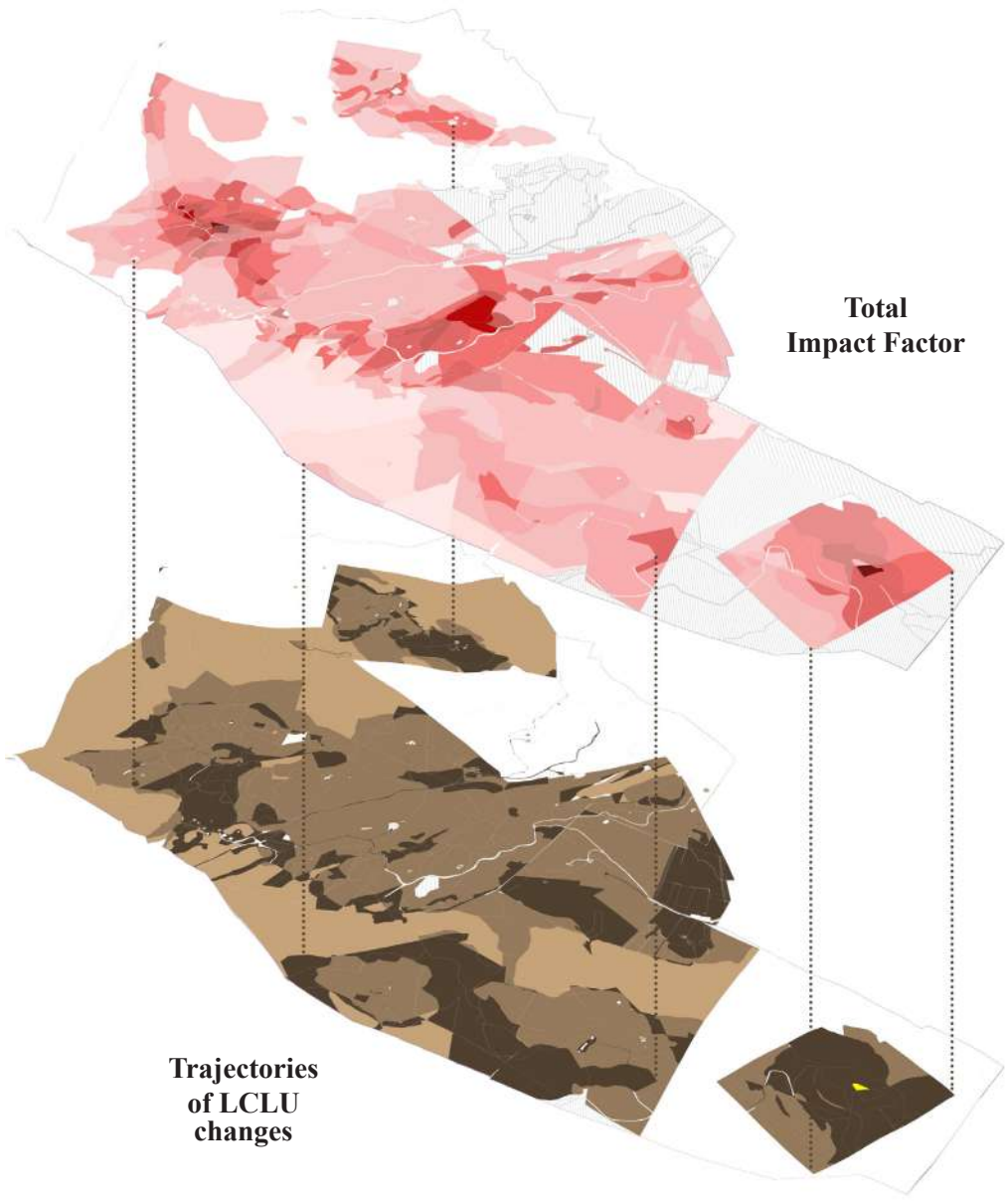
Tab. 8.36 | STRATIGRAPHIC TELESCOPE: Step 2. __Trajectories + Impact factor = different degrees of permanence

Overlapping historical maps
+
LCLU Analysis



Trajectories of change + Impact factor to reveal the different degrees of permanence

The comparison between the total Impact Factor, obtained from the sum of the partial values, and the elaborations obtained regarding the transformative dynamics of the LULC and the relative trajectories of change, has allowed us to better circumscribe the areas with a greater probability of finding material traces of the remains, that is, the areas in which the imprint of the war has been more impressed on the morphology of the territory and where, precisely because of this greater intensity, it can potentially still be present despite a hundred years of successive multi-layered modifications and alterations.



Total Impact Factor

Trajectories of LCLU changes

This overlap allowed for the identification of potentially denser areas in terms of permanences. These are areas influenced by the plans of militarization or by the destructive effects of the war itself in which the remains of the vestiges persist at different temperatures: sometimes clearly visible (especially permanent fortifications) but very often hardly recognizable or even hidden under layers deposited over time.

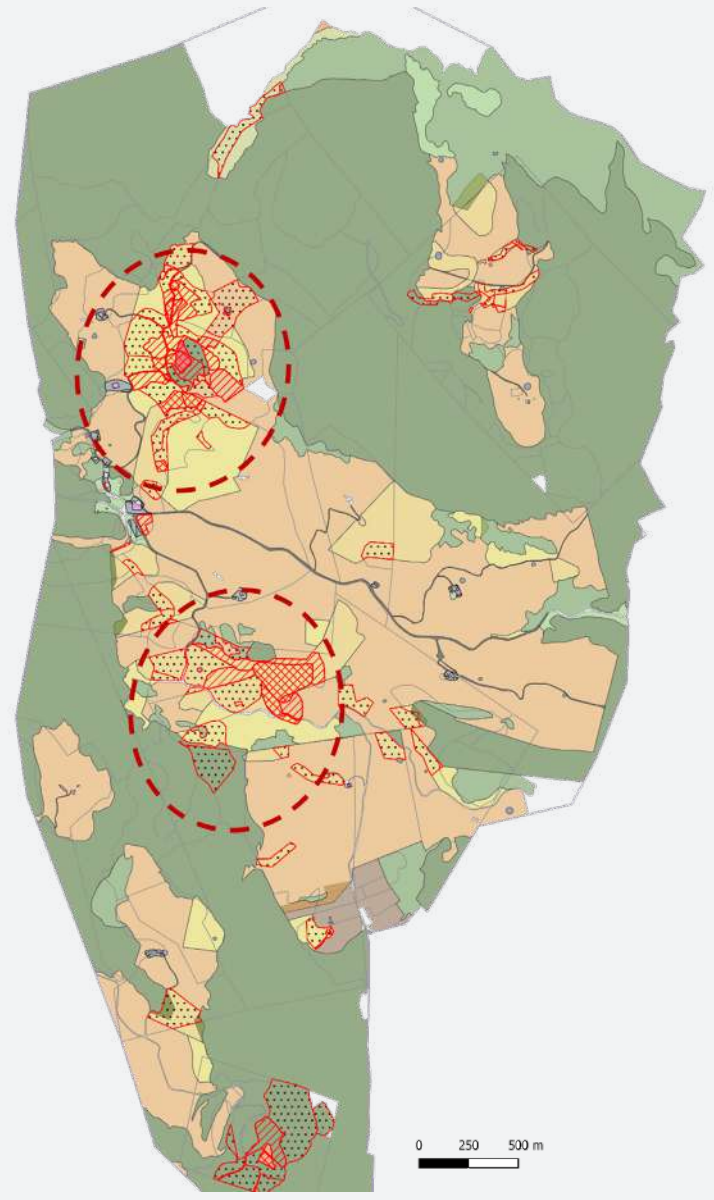
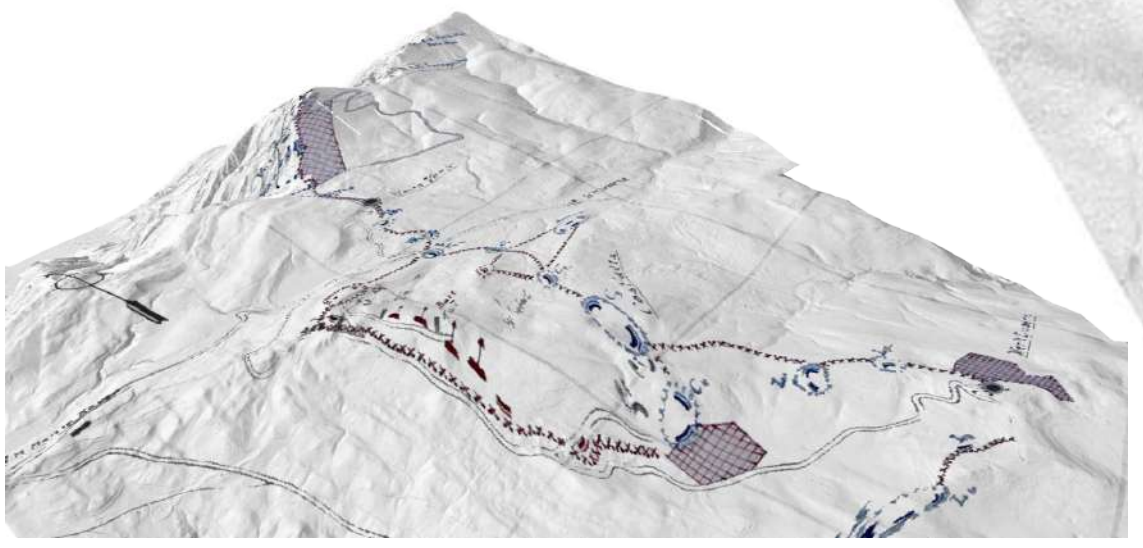
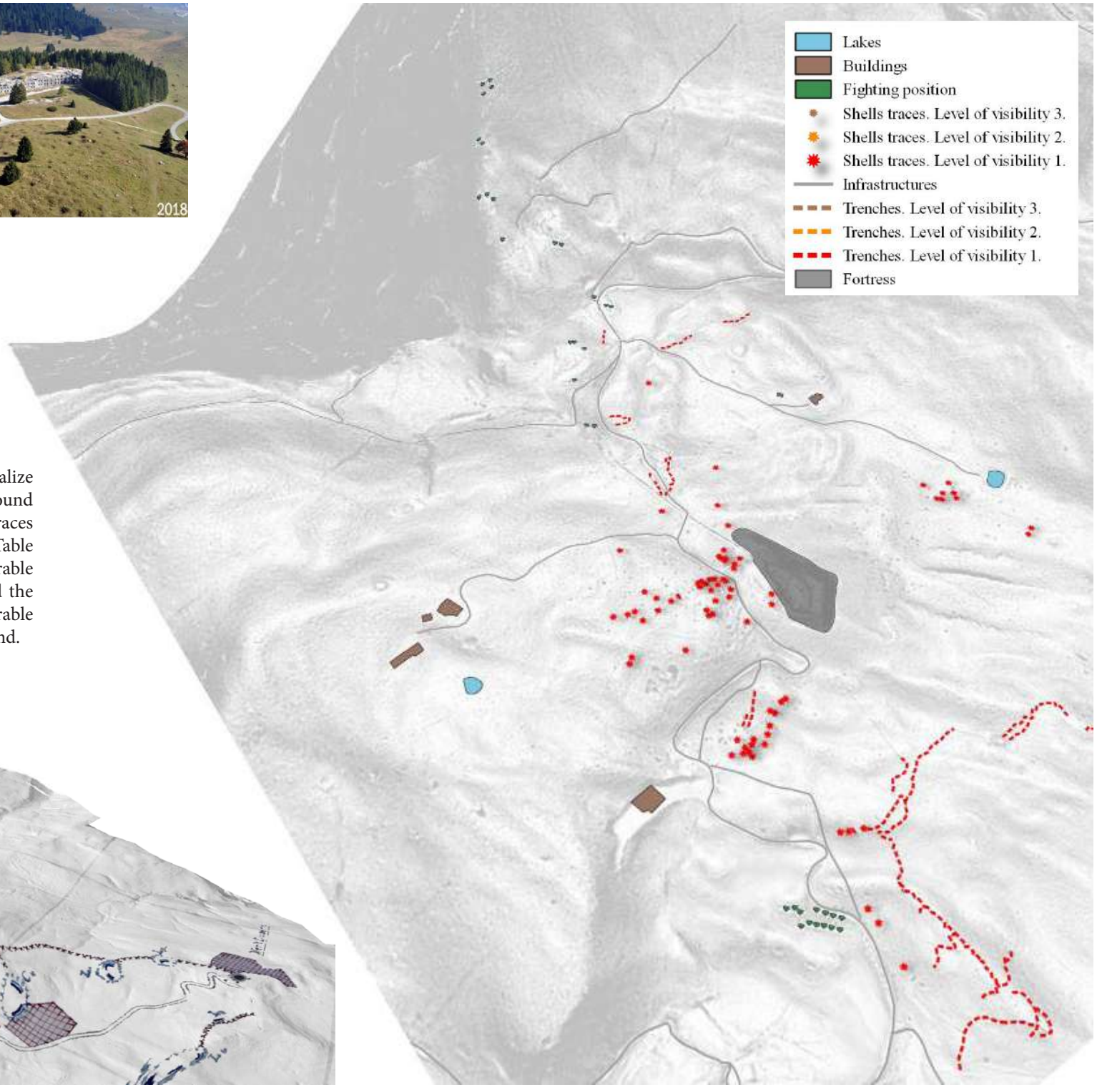


Table 1. Quantitative warscape recognition through orthophoto analysis

	Visibility Class 1
Shell traces	Nr. 77
Trenches	1761 m

This important methodological step made it possible to localize the areas most pregnant with "signs", including the area around Fort Busa Verle, which is particularly dense with material traces that are quite evident (Visibility Class 1). As summarized in Table 1, about 1761 meters of depressions and backfills clearly referable to the original traces of the trenches that developed around the fort, and 77 circular depressions or small "holes" clearly referable to the craters produced by repeated bombardments, were found.

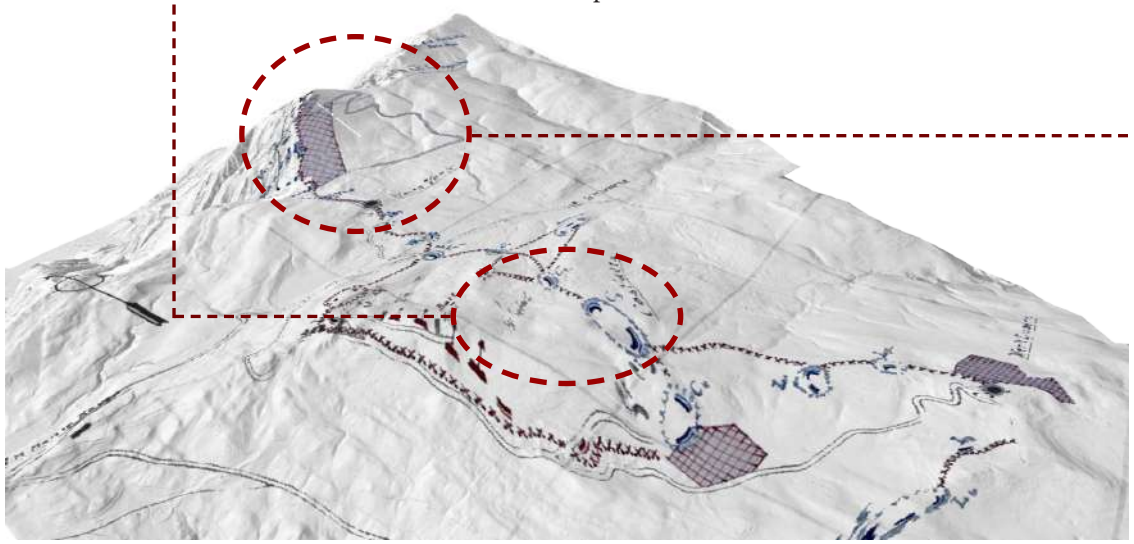


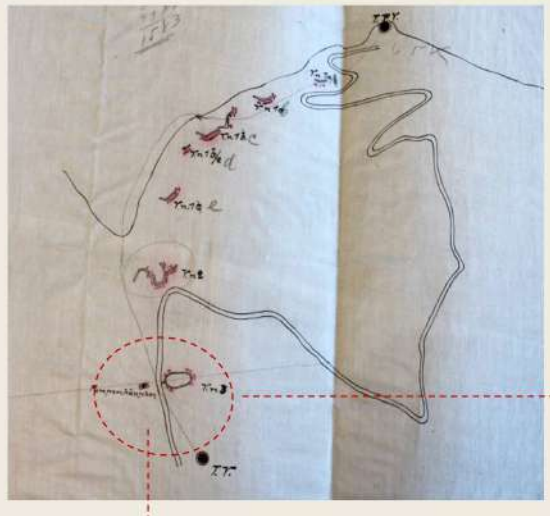


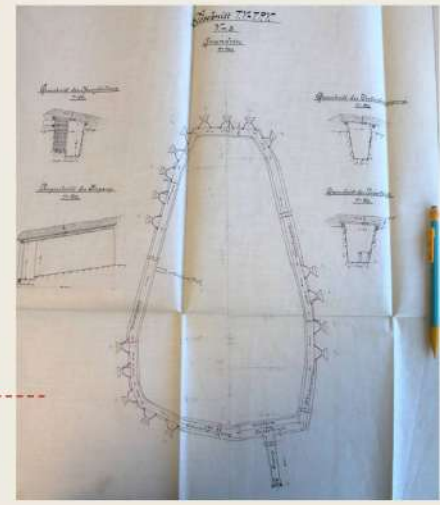
Tab. 8.37 | STRATIGRAPHIC TELESCOPE: Step 2. *__Recognition “Imprint of the war”: Visibility Class 1*

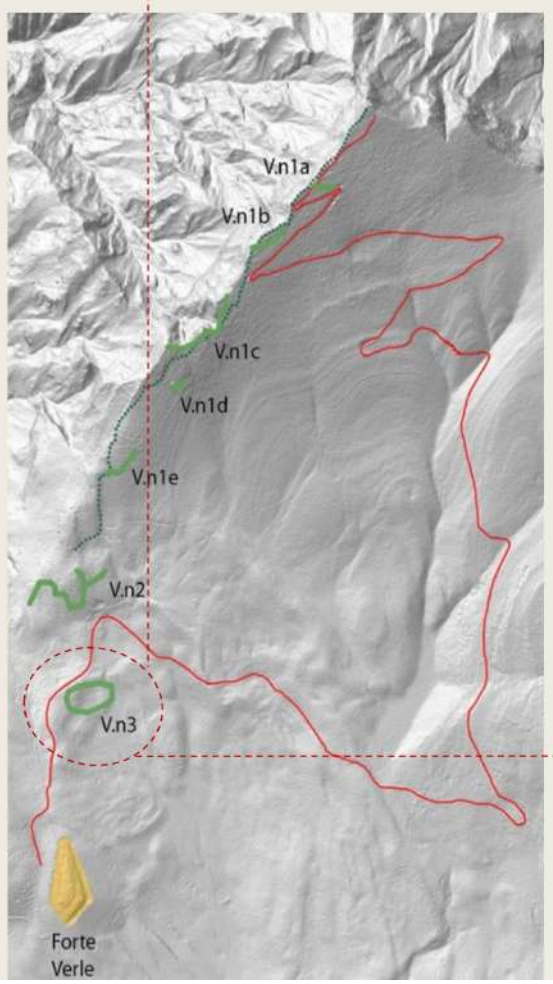
Tab. 8.38 | STRATIGRAPHIC TELESCOPE: Step 2. __Recognition "Imprint of the war": different temperatures

Through these analyses, two main areas emerged in which material remains of vestiges could be present, namely the area between Fort Busa Verle and Fort Vezzena, and the plateau between Fort Busa Verle and the Basson post, further south. In these areas, there are some irregularities in the ground that could be associated with defensive positions, entrenchments, and shelters, also because the specific project documentation of this area proves their presence, but the degree of visibility does not allow a clear recognition and a precise location.









Critical issues/questions

The methodological contribution provided by the analyses mentioned above represents an actual declination of the necessary holistic approach for recognizing and defining areas with different testimonial gradients. As already explained in chapter 6, foreign intervention approaches in terms of protection, conservation, and transformation may correspond to these recognitions, with the general objective of strengthening the testimonial value of the single areas and “educating” communities to an ethical responsibility towards heritage.

Because of this potential, applying the proposed method to the case study has revealed some critical questions and points for reflection, both operational and methodical, through which the proposed methodology could be further refined.

A first critical point concerns the operational method of characterizing and mapping the landscape’s historical uses, precisely the perimeter of irregularly shaped polygons constructed following the areas visible on the photographic documentation. Suppose this method is more immediate and expeditious in mapping the first temporal frame in the subsequent phases. In that case, the transformations of the uses/coverings of the land must proceed by comparison and relative subdivision by “difference” concerning the same areas identified initially. For example, it is evident how the dense forest cover in the first temporal frame can be transformed into another use only partially, thus implying the need to subdivide the perimeter area concerning the services identified in the subsequent frames. In the light of these findings, a more practical operational alternative is to adopt a more rigorous and scientific approach, subdividing the area to be investigated with a regular geometric grid. In this way, each cell of the polygonal mesh created can be associated with the characteristics required to compile the previously illustrated attribute table, independently of the temporal reference frames. Suppose this allows to solve the complications presented above. Such a solution implies a necessary reflection regarding the precision in the correspondence between the actual situation and the regular pixel geometrization. In essence, it is simply a matter of designing a standard mesh with a suitable spacing to avoid both areas that are too significant, inappropriate simplifications, and polygons with dimensions that are smaller than the degree of definition of the initial photographic materials. With the right balance to these considerations, the proposed method allows solving the criticality that emerged and obtain quantitative data more efficiently.

The redefinition of the mapping of the HLC on the case study in question according to these latter considerations was not considered necessary, as it concerns simple operational steps that are not decisive for the global understanding of the usefulness of the “stratigraphic telescope”

method and its internal development phases.

A second reflection concerns the direct application of the elaborated method and its effective contribution to the recognition of traces of vestiges in the contemporary landscape. In the face of a broad territorial context, the ability to identify the areas in which the probability of finding permanent physical "signs" linked to the conflict is more significant, very often does not coincide with the actual discovery of the same, particularly as regards the palimpsest of more minute and fragile remains, such as the "signs of destruction". Compared to the mere superimposition of military maps, the "stratigraphic telescope" undoubtedly allows a much greater degree of detail, for example in the possibility of locating even the "wounds" inflicted by the war itself. Yet, identified as potentially dense with vestiges in some areas, identifying these traces is still not straightforward. In other words, precisely concerning these areas, the proposed methodology highlights different degrees of visibility of the vestiges, "different temperatures" concerning which the imprint of the Great War remains in contemporary life.

It is therefore necessary to sharpen our gaze and calibrate the "stratigraphic telescope" to an even more detailed level of analysis to understand whether the strong aptitude for change in these areas has actually reabsorbed the "signs of history" to the point of leaving no visible trace, or, more likely, whether the evidence of the conflict has not been correctly "erased" but partially hidden under more recent post-depositional layers stratified over time. In this latter perspective of meaning, the physical traces of the remains would become the constitutive elements of a heritage that develops in the space of the visible landscape and expands in depth, and thus persists in the contemporary world while being partially latent and "submerged". Acknowledging the importance of the "materia signata" as an "accumulation basin" in which the tangible evidences of the conflict intertwine with time, the elaborated method proposes to analyse in detail the current morphology of the territories to understand the actual permanence of the imprint of the Great War under the most recent depositional layers stratified in history, integrating in an operative way the archaeological approach referred to at the beginning of the chapter.

This means operating in the limes between the visible and the "submerged", investigating the constitutive plots of that space-threshold on which the "signs of time" have been deposited and stratified.

8.2.4 Step 3. Unveiling latent heritage through the contribution of some specific LIDAR data visualizations

Just like a telescope in which the adjustment of the focus is measured concerning the distance of observation to be reached, in the same way, the following methodological step proposes a change of scale, from the general to the detailed, to probe in-depth the threshold-space between the “visible” and the “submerged” in search of any possible permanence of vestiges still present in the orography of the contemporary landscape.

In the light of the considerations and results obtained in the previous analytical phases, it is evident that the war and the processes of militarization connected to it have strongly shaped and physically imprinted the imprint of their passage on specific territorial areas, making it likely that such imprinting can still be found today, after a hundred years of successive stratifications. As already mentioned in chapter 5, it is a question of recognizing the importance of the soil as a place on which these “signs” have been deposited, a “reservoir” of tangible traces of the passage of time that have shaped its microtopography, enriching its significance and defining its historical and cultural “testimony value.” Refining our gaze to investigate more closely those areas in which the probability of uncovering “submerged” remains is greater, concerning what has emerged from previous analyses, means returning to observe the topography of the contemporary landscape, precisely detectable thanks to modern remote sensing technologies, adopting an archaeological-stratigraphic approach extended to a territorial scale.

In this sense, it is clear to better understand the very meaning of the “stratigraphic telescope” as a tool capable of operationally combining the different depths of analysis with the different scales of observation, in a continuous tension between the general and the particular, to recover that systemic vision lost today. In this sense, the possibility of having very high-resolution territorial datasets obtained, for example, by airborne laser scanning (ALS or airborne LIDAR), with centimetric precision, makes it possible to elaborate equally detailed analyses, “scanning” the microtopography of the ground in a non-invasive manner to be able to recognize, even in the slightest irregularities, possible latent evidence linked to the Great War, preventing any potential disturbance and modification that traditional archaeological excavation techniques would imply.

The specialized analysis of the current morphology of the territories through the interpretation of digital data using appropriate and specific visualization methods constitutes an original and innovative contribution, especially in the Italian context, for the unveiling of that palimpsest of relics which, although “submerged,” remain in the contemporary landscape.

Even though it is not entirely new in the field of studies related to the First World War, since it is part of the research strand "Archaeology of the Great War," as anticipated at the beginning of the chapter, this interdisciplinary approach constitutes an indispensable contribution to facilitate the recognition of the different temperatures concerning which the imprint of the Great War remains within the landscape of today, thus contributing to define better Indicator 3, indispensable for recognizing the different "testimonial gradients," as explained in Chapter 6.

Methodology

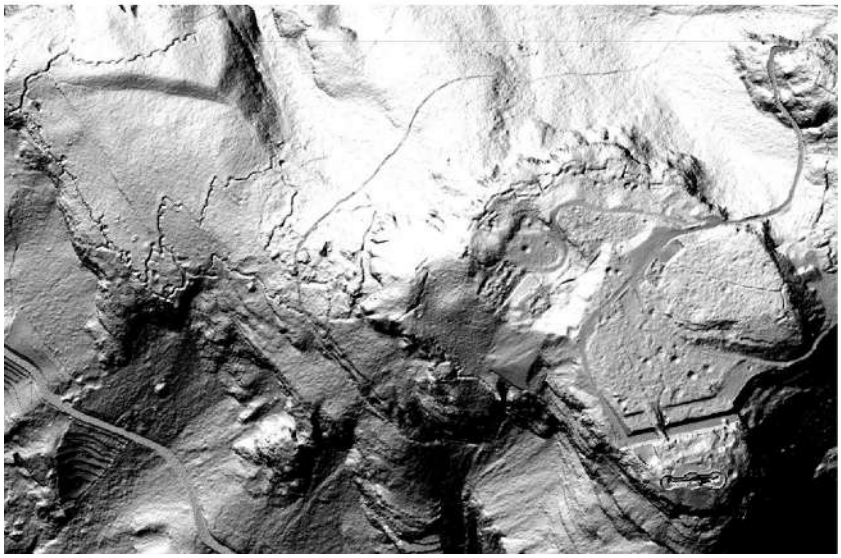
Unlike the previous methodological steps, which were developed from the in-depth study of historical, planning and photographic documentation, this analytical phase focuses exclusively on the detailed investigation of the micro topography of the contemporary landscape, whose morphological conformation can be easily obtained thanks to modern remote sensing techniques, such as interferometric synthetic aperture radar (InSAR) or the Airbone Laser Scanner (ALS). Understood as a technological development of aerial photogrammetry, the evolution of remote sensing has led to the possibility of acquiring topographical and altimetric information in an increasingly rapid, precise and systematic manner, returning digital elevation models (DEM) that are valuable sources from which to obtain countless information.

Among these technologies, LIDAR (acronym for Light Detection and Ranging), an "active" remote sensing technique that performs high-resolution topographic surveys using an aerial scan of the portion of territory to be analysed, proved to be particularly useful for the proposed research. The topographical survey measures the distances between the laser beam emitter and the earth's surface. What is obtained is a cloud of points, each of which is associated with a datum relating to the geographical coordinates (according to the WGS84 system) and the altimetric height calculated based on the difference in time between the emitted and reflected pulse, and the intensity of the reflected signal itself. Among the various remote sensing methodologies, LIDAR has also assumed strategic importance in the study of the dynamics of the archaeological transformation of the landscape thanks to its ability to overcome the interference caused by the presence of vegetation, returning, in addition to a digital surface model including each element detected (the DSM, Digital Surface Model), also a digital model of the "clean" orography of the land (the DTM, Digital Terrain Model), built exclusively with the points that belong to the ground. As far as the research in question is concerned, this translates into the potential possibility of identifying "remotely" the permanence of some archaeological evidence from the Great War that would otherwise not be visible through the sole analysis of current orthophotos. In areas

where the land cover/land use has changed compared to the immediate post-war period, for example in newly planted woodland contexts (see analysis in the previous paragraph), the study of the DTM therefore facilitates the identification of traces imprinted in the morphology of the land, reducing the number of field surveys and detailed reconnaissance/ surveys, which are certainly more costly and time-consuming (Pic.8.7a,b).

However, the information potential of LIDAR data is greatly amplified by the implementation of advanced visualisation modes developed specifically for archaeological purposes and partially borrowed from other scientific fields, which go beyond the traditional ‘grey scale’

Pic.8.7a



Pic.8.7b

views of height models of the terrain, thus making it possible not to miss important archaeological features simply because of their orientation or size. Through these specific "looks" the "stratigraphic telescope" method can scan in depth the morphology of the contemporary landscape, relating the "emerged" heritage with the "submerged" palimpsest of more labile evidence, often covered by post-depositional layers of degradation but not disappeared, to identify the permanence of vestiges and recognise their narrative potential.

From an operational point of view, the same GIS programs used in the previous analytical phases, such as QuantumGis, are complemented by a specific application developed by the Institute of Anthropological and Spatial Studies of Ljubljana, Slovenia, called Relief Visualization Toolbox, which can be freely downloaded to implement the visualizations of spatial datasets of high-resolution digital elevation models derived from LIDAR scans[557]. Congruently with the objectives of this research, this tool allows for the inclusion of the most effective analytical techniques for investigating small-scale spatial models, i.e., those most suitable for studying the micro-topography of the territory, including analytical shading or shading from different angles, gradient, sky visibility factor (SVF), positive and negative aperture, degree of sky illumination and local dominance.

Among these, *Hillshade visualization* is undoubtedly the most widespread way of visualizing LIDAR data (already shown in Pic.8.7), particularly for archaeological interpretation. It returns a plastic and illustrative representation of the topography of the ground that can be easily interpreted. Operationally, this elaboration consists of calculating shading for each grid cell, referred to established illumination values coming from a hypothetical light source positioned at an infinite distance, with a constant azimuth and zenith angle for the whole studied area. The areas hit perpendicularly to the light beam are the most illuminated, while the areas with an incidence angle equal to or greater than 90◦ are in the shade.[558] The possibility of artificially

557 The Relief Visualization Toolbox was developed to help scientists visualize raster elevation model datasets, particularly by including techniques that effectively identify small-scale features. Therefore, the default settings assume that we are working with high-resolution digital elevation models derived from aerial laser scanning missions (LIDAR data). The potential of these views is applicable in a variety of disciplinary fields and for different purposes. The Sky-view factor, for example, can be effectively used in numerous studies where digital elevation model visualization and automatic feature extraction techniques are indispensable, e.g., in geography, geomorphology, cartography, hydrology, glaciology, forestry, and disaster management. It can also be used in engineering applications, e.g., predicting GPS signal availability in urban areas. See also KOKALJ, ŽIGA, ZAKSEK, OSTIR, 2011 for more details.

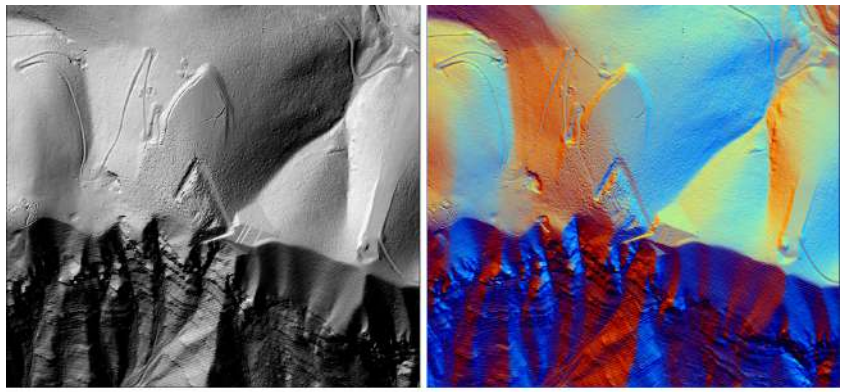
558 There are numerous analytical hillshading techniques (HORN 1981; PHONG 1975; BLINN 1977; BATSON et al. 1975; MINNAERT 1961), although only the

setting these light source positions at any desired angle (even those not possible “in nature”) allows even weakly signed features on the terrain to be highlighted. Since the color change from white to grey and black improves the perception of the relief morphology, the analytical hillshading is usually rendered in greyscale. However, this limits the visibility of fully illuminated or shaded areas. In addition, each specific direction of the illumination angles may be parallel to particular evidence on the ground that, if hit by a light beam in the same direction, would not become visible as they are unshaded. To overcome this criticality, interesting algorithms of hillshading from multiple directions have been proposed in the literature, i.e., applications of the analytical model capable of mapping on a single visualization different hillsides with different angles but equally distributed between 0° and 360°, to simultaneously detect all the evidence on the ground. Usually, the most exciting views are obtained by combining 8 to 16 directions. Still, the tool used allows the user to manually choose the interval according to which the spatial data should be analyzed, about the degree of definition of the data, and possible mutual interferences due to high autocorrelation. For the calculation of visualization in 8 directions, for example, the preferential angles are equally distributed at regular intervals of 45°: 0° is always in band 1, 45° in band 2, 90° in band 3, up to 315° in band 8. Since the superimposition of multiple visualizations in ‘grey scale’ would not allow a clear identification of the archaeological evidence, the proposed method suggests filtering the obtained elaborations to obtain RGB images of more immediate comprehension. In this specific regard, the best settings consist of views from three different directions, preferably at 60° intervals, to which the other color bands are associated, e.g., the red bar at 315°, the green band at 15°, and 75° in the blue band. In this way, we obtain raster images produced by the superimpositions of these three RGB layers concerning the shading obtained from the three chosen directions, on which other hillshading visualizations can also be conveniently combined, chromatically graduated accordingly (Pic.8.8).

The shading views are beneficial for tracing possible embankments and soil accumulations that may conceal the remains of small constructions or wall fragments of original entrenched or defensive systems, now ‘submerged’ by layers of topsoil or deposited over time. In the same way, the shaded areas can also highlight the traces of slight depressions not visible through the previous analyses, which highlight the presence of sites at different heights, possible evidence of craters or excavations linked to the processes of militarisation that over the years have been voluntarily ‘filled in’ concerning the trajectories of change in land use (see the previous paragraph) or by natural deposition actions.

method developed by Yoëli (1965) has become a standard feature in most GIS software.

Pic.8.8

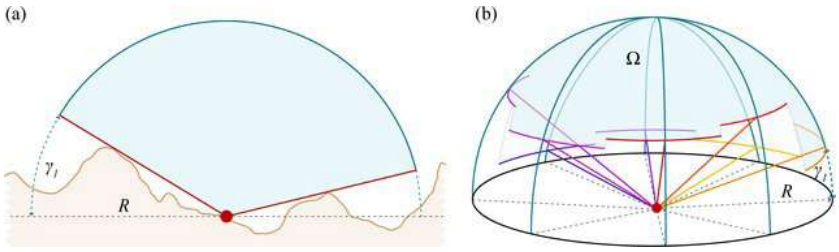


In the face of these critical contributions that hillshading visualizations can provide, however, the degree of accuracy they can achieve is measured concerning diffuse irregularities present in the general morphology of the reference context. In other words, there is again a problem of scale: if the predominant morphologies of the territory are particularly accentuated, such as slopes, rocky spurs, caves, vigorous depressions, the visualization of the shading must provide a homogeneous vision of the context, calibrating the degree of detail concerning a macro-topographical survey rather than about a study aimed at highlighting the most minute evidence at a micro-topographical scale, which would thus risk not being able to be revealed.

Declining the multi-scalar approach already hoped for, in words, the Relief Visualization Toolbox allows, however, to overcome this operational gap by processing LIDAR data to better adapt them to the needs of archaeological analysis, whose elements are generally at a much smaller scale than the landforms on which they are found. Through 'trend removal,' small-scale local features can be separated from large-scale landscape forms to obtain a Local Relief Model to be used as the basis for further visualizations. From an operational point of view, this means applying the "trend removal" to calibrate the "stratigraphic telescope" concerning the different morphological characteristics of the reference contexts (the other warscape classes), since, along the former front line, the overall landscape forms vary considerably: think for example of the uniform Belgian, French or Galician plains, rather than the naturally impervious and irregular territories of the Alps and karst areas. With the implementation of the 'trend reduction' tool, it is, therefore, possible to process the spatial data by adopting a more homogeneous scale of observation concerning the archaeological elements waiting to be recognized, through a generalization process usually elaborated with a lower convolution filter, such as the mean or median, or by resampling the DEM at a lower resolution.[559]

559 For more details on these data processing and visualization methods, see

In addition to the technologies described above, with specific regard to the study aimed at recognizing the permanence of the “signs of destruction,” the “stratigraphic telescope” method proposes another fundamental visualization method based on diffuse illumination, again obtained thanks to the Relief Visualization Toolbox, which is particularly suitable for revealing not only the presence of any permanent trenches or craters left by the bombardments but also the relative degree of depth of these “signs” in the ground. This is the Sky View Factor (SVF) Visualization, a computational algorithm consisting in the simulation of a fictitious illumination diffused on each pixel of the DTM and coming homogeneously from all directions from above, as if, above each point, there was a uniformly illuminated hemisphere (Fig.8.9).

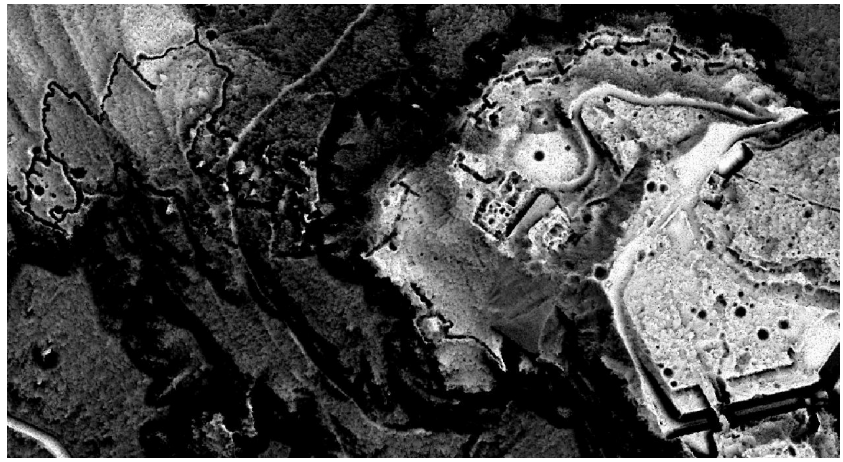


Pic.8.9

Without going into detail, it is evident how this visualization mode allows the best possible use of the information potential of LIDAR data to obtain a clear and precise picture of the current morphology of the territory, also recognizing on it the different depths of the “footprints” left by the conflict on the landscape, hidden under the “century deep archaeological deposit,” but not disappeared. The sky visibility factor represents the measurement of the portion of the sky visible from each specific point on the surface and returns a dimensionless parameter between 0 and 1: values close to unity are returned in white color and indicate that almost the whole hemisphere is visible, for example in exposed features such as ridge tops, while values closer to 0 are present in positions of greater relative depth, such as in the inner points of a narrow valley, where almost no portion of the sky is visible (areas returned in black color). The intensity of the black color is, in fact, directly proportional to the relative depth of the regions in question and also makes it possible to advance a plausible classification of them according to their current level of visibility concerning their original condition (Pic.8.10).

Through the management of these visualizations in the QuantumGis environment, it is possible to synthesize the information obtained from these analyses on different interpretative layers, refining the previous classification on three other Visibility Classes: areas with well-

KOKALJ, ŽIGA, ZAKSEK, OSTIR, 2011.



Pic.8.10

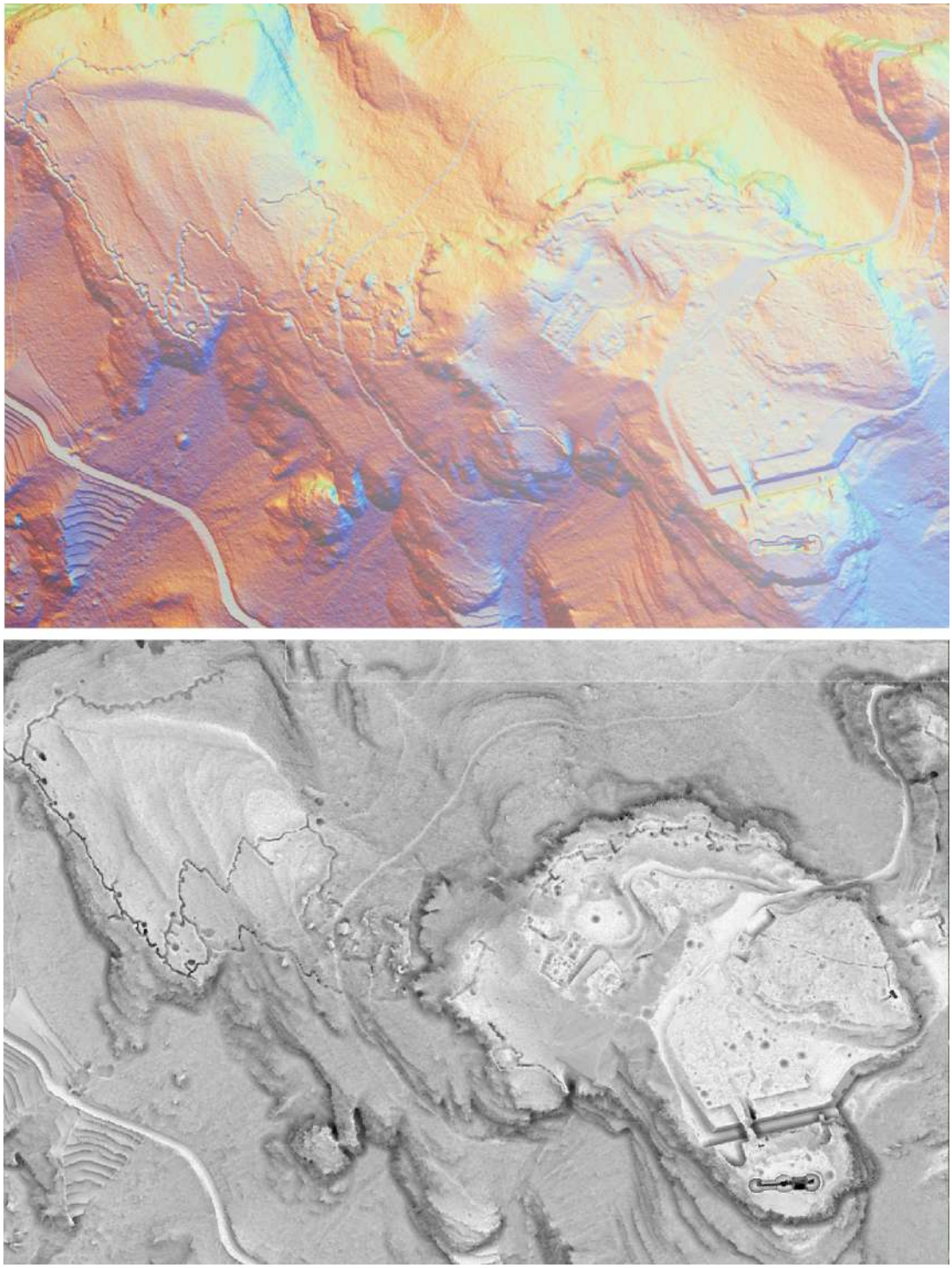
preserved surface features, identified when the SVF shows clear and well-defined edges and perimeters and the contrast in the visualization is strong; areas that are recognizable but compromised by erosion and sedimentation; and finally areas with poor conservation, in which the individual features are complicated to 'see.' In addition to this, the geometric conformation of the recognized evidence allows us to distinguish the presence of elements that tend to be circular, which can be identified as the remains of craters left by the explosion of bombs and mines, and other factors that develop longitudinally, which are most likely the material evidence of the original entrenched systems (Pic. 8.11-8.12).

In support of these analytical procedures, for the areas in which the remains are found, the use of digital terrain models obtained from LIDAR data also makes it possible to get specific and distinct territorial sections that, in the case of evidence linked to trenches and other works built for the war, can be compared with the particular design drawings or typological-constructive references found in military manuals (chapter 7). Comparing the territorial sections in correspondence of original trenches that remain in the landscape today at different degrees of recognisability, different relative depths emerge: the most easily identifiable 'signs' (Visibility Classes 0-1) correspond to greater depths, which gradually decrease until Visibility Class 3, in which the traces are identifiable exclusively thanks to SVF visualization (Pic.8.13).

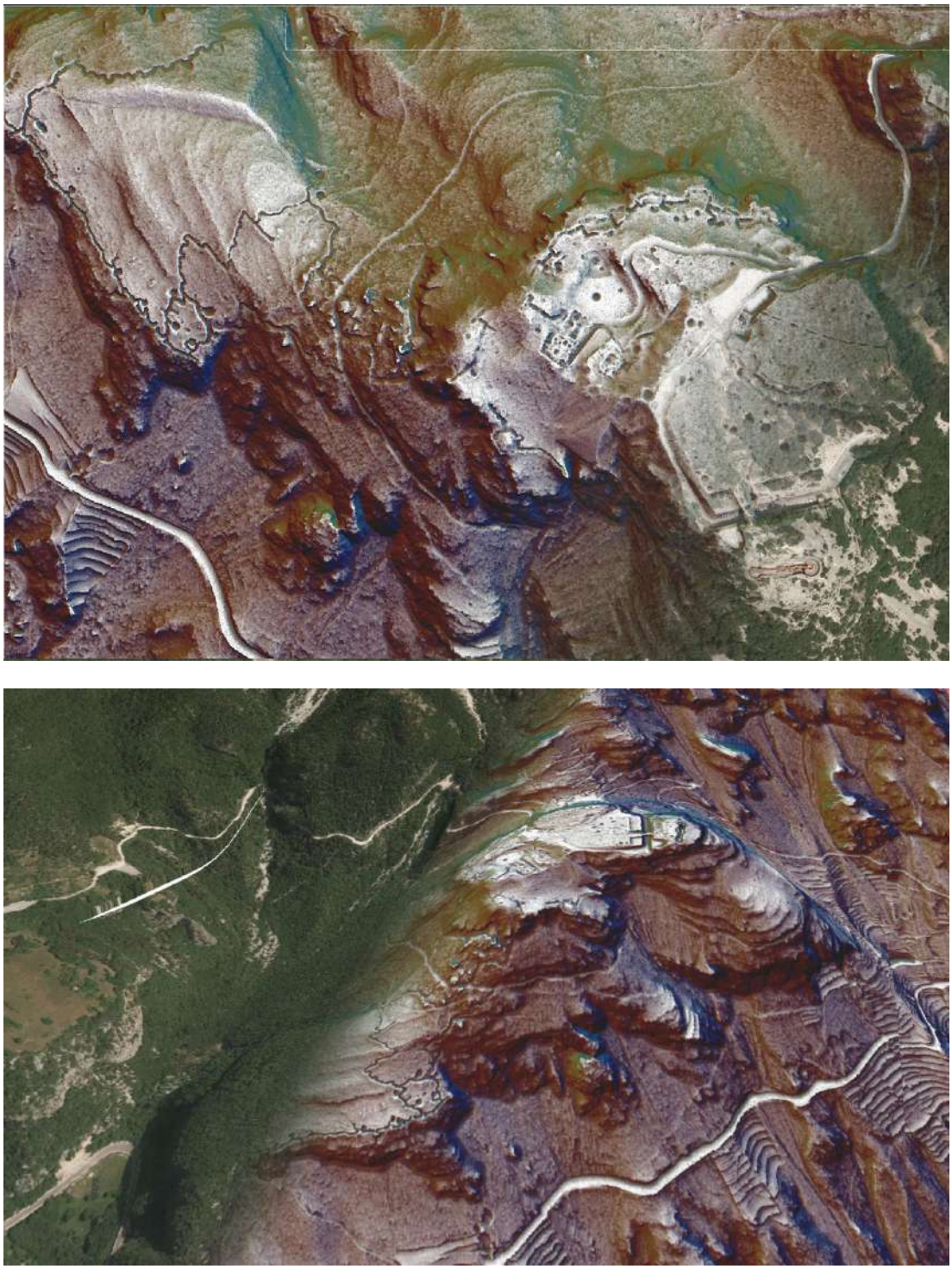
This constitutes a further interesting comparison better to understand the "physical thickness" of time that in the last century has deposited itself on the threshold-space where the traces of the conflict existed and has "submerged" them, hiding them from view but preserving their value as testimony.

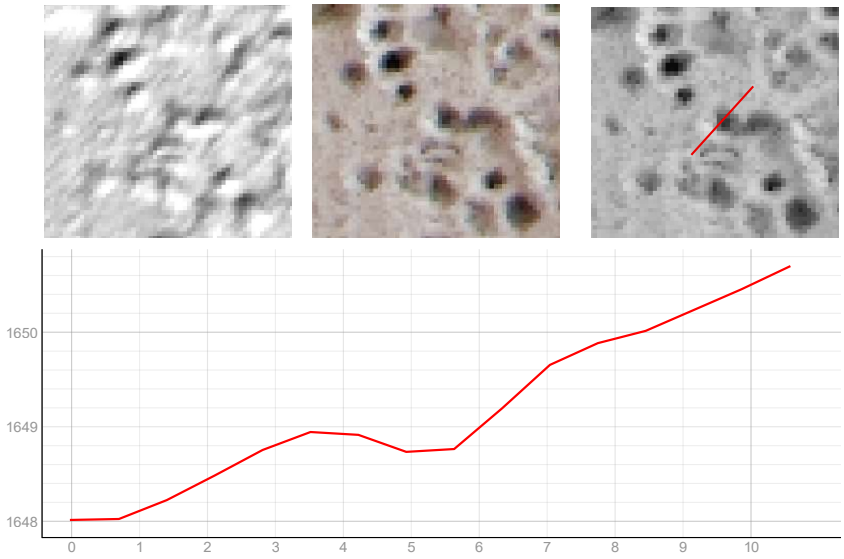
The size of the objects to be visualized. The goodness of these types of visualization depends on the excellent resolution of the starting digital

Pic.8.11



Pic.8.12





Pic.8.13

model, the number of directions that are considered in the analysis, and the maximum size of the ray in which to calculate the processing, which is closely linked to the degree of resolution (pixels) of the data itself. As far as the number of directions to be considered is concerned, the application used suggests four proposals that do not differ substantially from each other (8,16,32, and 64 orders), while relating to the maximum search radius, particular attention must be paid to the observation scale at which the investigation is to be conducted. A visualization based on SVF by choosing a large search radius exposes features of great importance, while when a smaller radius is used, the parts are more detailed: if the craters to be observed, for example, have a diameter of no more than 30 meters, the maximum search radius can only be less than 30 m (30 pixels). Otherwise, the archaeological feature could not be identified. Ultimately, with an appropriate calibration of the parameters about the context of reference, this type of processing can return much more precise and sharper visualizations compared to the classic hillshade visualization, thus facilitating the identification of many more remains of vestiges within the areas previously identified as potentially rich in material evidence related to the Great War. In other words, using this analytical method that scans the morphology of the terrain in-depth in a non-invasive manner, it is possible to unveil the traces of what remains of the “matter signed” by the conflict, of that palimpsest of labile and more fragile evidence in terms of permanence which, without this view, would risk not being recognized, and would therefore be destined to be lost forever.

Pilot case

The analysis obtained through the study of the changes in the HLC

and the relative impact of the conflict on the territory was implemented through the processing of spatial data as described above to allow a better unveiling of all those "signs" related to the war, less visible but still imprinted on the morphological conformation of the contemporary multi-transformed landscape.

Adopting the archaeological approach proposed by the "Stratigraphic Spyglass," the spatial datasets already used in the previous methodological steps were processed again in the Relief Visualization Toolbox to obtain the visualizations described above, in particular, the Multi-hillshading Visualization and the Sky-View Factor Visualization, as can be seen in Pic.8.14-8.15-8.16. The relative comparison between the different ways of visualizing spatial data has made it possible to obtain eloquent graphical elaborations, both in terms of quantity concerning the number of vestiges "uncovered" thanks to this "stratigraphic telescope" (as reported below) and in terms of figurative narration, which is extremely useful concerning the ability to propagate knowledge to create widespread awareness within the community and especially among the younger generations, to whom this strong heritage should be handed down.

The detailed analysis focused precisely on the areas potentially pregnant with material traces, according to what emerged from the previous methodological step, and therefore specifically in the area around Fort Busa Verle, in the area insisting on the Basson post, and in the entrenched system that connected the Vezzena plateau with Fort Spitz Verle.

As can be seen in Tables 8.39-8.40-8.41, the current territorial morphology of these contexts was 'scanned' through this 'investigative lens,' initially through a classic Hillshade visualization of the three-dimensional terrain model, which allowed the conformation of the land to be highlighted 'clean' of any forest cover, thus making it possible to analyze those areas that could not be decided by orthophotos alone. Using the multi-hillshading visualization, it was possible to bring out more clearly some permanent entrenchments whose course, being parallel to the incidence radius of the illumination, was not readily recognizable through the "classic shading" visualization. The analysis of the "degree of visibility of the sky," on the other hand, revealed the permanence of many "signs of destruction." In fact, through the rendering of white/black bands concerning the depth of the depressions or holes present on the current morphology, it was possible to recognize the imprint of numerous craters caused by the bursting of bombs and mines during the battles that affected these sites, in particular the attack on Forte Verle in 1915. As specified in Table 2, in fact, thanks to these Digital Terrain Model visualizations, it was possible to identify a further 3849 meters of depressions attributable to trenches, in addition to those previously

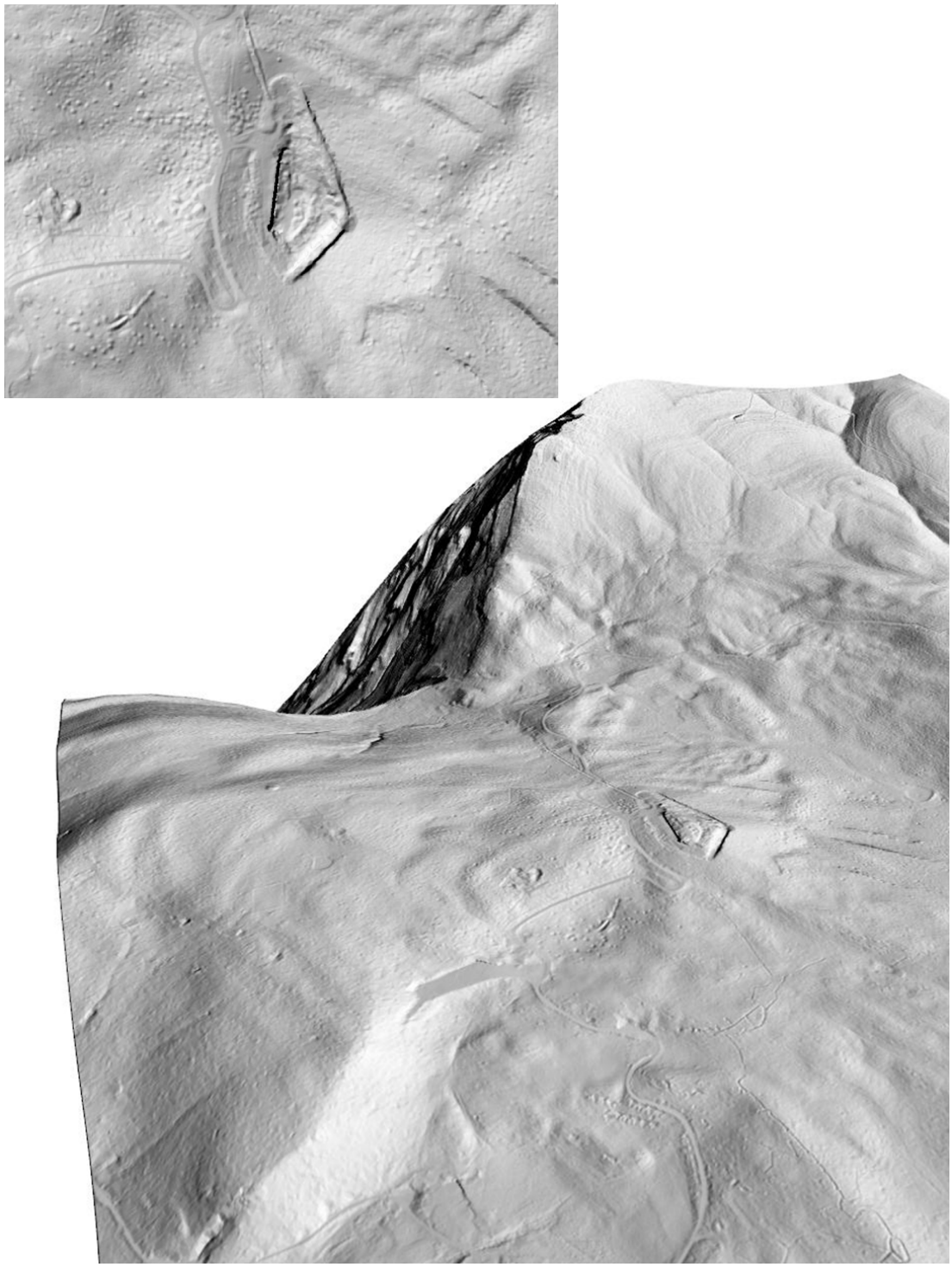


Fig.8.14

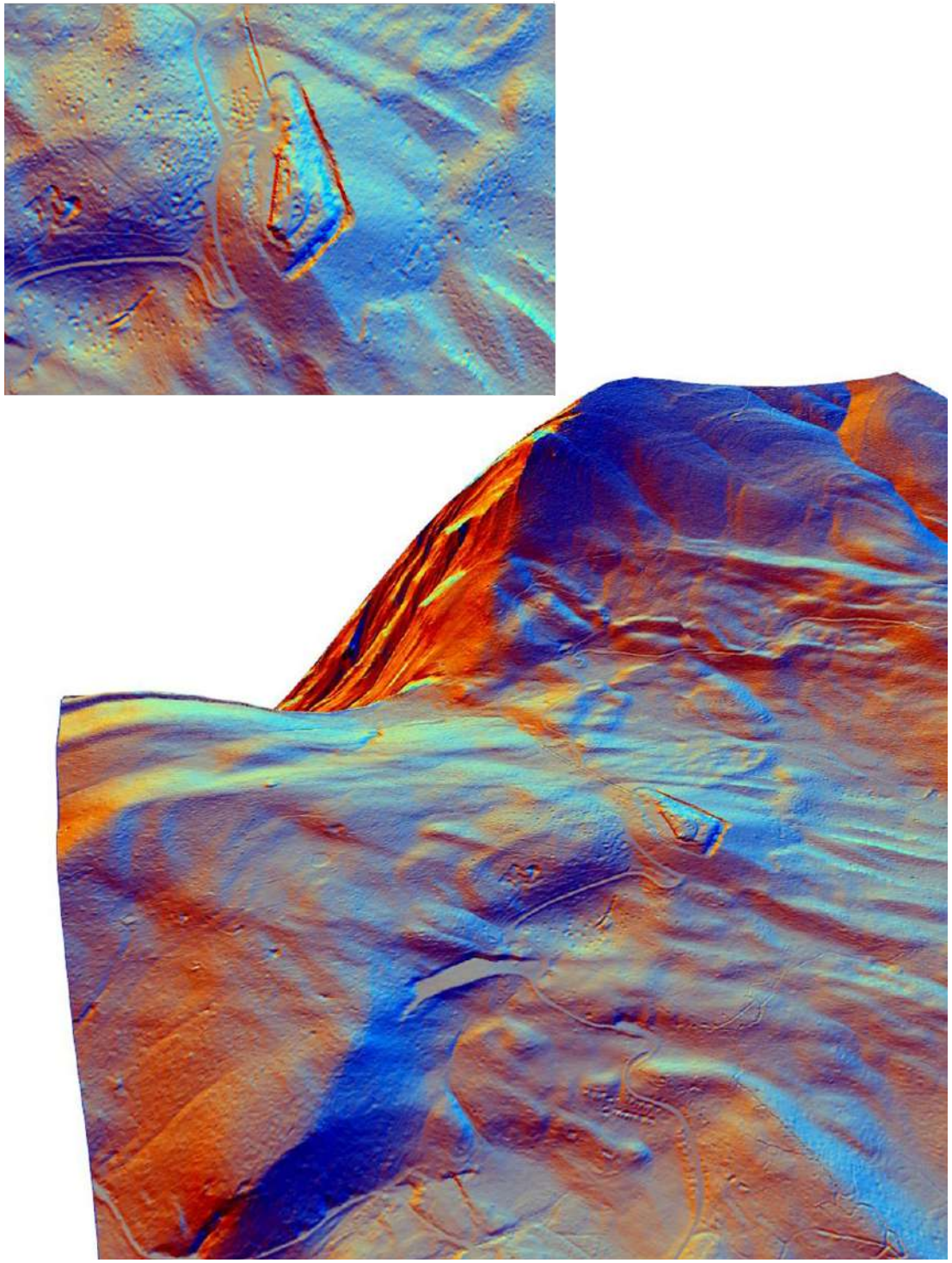


Fig.8.15

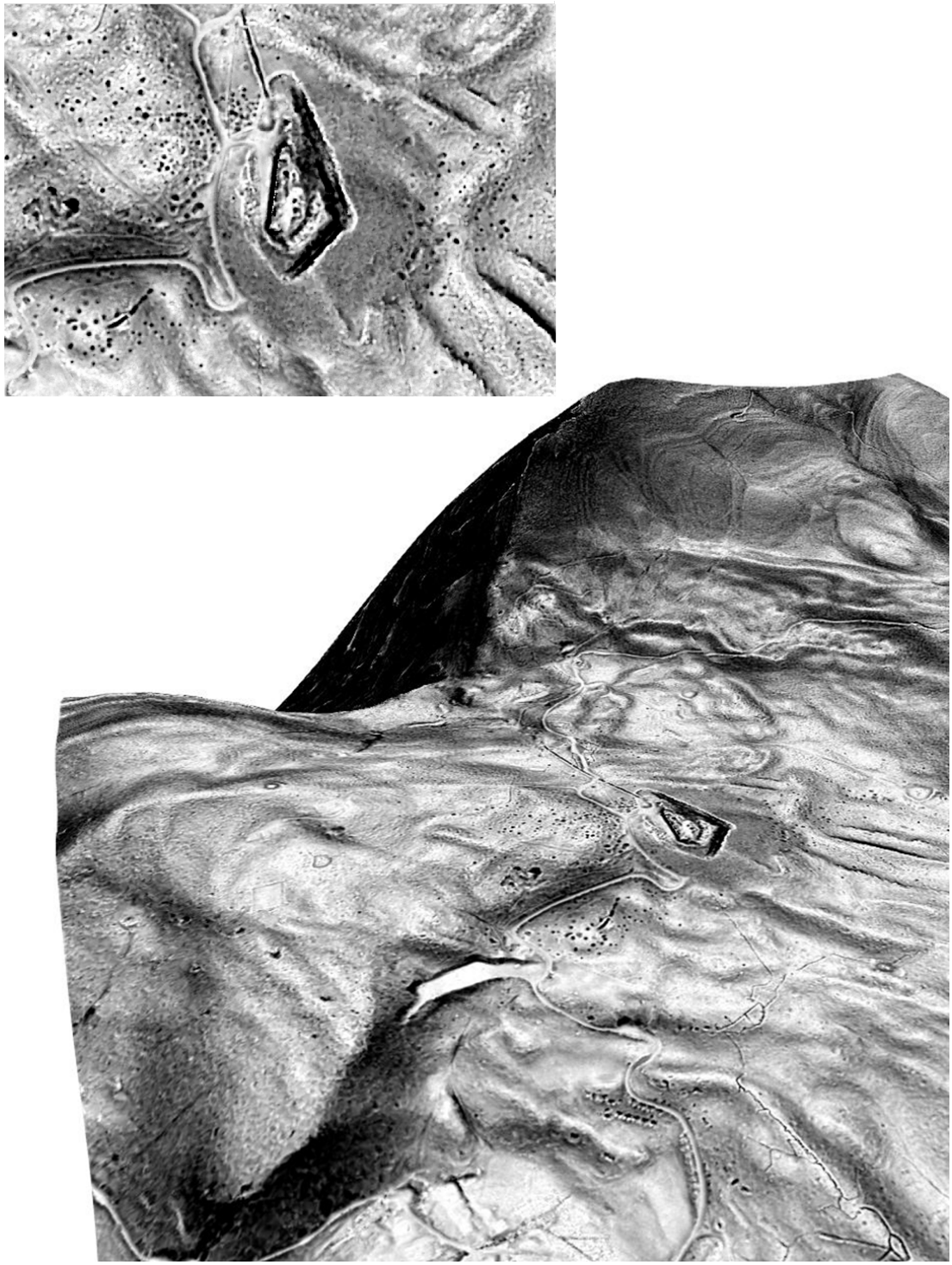


Fig.8.16

identified in the previous phase, and more than 1265 small and medium-sized circular depressions, referring to craters produced by the bombing.

Since the input datasets, as already mentioned in the previous paragraphs, present an excellent resolution, the elaborations obtained allowed us to subdivide the recognized "signs" into two different categories, according to their degree of visibility: Visibility Class 2, drawn in yellow in Fig. V and referring to a medium degree of recognisability, and Visibility Class 3, illustrated in brown and referring to signs that are more difficult to identify, were added to Visibility Class 1, already identified in the previous step.

In Tables 8.42-8.43, it can be seen how the application of this "stratigraphic telescope" has effectively led to a "process of unveiling" of an entire heritage that can be defined as partially latent, buried under the "blanket of time," which has smoothed its edges, altered its depths, canceled its clear visibility, but has not weakened the semantic capacity it contains.

The potentiality of integrated visualizations between Hillshade from multiple directions and SVF has therefore proved indispensable in recognition of these trenches and crater "footprints" present in the contemporary landscape at different degrees of legibility to be protected and handed down, even though they are less visible as they were probably produced by the bursting of medium and small-caliber artillery (destructive power and consequently limited crater depth) and subject to more consistent stratifications of post-depositional layers (Visibility Classes 2-3). By way of example, a simple comparison between the number of "craters" recognized exclusively through the observation of orthophotos (no. 77) compared to those identified through integrated DTM analysis (no. 1342) shows how these visualizations have allowed the recognition of approximately 1265 "wounds" that are weak but still present in the contemporary landscape, which would otherwise have remained unidentified (Table 3). This increase, therefore, allowed the recognition of about 25% of the total bombing inflicted on this warscape during the first months of the war, according to the documentary sources previously studied, which indicate that over 5000 bombs of various caliber fell around Forte Verle.

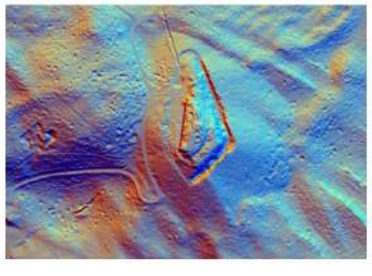
	Visibility Class 2	Visibility Class 3
Shell traces	329	936
Trenches	854 m	2995 m

Table 2

	Nr.	%
Total	> 5000	100
without DTM analysis	77	1,54
with Hillshade +SVF Analysis	1342	26,84

Table 3

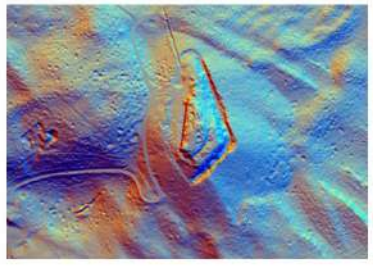
The Unveiling of a "Submerged Information Basin"

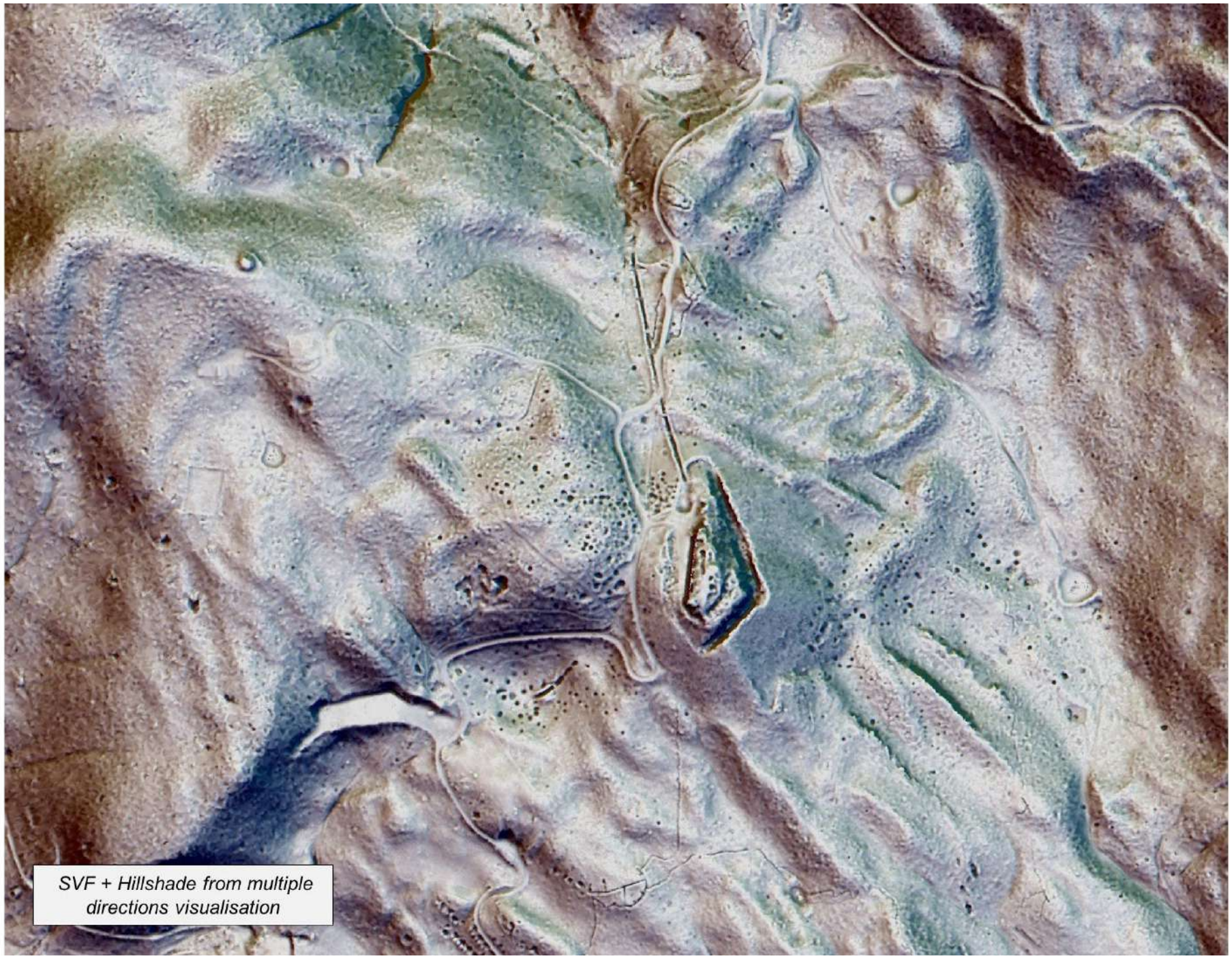


Tab. 8.39 | STRATIGRAPHIC TELESCOPE: Step 3. *__The revealing of the Great War’s permanences*

Tab. 8.40 | STRATIGRAPHIC TELESCOPE: Step 3. *__The revealing of the Great War's permanences*

The Unveiling of a "Submerged Information Basin"





SVF + Hillshade from multiple directions visualisation

Tab. 8.41 | STRATIGRAPHIC TELESCOPE: Step 3. *__The revealing of the Great War ‘s permanences*

Tab. 8.42 | STRATIGRAPHIC TELESCOPE: Step 3. __*The revealing of the Great War's permanences: Visibility Class 2-3*

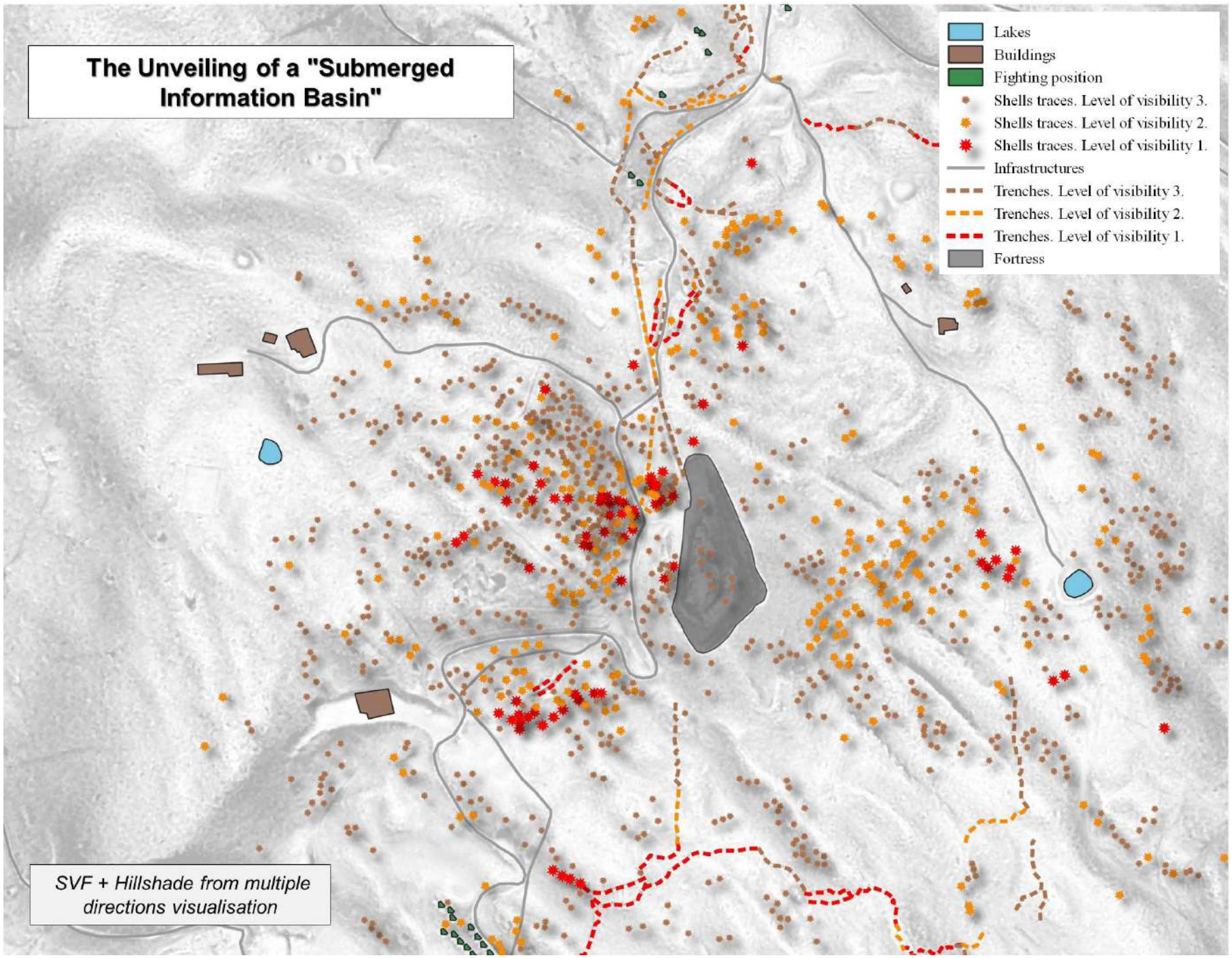
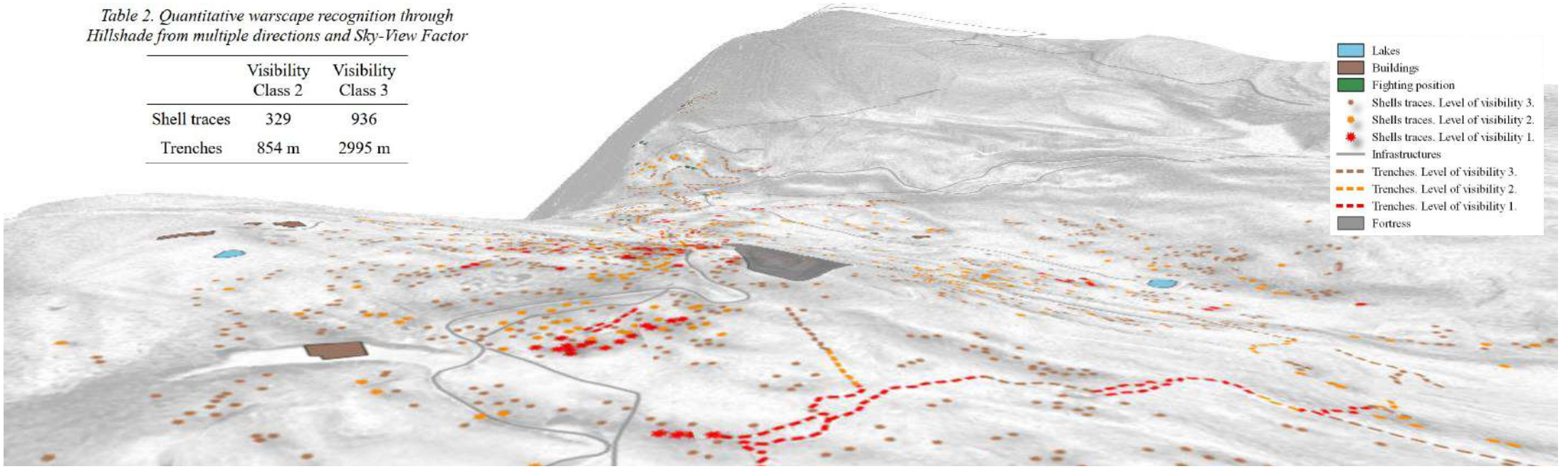
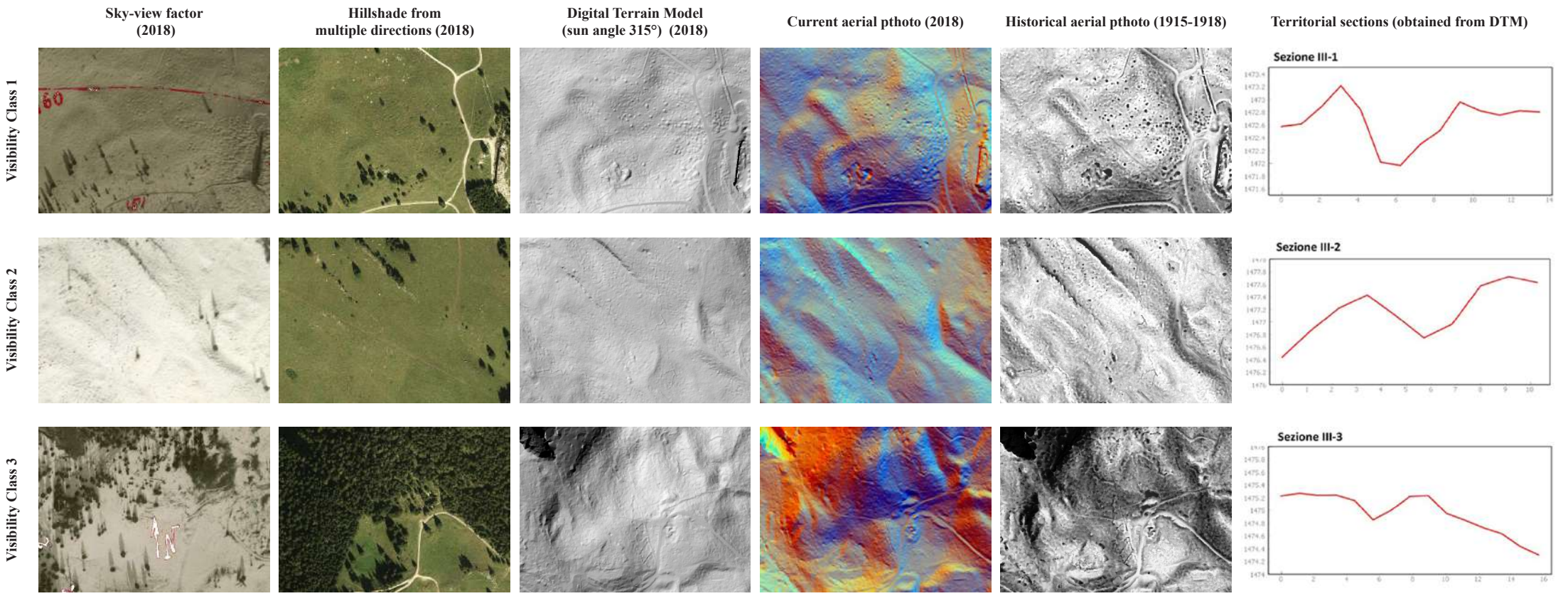


Table 2. Quantitative warscape recognition through Hillshade from multiple directions and Sky-View Factor

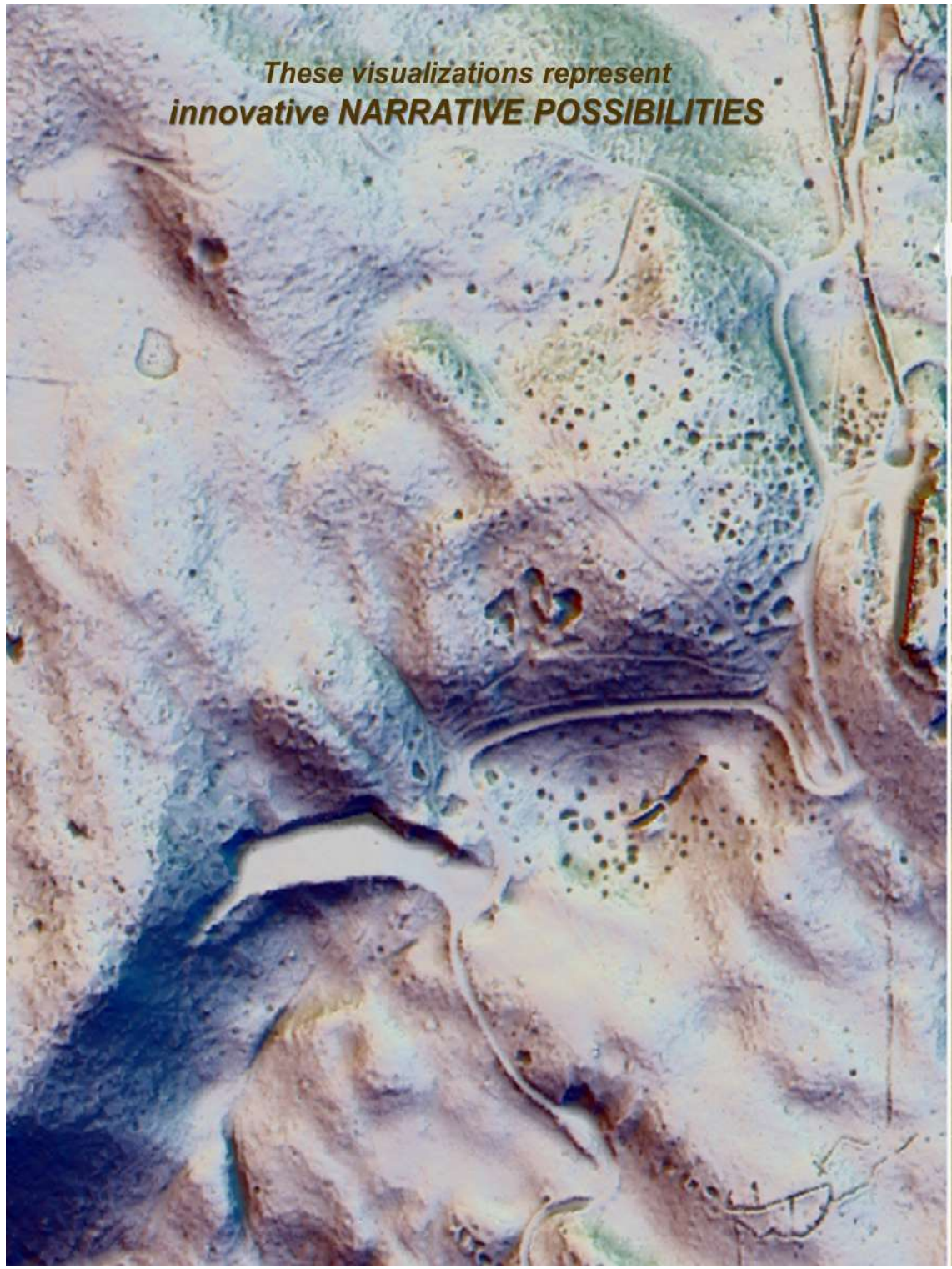
	Visibility Class 2	Visibility Class 3
Shell traces	329	936
Trenches	854 m	2995 m

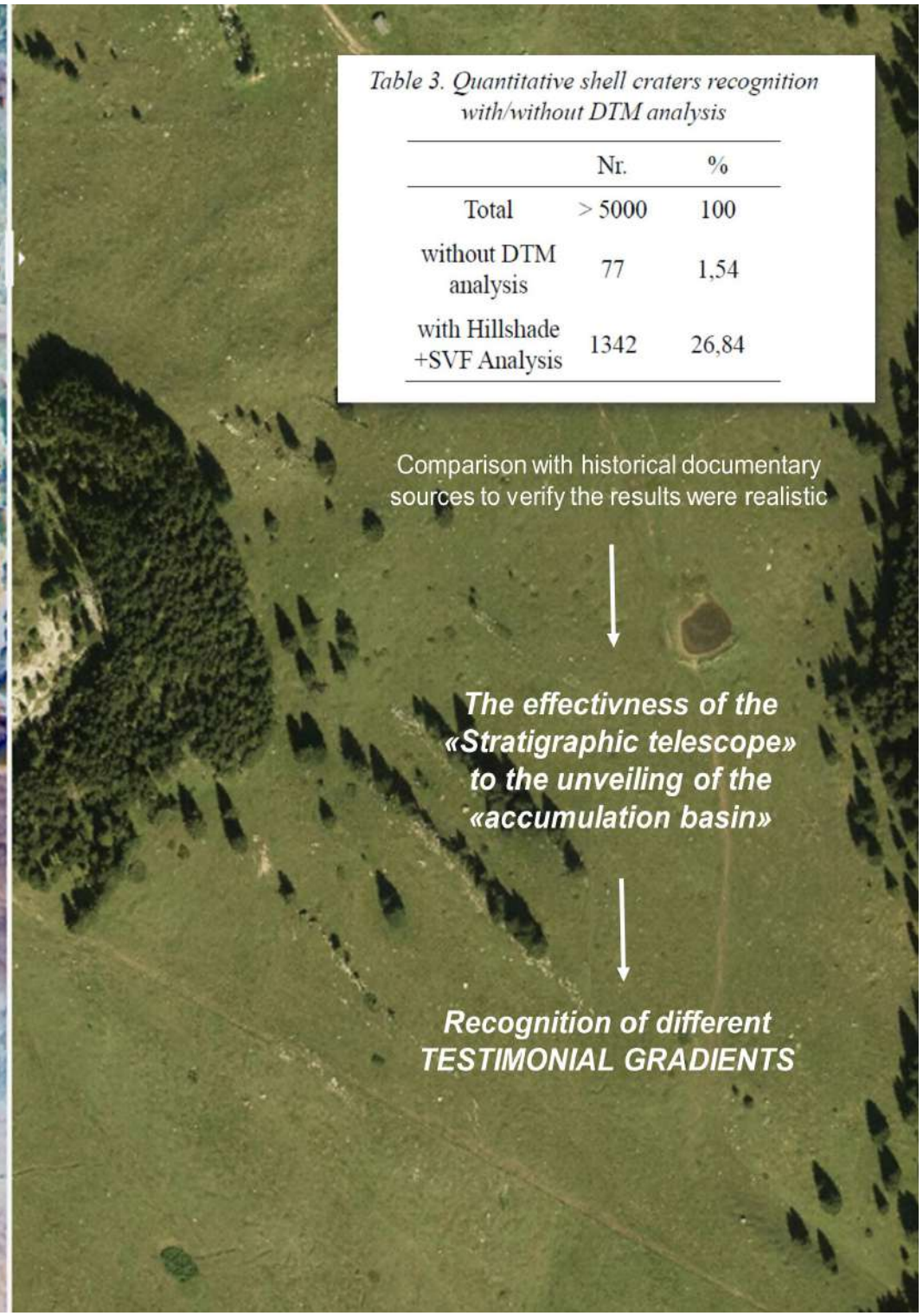




Tab. 8.43 | STRATIGRAPHIC TELESCOPE: Step 3. *__The revealing of the Great War's permanences: Visibility Class 2-3*

Tab. 8.43b | STRATIGRAPHIC TELESCOPE: Step 3. __*The revealing of the Great War's permanences*





8.2.5 Overall results

In the light of what has been described above, the critical, innovative contribution that the “stratigraphic telescope” method provides for recognizing the remains of the Great War is evident. Overcoming the disciplinary barriers, this approach allows to set up a highly specialized study of the different warscapes through the integrated analysis of the other data and input materials, managing to control the constant internal coherence of the continuous alternation of glances that from the territorial scale descend in depth up to the detailed micro-topographic scanning. The protagonist of this investigation becomes the soil, the “accumulation basin” in which the “signs of time and history” are physically deposited and reciprocally stratified, giving rise to variations, occultation, alterations, erasures, rewritings. Following a sort of progressive “focusing” of the “stratigraphic telescope,” the proposed methodology aims to provide the operational tools to “fathom” this threshold-space between the visible and the “submerged” to build a solid cognitive basis of the actual status of what remains of the different warscapes in contemporary landscapes. The “stratigraphic telescope” constitutes, in fact, a sort of device that provides some “privileged looks” through which to investigate, in a non-invasive way, the Digital Terrain Models to recognize their complex stratification and, as a consequence, to facilitate the unveiling of the rich, informative potential hidden in the “signed matter.” As shown by the results presented, this is the construction of an articulated and in-depth knowledge base that is indispensable for linking “knowing” to “knowing how to do,” implementing the ability to critically analyze a palimpsest of traces by working on discontinuities, on “wounds,” on the rewriting of walls, soils, vegetation, in order not only to understand these traces as the result of the evolution of a conformative imprinting left a hundred years ago but also to be able to set, on this “knowing how to see,” a responsible action in terms of permanence or modification of the “testimonial gradient.” As already stated, the ability to recognize the tangible permanence of the war does not imply the need to restore or recover the whole of this heritage, which would not be possible nor coherent with the horizon of meaning in which this research has been set up, but constitutes the necessary and unavoidable condition that allows us to connect “knowing how to see” to “knowing how to do,” responsibly opening our eyes to the different “possibilities of care.”

8.3 Validation phase: application of Step 3 to the Trentino fortified system

The experimentation of the "stratigraphic telescope" method on the fortified system between Fort Campo Luserna, Fort Busa Verle, and Fort Cima Vezzena in the province of Trento (Italy) has provided an essential contribution to the unraveling of areas with different witnessing gradients in which many tangible pieces of evidence of war remain at varying levels of visibility.

In particular, the most innovative contribution of the proposed methodology concerns the implementation of specific interpretations of LIDAR data obtained through Hillshading from multiple directions and Sky View Factor Visualizations, whose effectiveness has been amply demonstrated in the decisive percentage increase of elements recognized in Visibility Classes 2 -3.

To prove the actual validity of these thematic investigations, it was decided to test the proposed method in a broader range of case studies to obtain a more significant number of comparisons between the number of elements recognized using only the DTM observation and those obtained using the specific visualizations developed with the Relief Visualization Toolbox, through which the effectiveness of the method could be validated.

8.3.1 General overview and description of results

Even though the "Stratigraphic Spyglass" represents a proper analytical method for investigating any "Warscape Class," it was decided to decline the Validation Phase by applying these visualizations to the entire system of permanent fortifications and their surroundings, built in the Saliente Trentino-Tirolese. The choice was motivated by two main reasons: the immediate availability of the input materials (LIDAR datasets freely downloadable from the Portal of the Autonomous Province of Trento, according to the same modalities used for the case of Fort Busa Verle), and the opportunity to provide a substantial analytical-operational contribution at a local level, useful in future policies of large-scale territorial planning and management.

Leaving the unveiling of the heritage of "signs engraved" in the morphology of the land to the narrative capacity of the graphic elaborations obtained, the validation phase was developed in two successive steps. In a first phase, the spatial datasets of the surroundings of each permanent structure were first processed in a GIS environment and through the Relief Visualization Toolbox to obtain the independent visualizations of the clean terrain orography with simple shading, of the Hillshading from multiple directions visualization and of the Sky-View Factor view. Subsequently, these elaborations were combined using different

transparency overlay modes to systemize the specific spatial features expressed by the individual ideas into a single overall synthesis view, capable of revealing the “hidden world” of physical traces guarded by the “signed matter.”

Sheets 8.44-8.70 show the interesting comparisons between the current orthophotos and these elaborations, which eloquently highlight the potential of this method to give voice to that heritage that is latent today, waiting to be revealed. If in the majority of the cases analyzed, direct comparison already at a territorial scale was sufficient to demonstrate significant informative potential, in the areas where the

scale of observation did not allow for a specific vision of the work and its surroundings, it was decided to add a different view at a closer scale, to make the reading of the signs impressed on the ground more evident (see Tables 8.71-8.90).

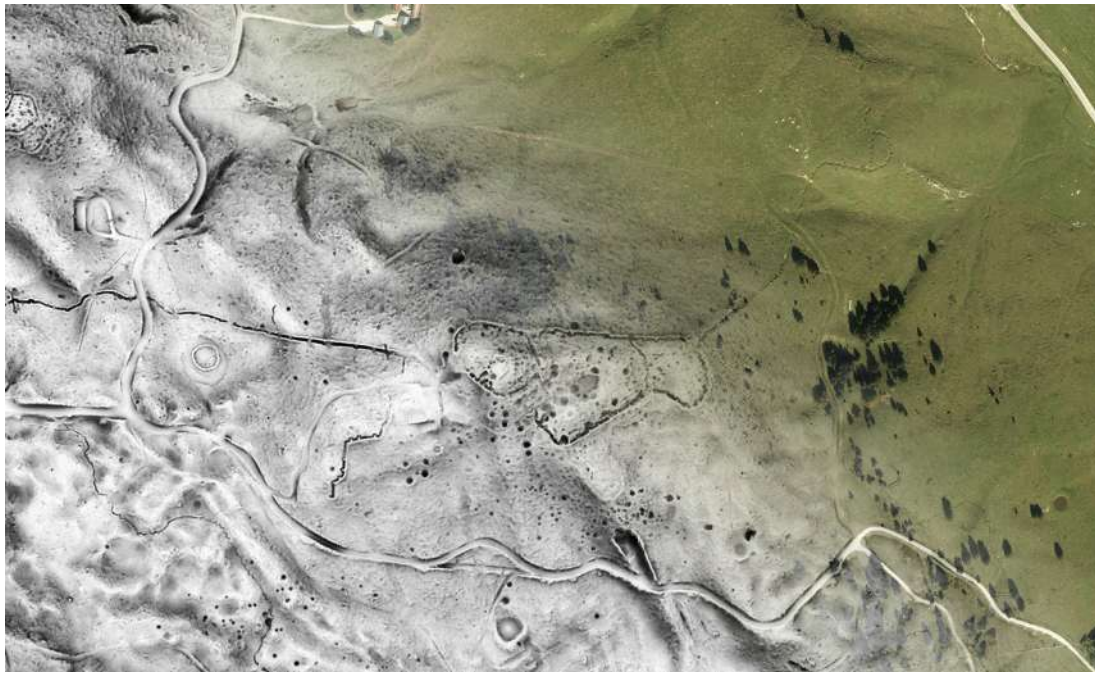
In a second moment, identifying among the different elaborations obtained some potentially significant sample areas,[560] on these, the analyses were deepened through the critical interpretation of the recognized "signs," producing specific mapping of the entrenched systems and the "traces of destruction." As in Fort Busa Verle, the integrated management of these data in the QuantumGis environment made it possible to combine qualitative observations with quantitative data on the various numbers about the visibility class of the remains. In addition, each 'visibility class' was also associated with a territorial section of the permanence under analysis to verify the absolute morphological conformation of the current terrain, as shown in Tables 8.91-8.101. This information can be beneficial for understanding the thickness of the fill that has stratified overtime above the original track created one hundred years ago, if compared with the data obtained from the knowledge of construction types and techniques, as far as entrenched systems are concerned, but also from the calculation of the size and depth of the craters created by the explosion of the bombs about the size of the howitzers and projectiles themselves.

Ultimately, the table in Fig.8.17 and the accompanying graphs show the overall data on the number of craters and the metric quantity of entrenched trenches detected concerning the three different degrees of visibility: the last column shows the percentage contribution, on the total, of the information obtained through the specific visualizations of the Sky-View Factor and the Multi Hllshading Visualization and testifies, once again, to the efficacy of the proposed methodology, proving to all effects its validity.

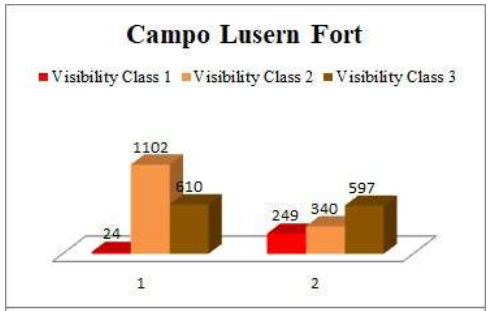
As can be seen from the proposed visualizations, the LIDAR data is a rich source of data that does not concern exclusively the heritage of works linked to the Great War but is evidence of the various uses of the land and the natural and anthropic transformations that have taken place on it over time. For this reason, the proposed method can also bring exciting contributions for further research and in-depth studies in other disciplinary fields.

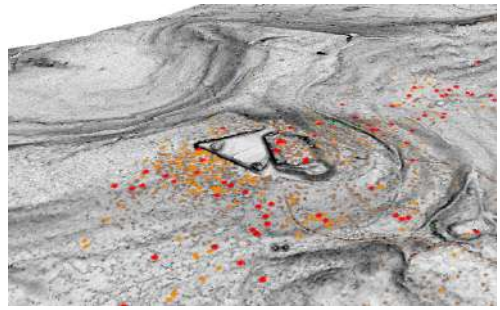
560 For the identification of "significant" areas, one of the requirements considered decisive was the direct involvement in offensive/defensive actions during the wartime, and therefore the potential presence of weak "signs" related to the destruction of the war impressed on the micro-topography of the terrain at "risk of loss."

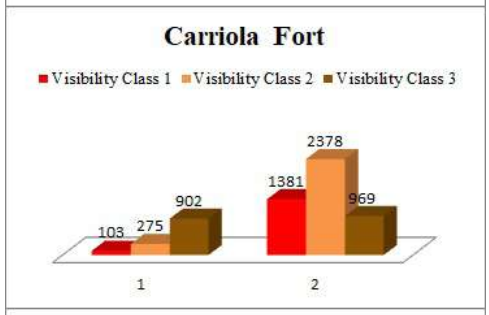
		Visibility Class 1	Visibility Class 2	Visibility Class 3	Total	% of total given by SVF+Multi Hillshading visualization
Campo Lusern Fort	[1] Shell traces [nr]	24	1102	610	1736	**98,62%**
	[2] Trenches [m]	249	340	597	1186	**79,01%**
Carriola Fort	[1] Shell traces [nr]	103	275	902	1280	**91,95%**
	[2] Trenches [m]	1381	2378	969	4728	**70,79%**
Serrada Fort	[1] Shell traces [nr]	121	399	857	1377	**91,21%**
	[2] Trenches [m]	193	1856	634	2683	**92,81%**
Mero e Zaccarana Forts	[1] Shell traces [nr]	7	27	449	483	**98,55%**
	[2] Trenches [m]	0	539	1465	2004	**100,00%**
Pozzacchio Fort	[1] Shell traces [nr]	13	15	68	96	**86,46%**
	[2] Trenches [m]	1706	772	505	2983	**42,81%**

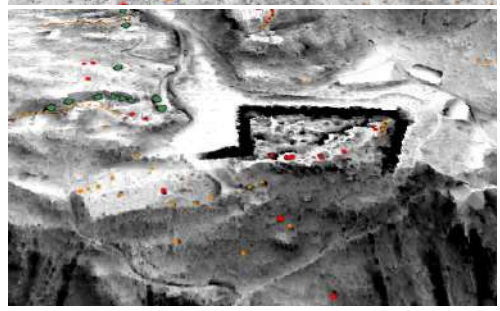


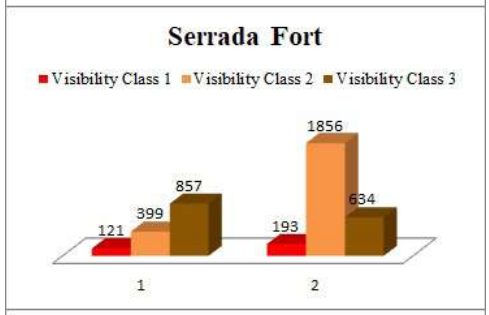
FINAL TABLE - VALIDATION PHASE

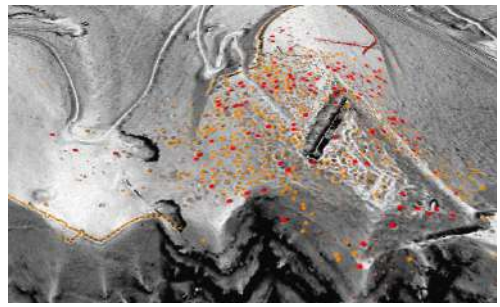


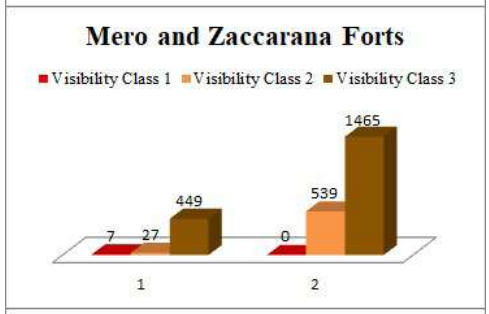


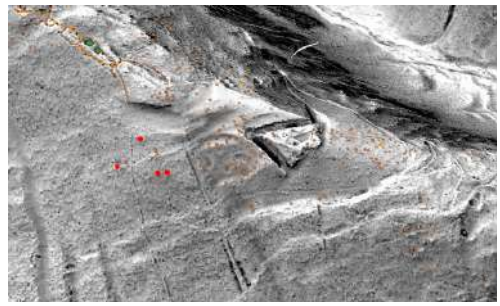


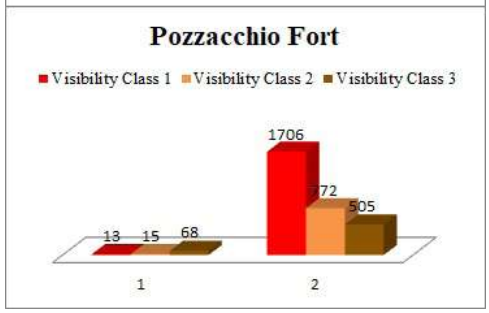


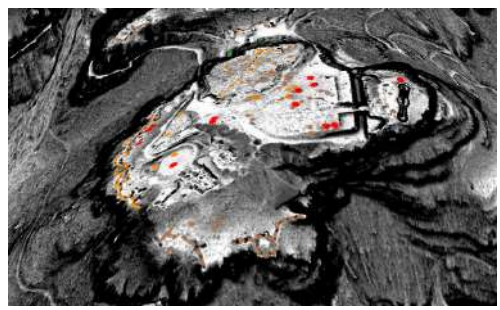


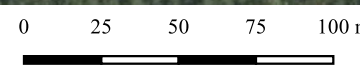


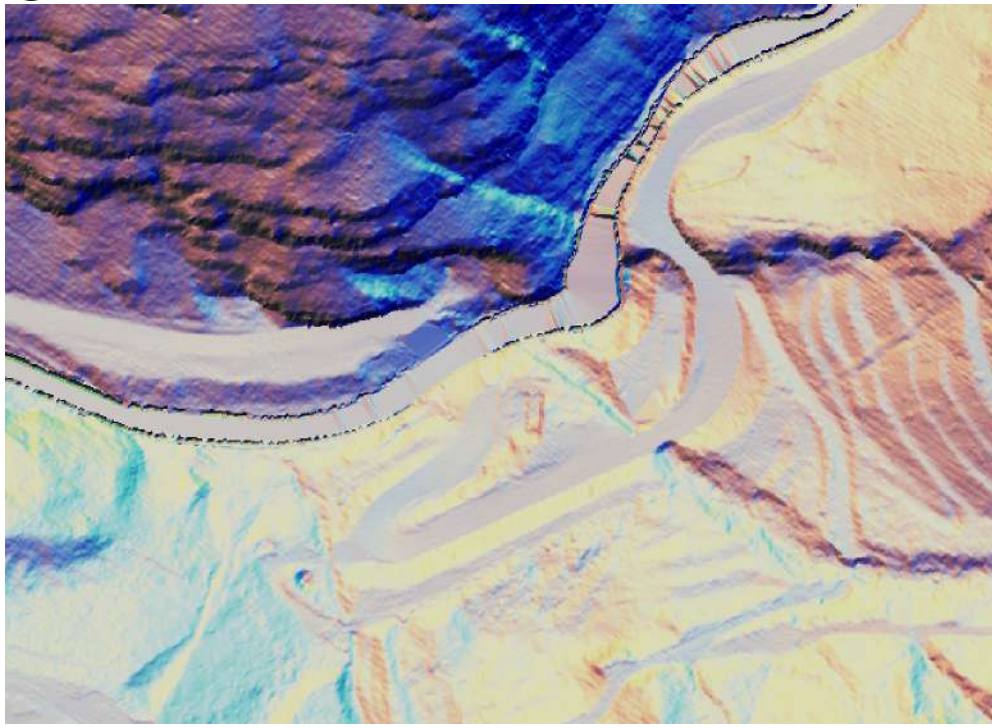












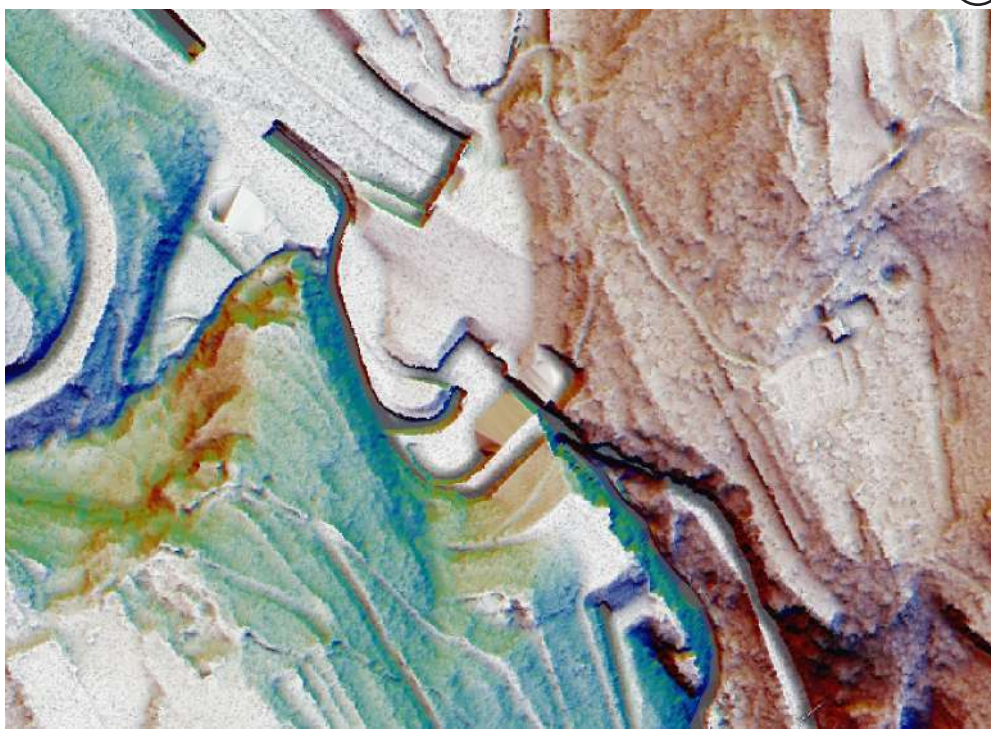
1ª GENERAZIONE

Forte Ampola, 1861

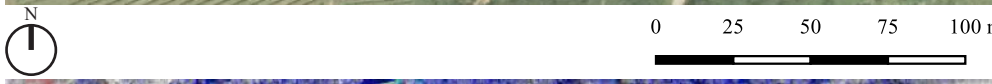
1^GENERAZIONE

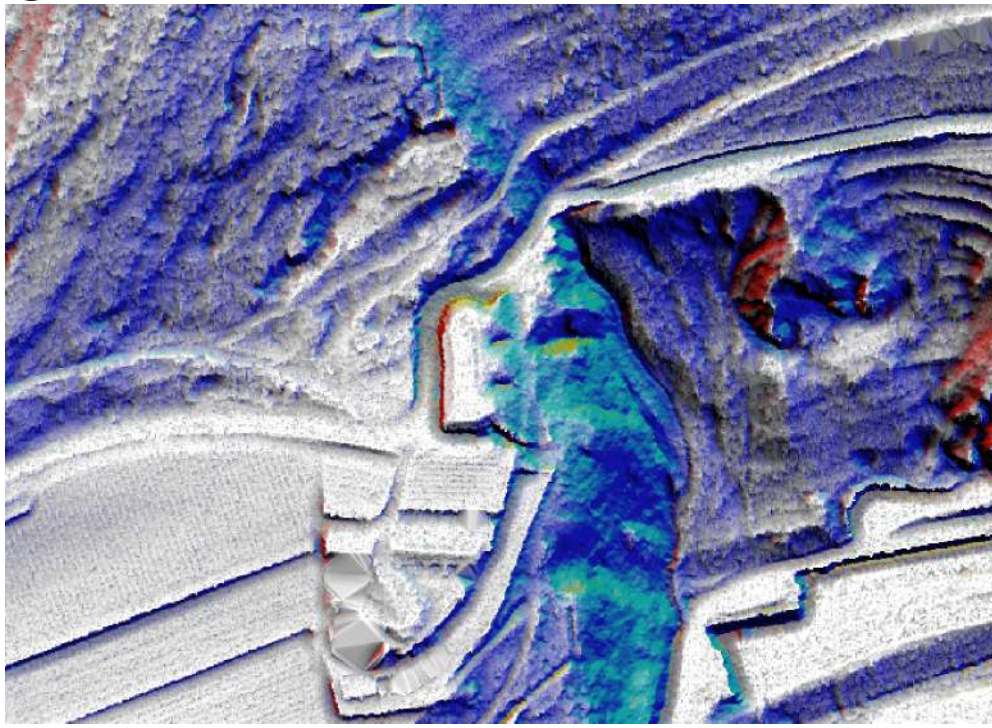
0 25 50 75 100 m

N



Forte Cadine, 1860-1861





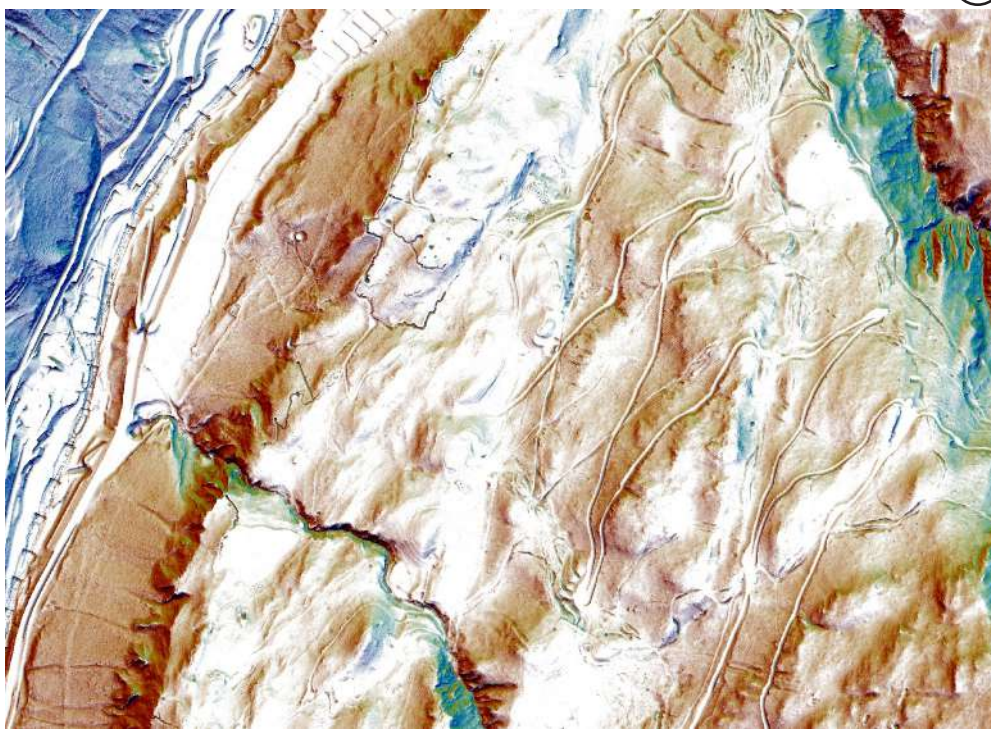
1^A GENERAZIONE

Tagliata superiore e inferiore Civezzano, 1869-1872

1^A GENERAZIONE

0 100 200 300 400 m

N

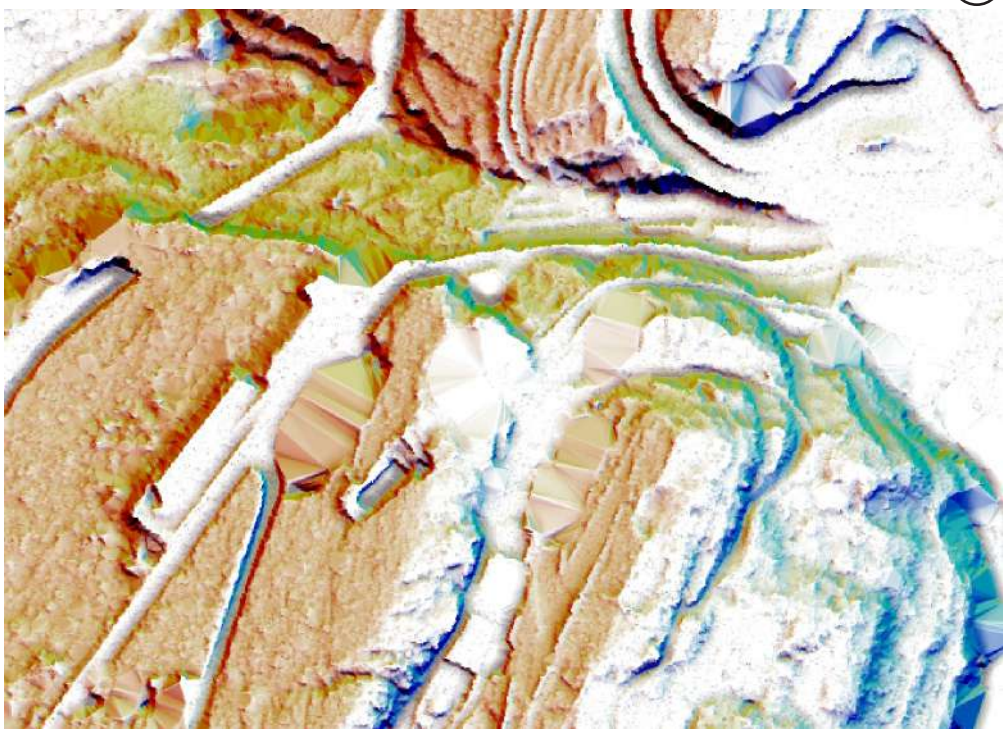


Forti Danzolino e Revegler, 1860-1862

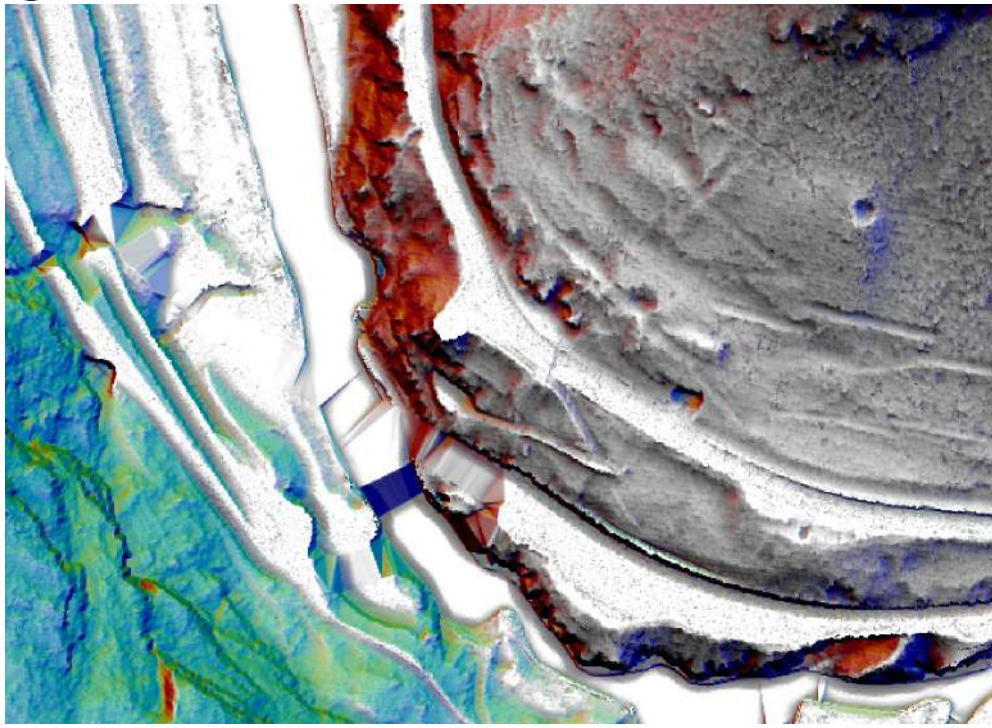
1ᴬ GENERAZIONE

Forte Larino, 1860-1862

1ª GENERAZIONE



Forte Nago, 1860-1861



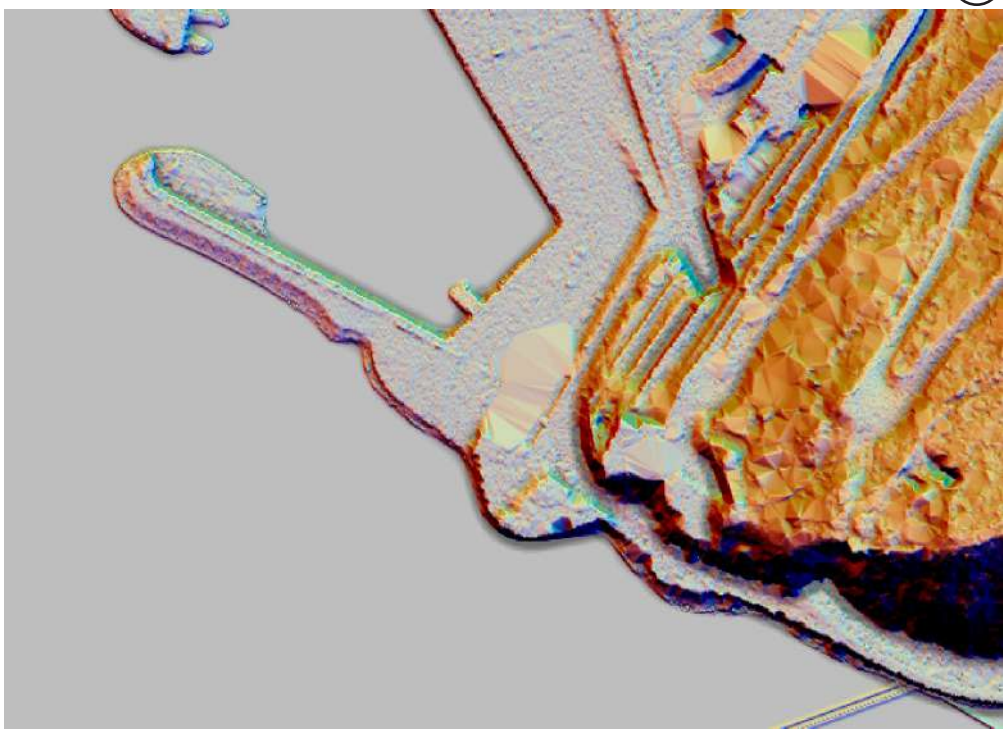
1ᴬ GENERAZIONE

Forte Rocchetta, 1860-1861

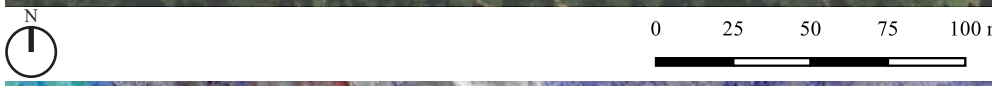
1^A GENERAZIONE

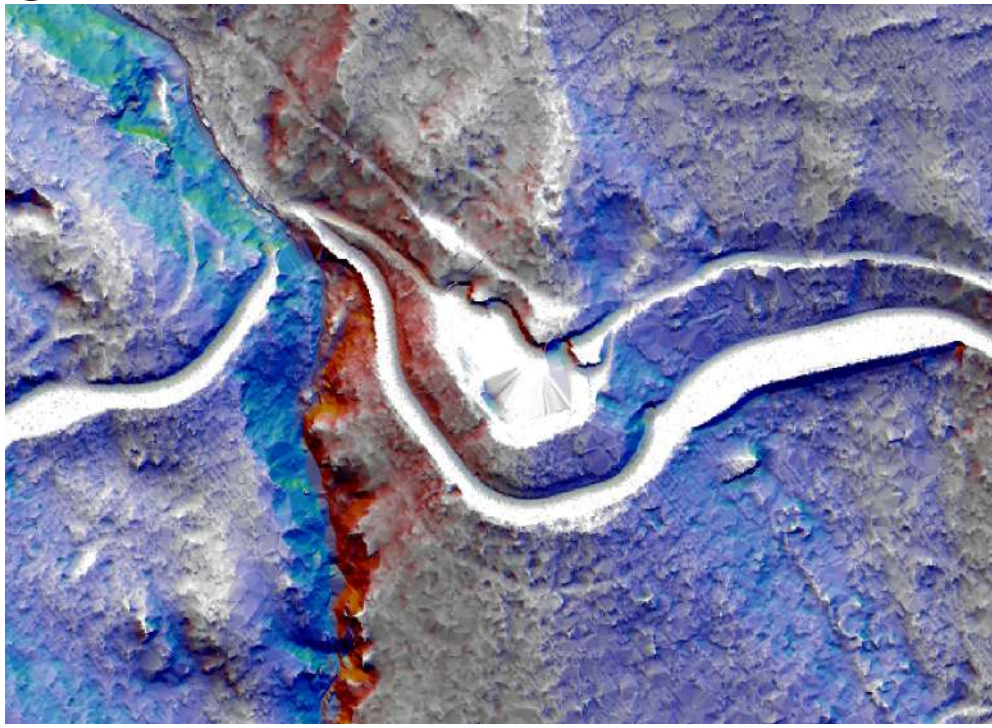
0 25 50 75 100 m

N



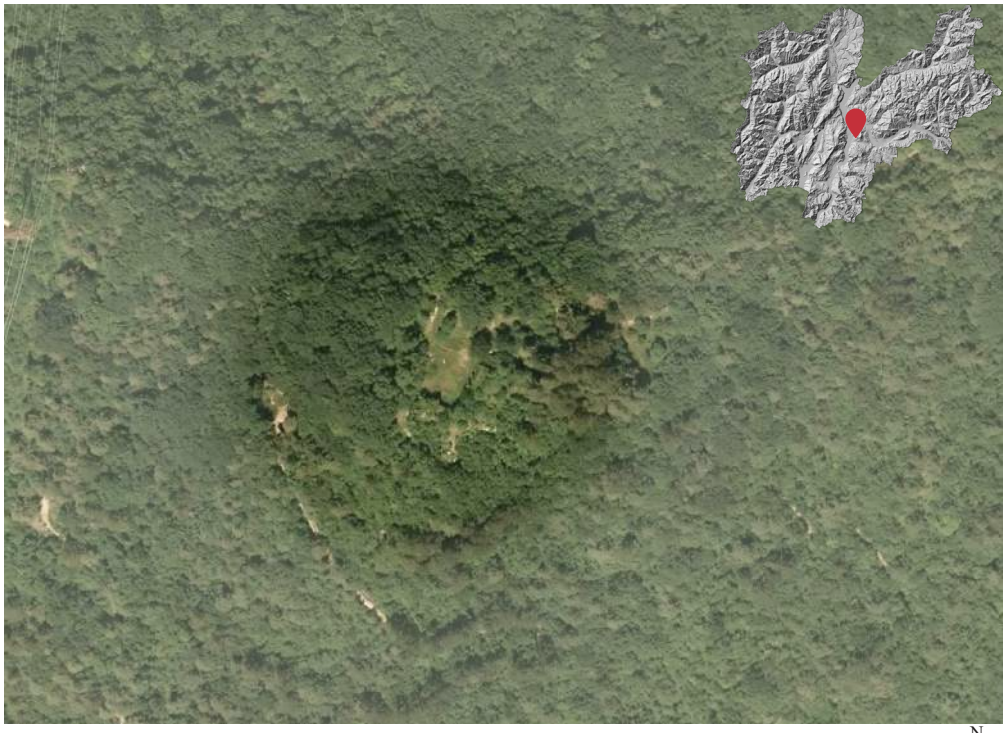
Forte San Nicolò, 1860-1861





1ª GENERAZIONE

Forte Strino, 1860-1861



0 25 50 75 100 m

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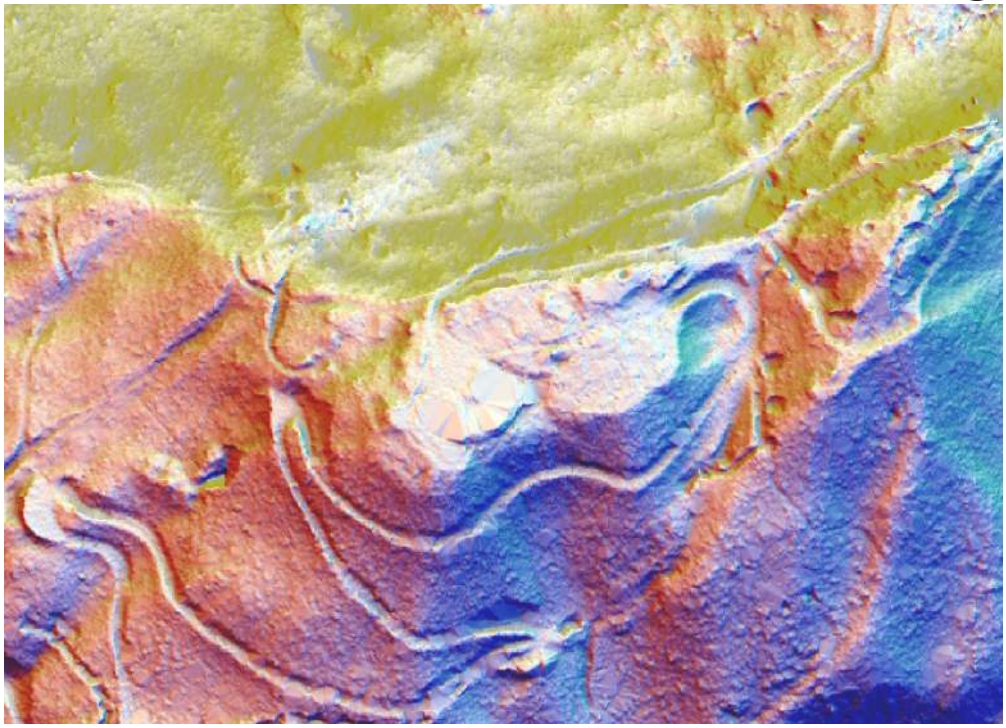
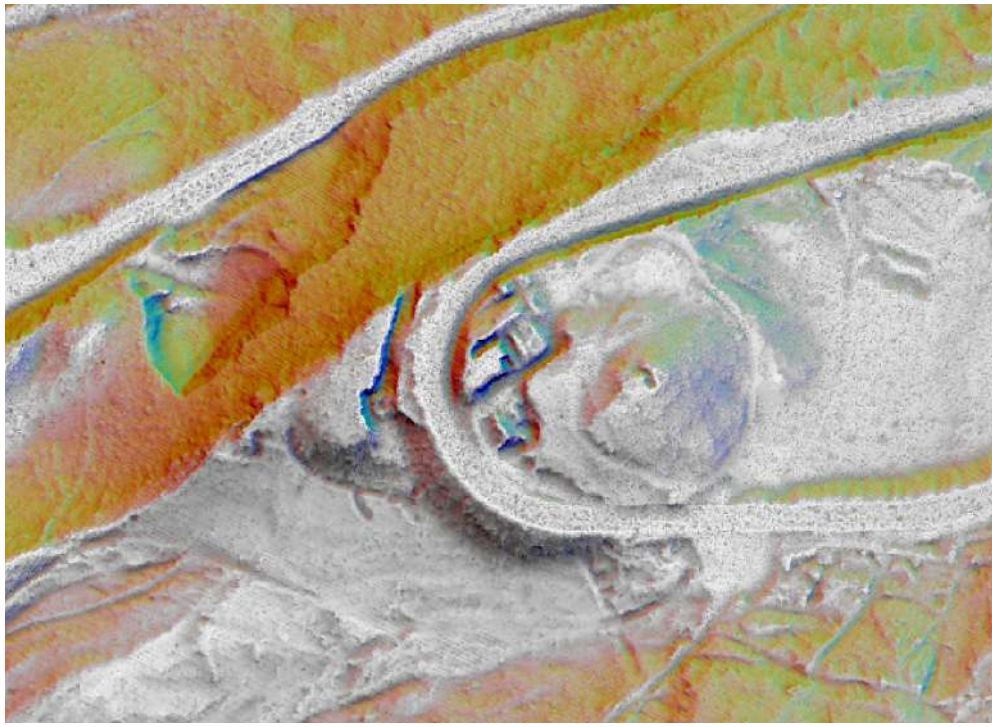


2ª GENERAZIONE

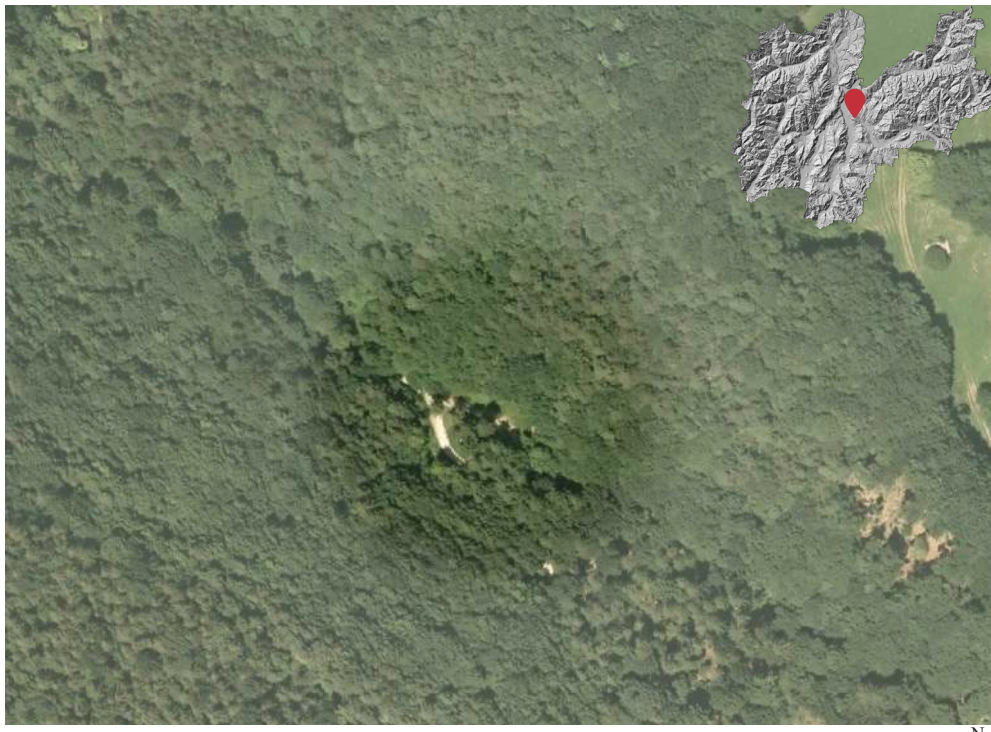
Batteria Brusa Ferro, 1879-1880



2ª GENERAZIONE

Batteria Candriai, 1879-1880

2ª GENERAZIONE



0 25 50 75 100 m

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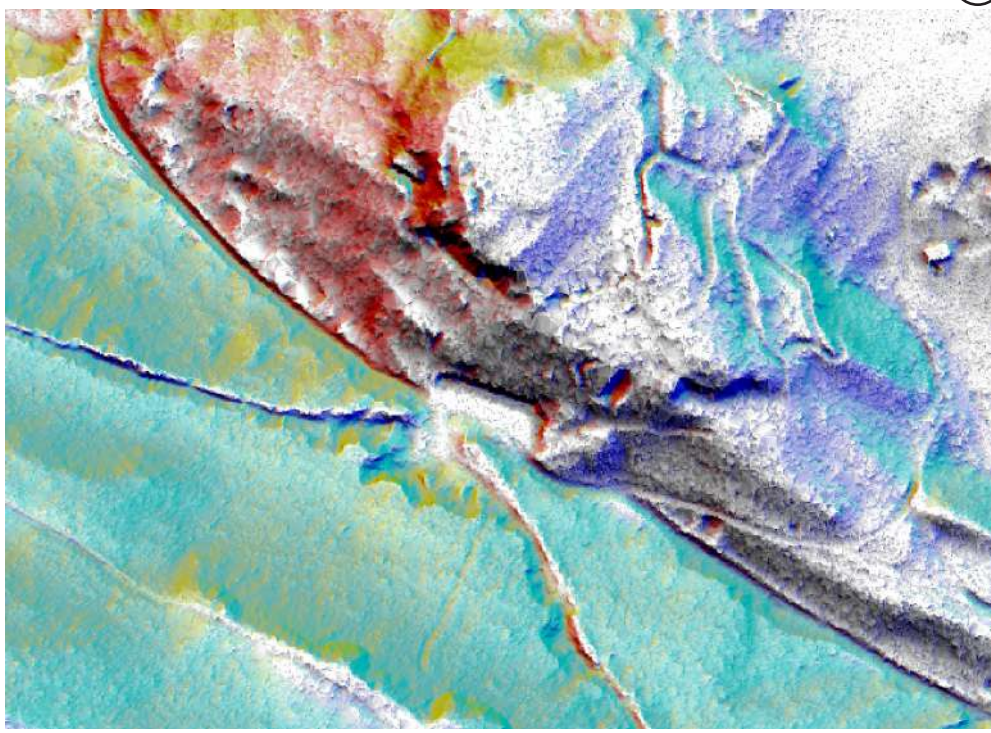
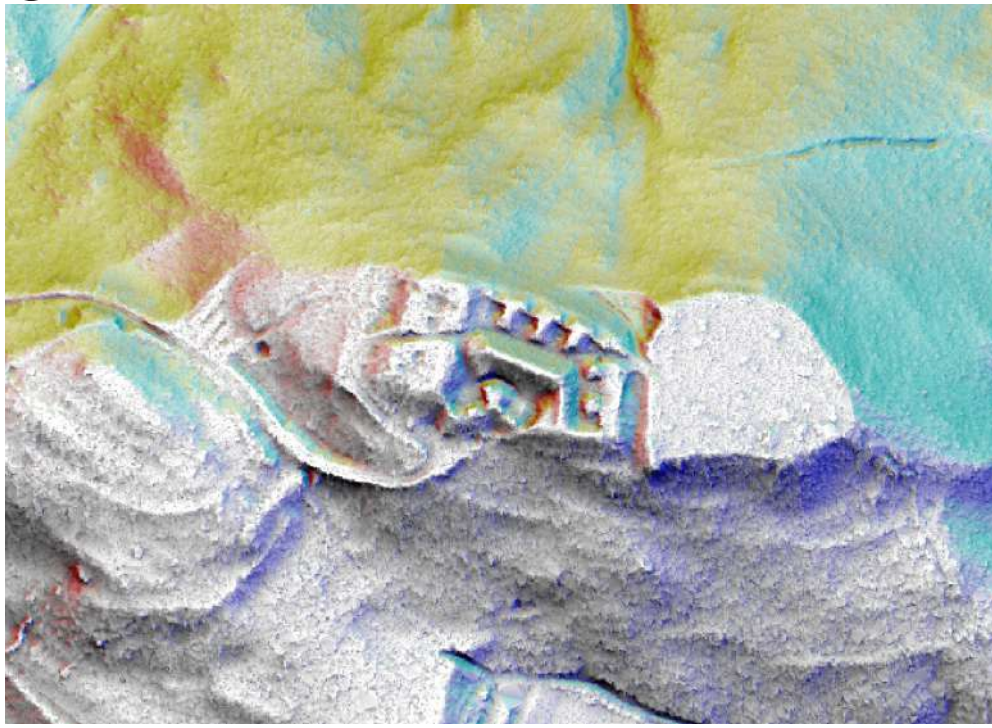


Forte Casara, 1882-1884



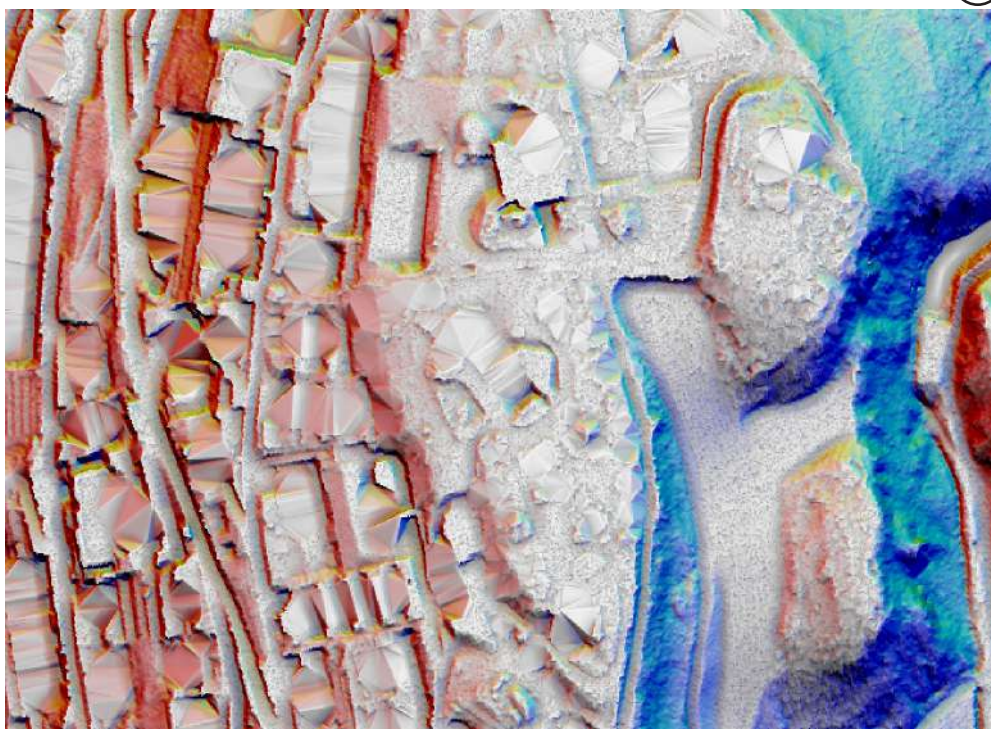
2ª GENERAZIONE

Batteria Cimirlo, 1881-1882

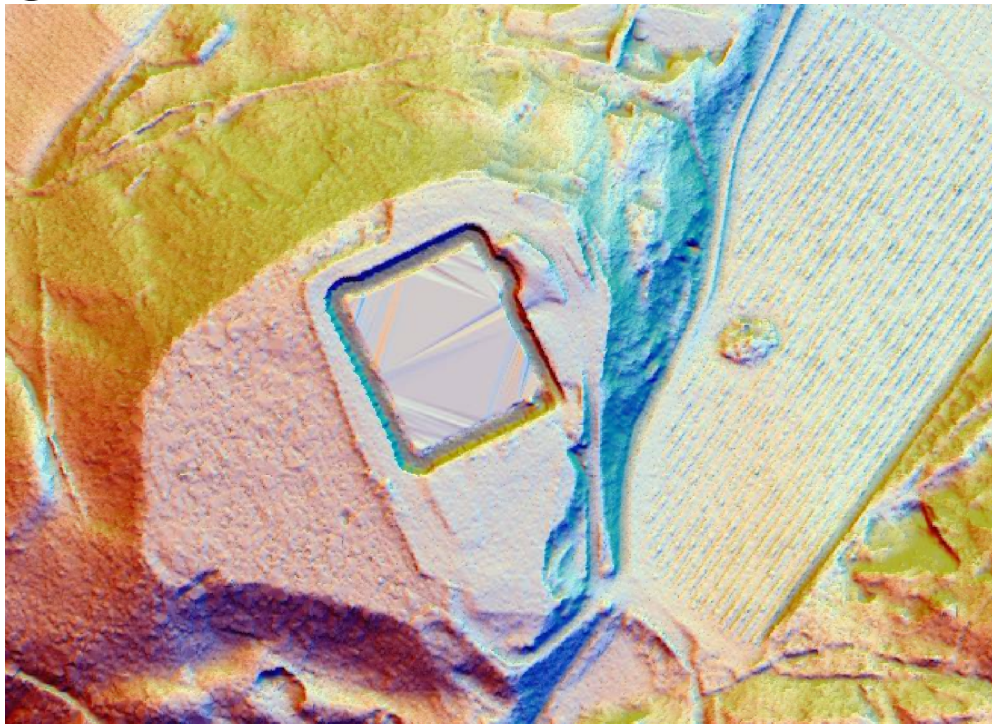
2ª GENERAZIONE

0 25 50 75 100 m

N



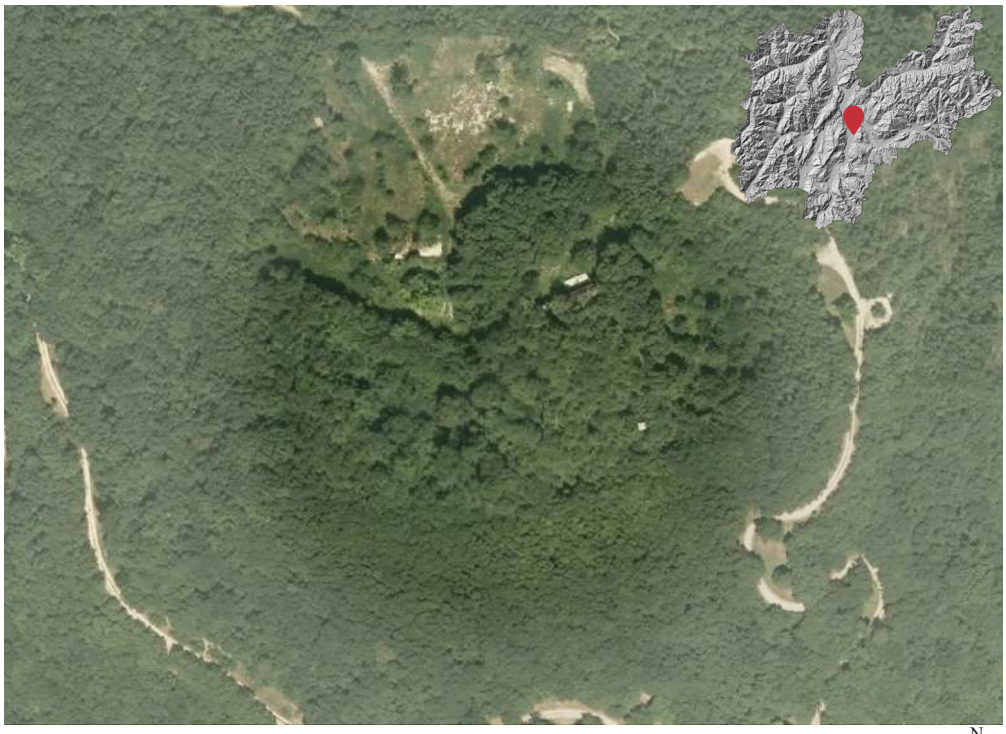
Forte Martignano, 1882-1883



2ª GENERAZIONE

Batteria Superiore Mattarello, 1879-1880

2^A GENERAZIONE



0 25 50 75 100 m

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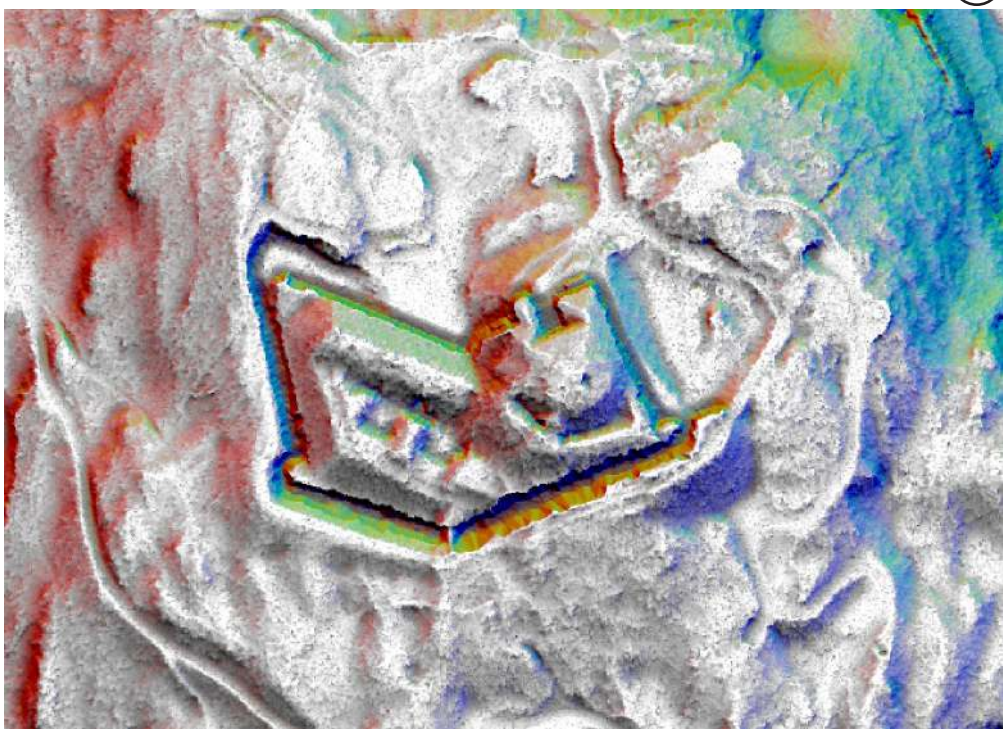
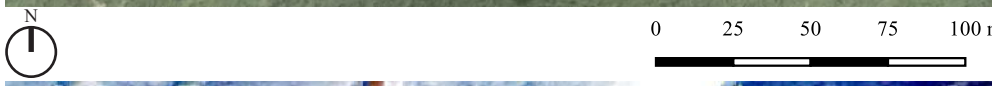
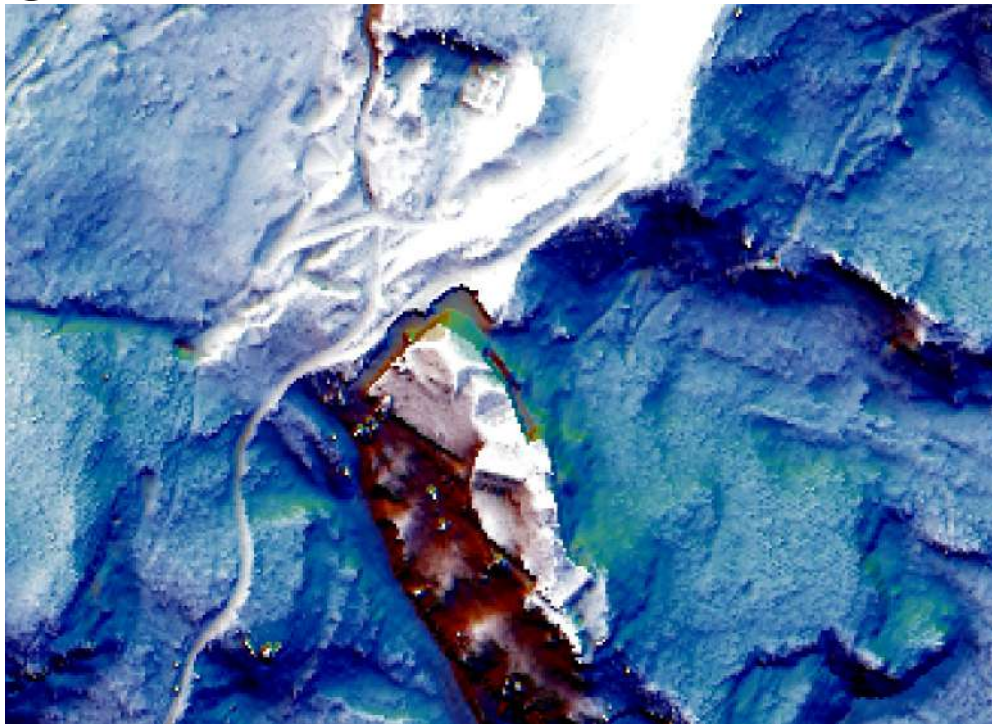


Forte San Rocco, 1881-1883





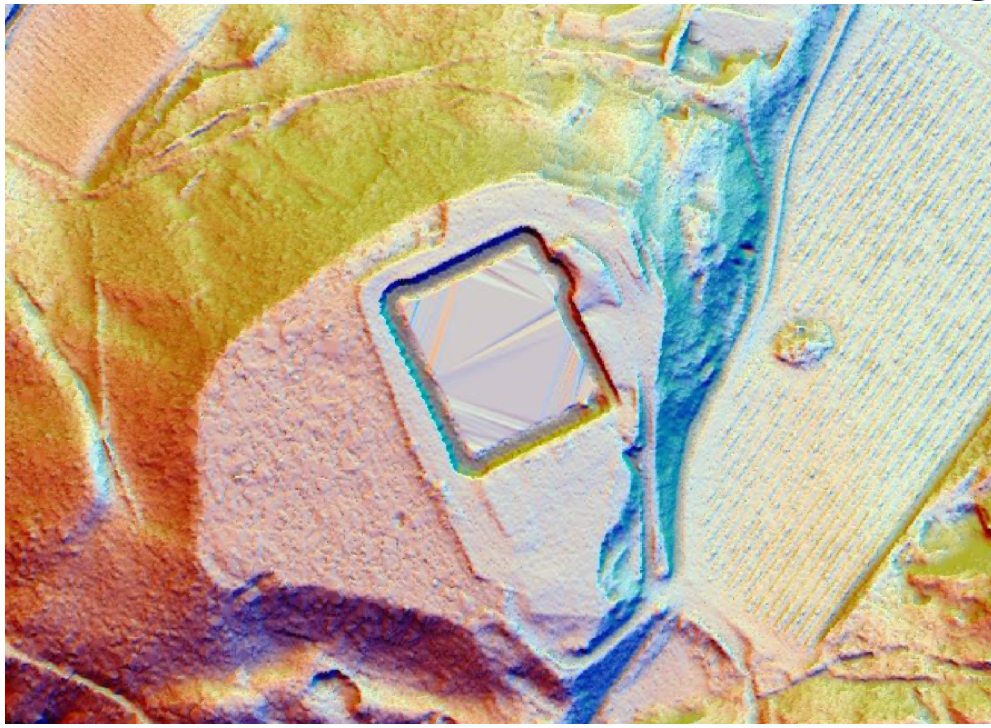
3A GENERAZIONE

Forte Corno, 1883-1890

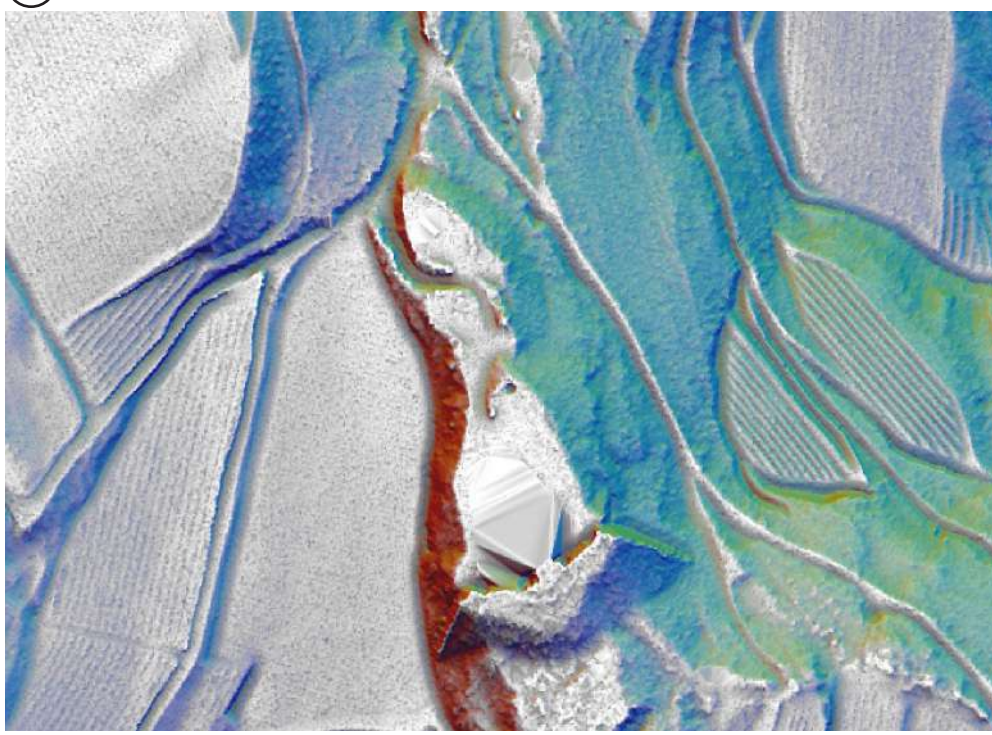
3^A GENERAZIONE

0 25 50 75 100 m

N



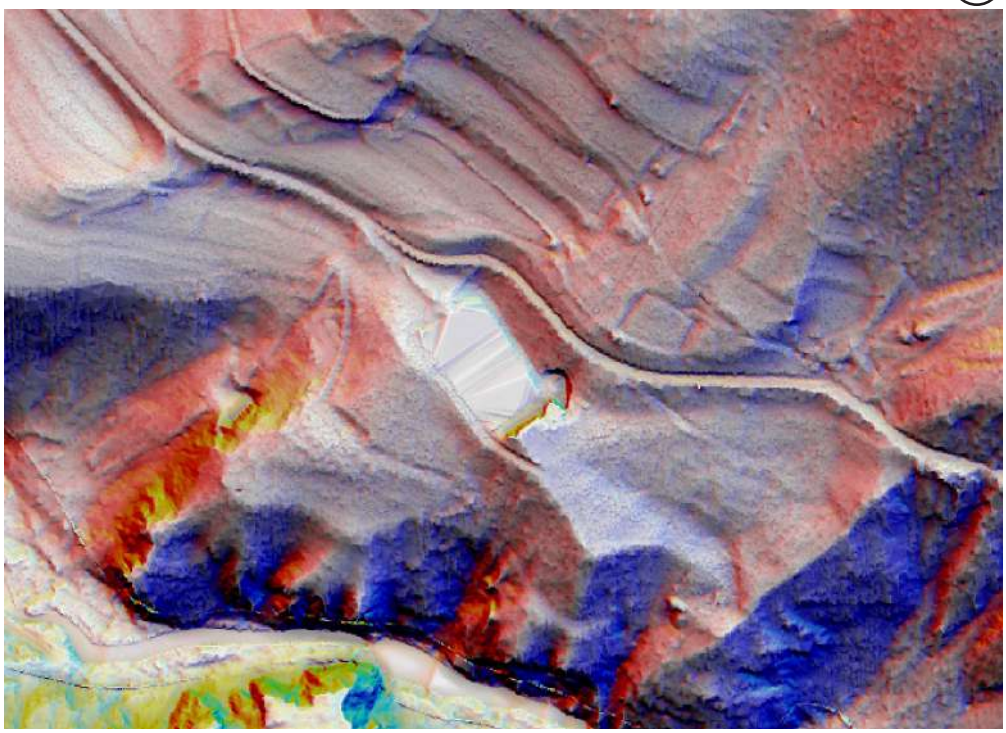
Forte Mattarello, 1897-1900



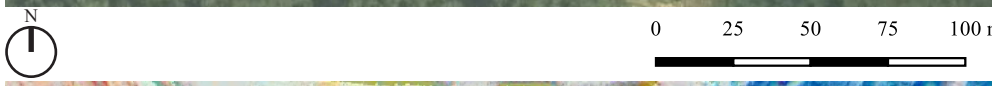
3A GENERAZIONE

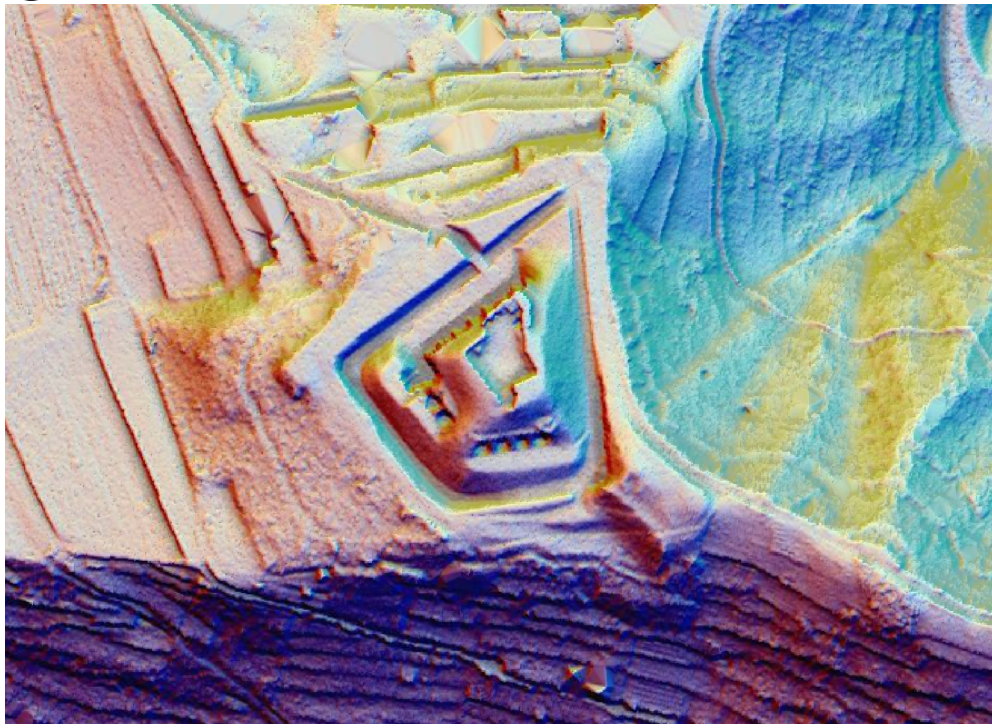
Forte Romagnano, 1879-1880

3^ GENERAZIONE



Forte Someda, 1897-1900





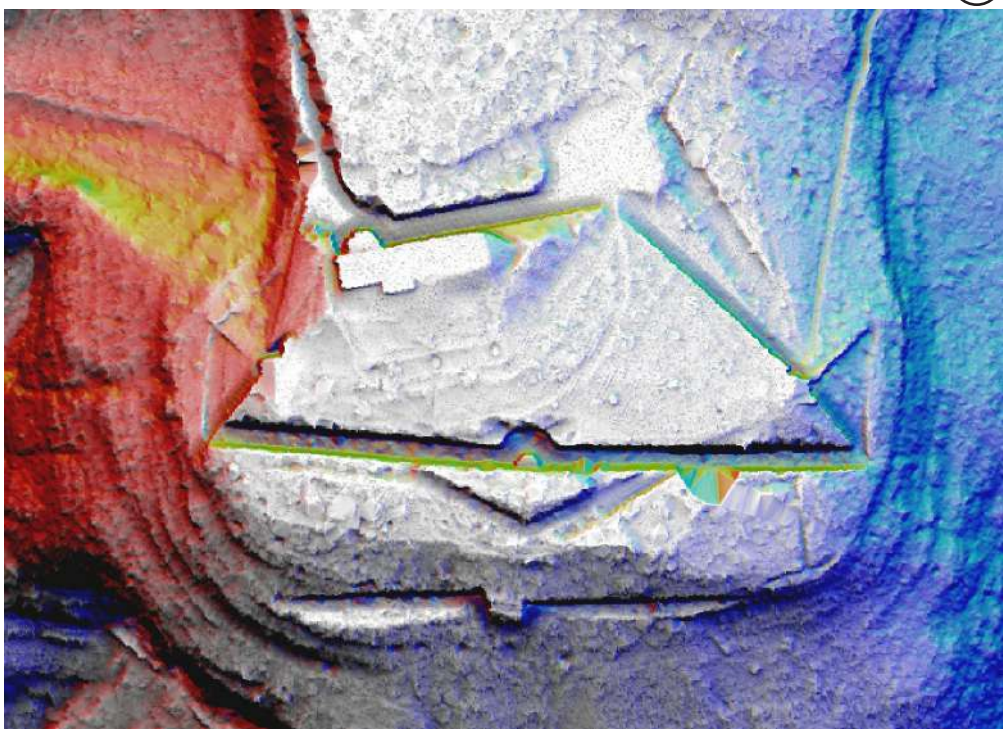
3A GENERAZIONE

Forte Tenna, 1884-1890

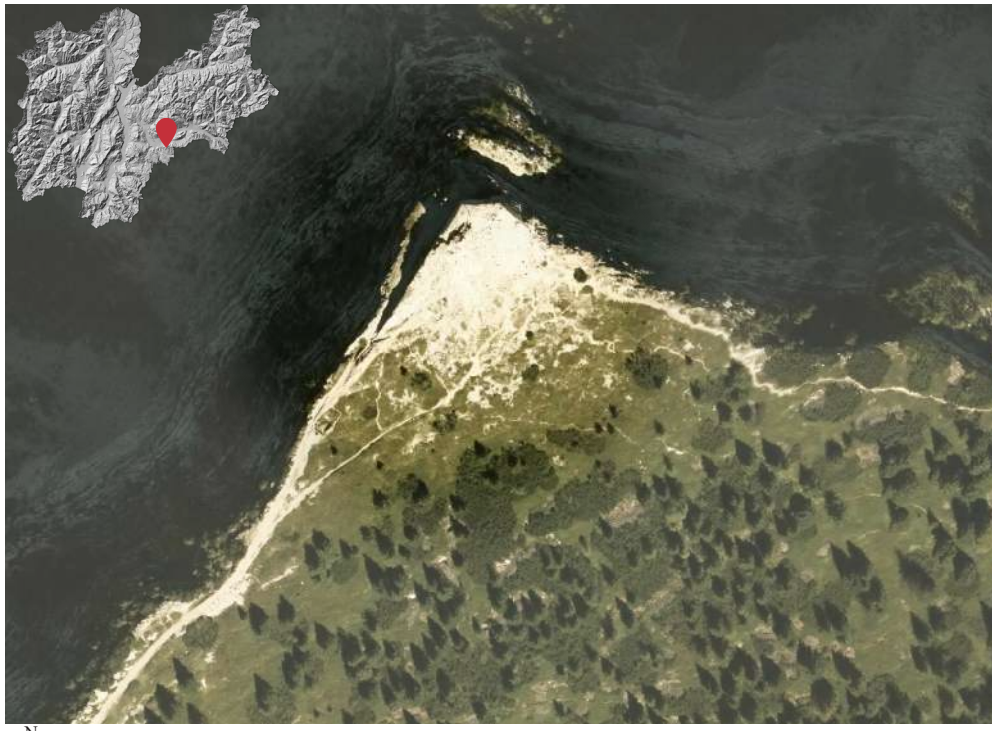
4ª GENERAZIONE

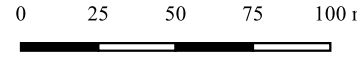
0 25 50 75 100 m

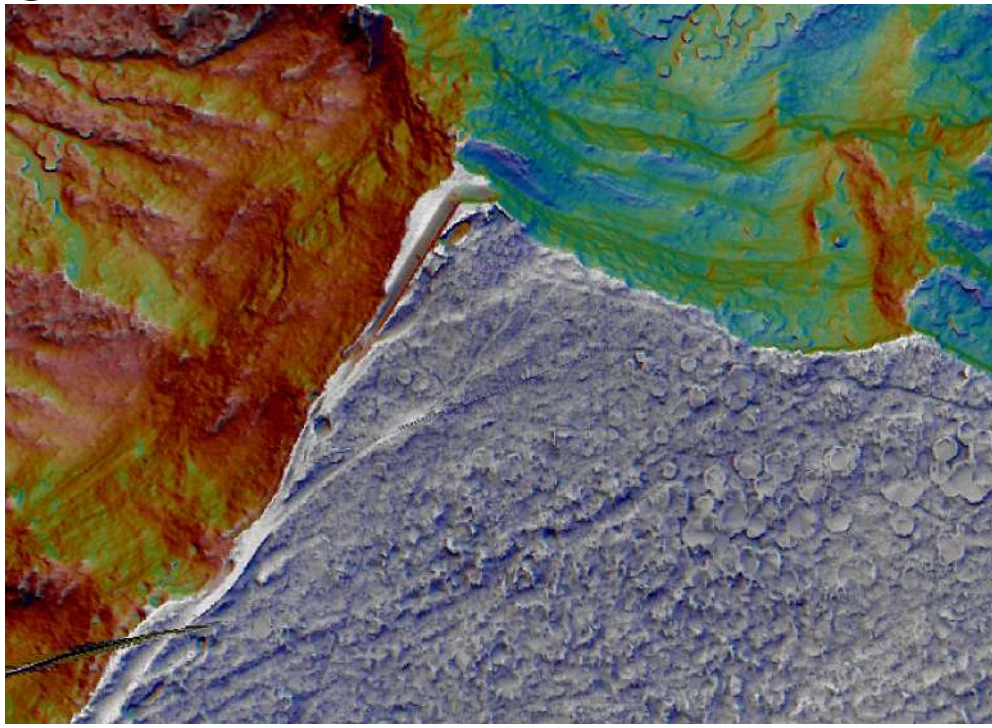
N



Forte Belvedere, 1908-1912







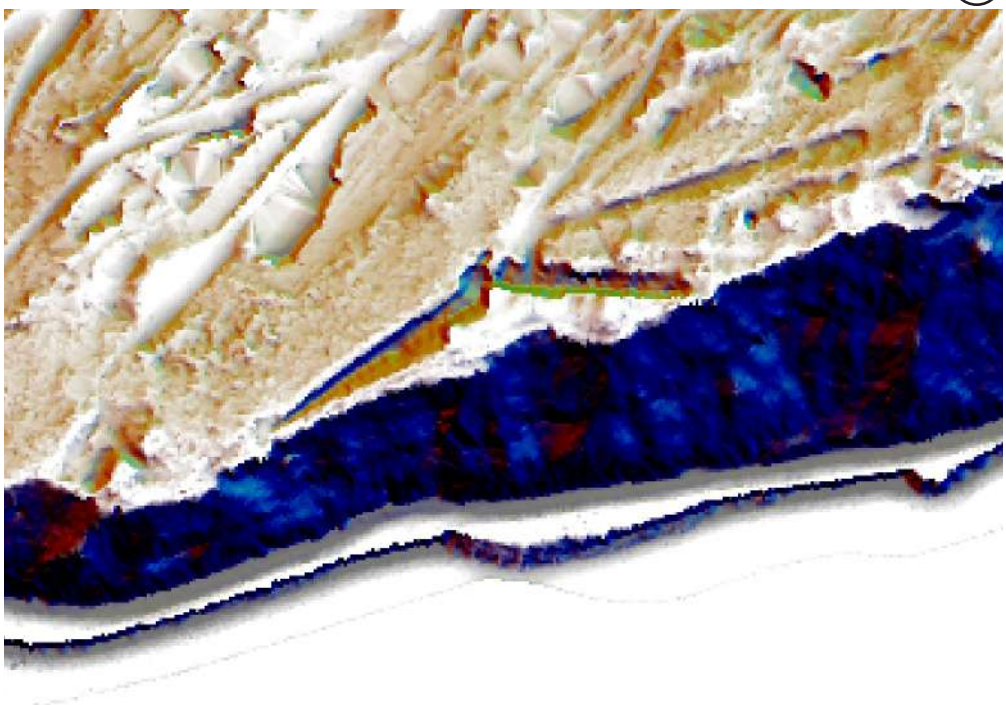
4ª GENERAZIONE

Forte Cima Vezzena, 1910-1914

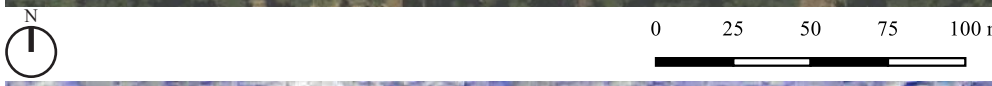
4^A GENERAZIONE

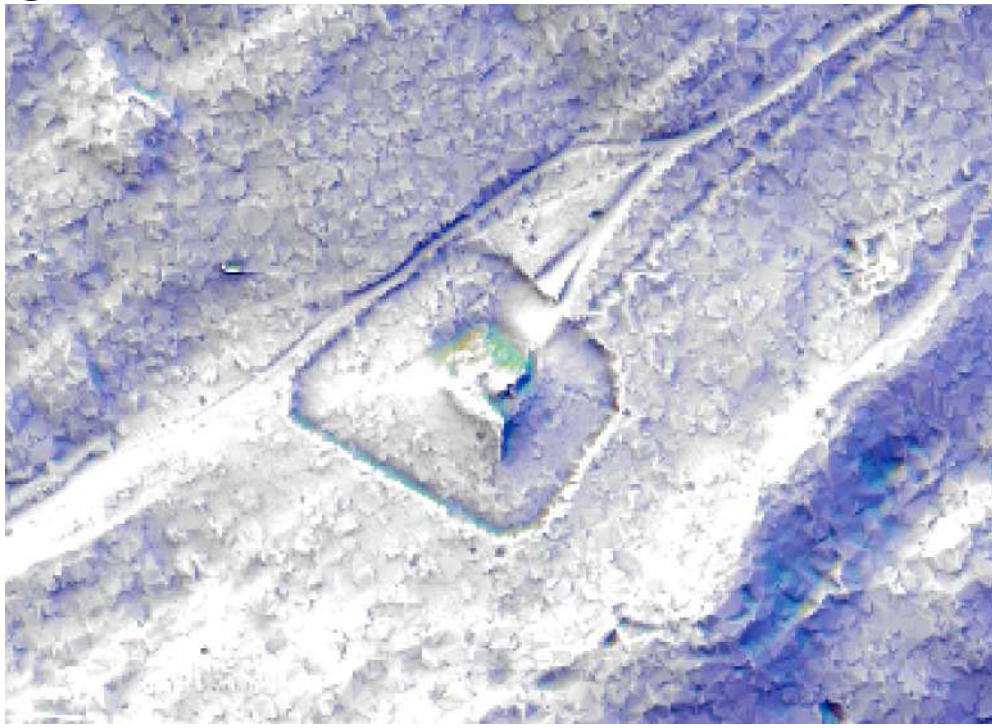
0 25 50 75 100 m

N



Forte Garda, 1904-1907

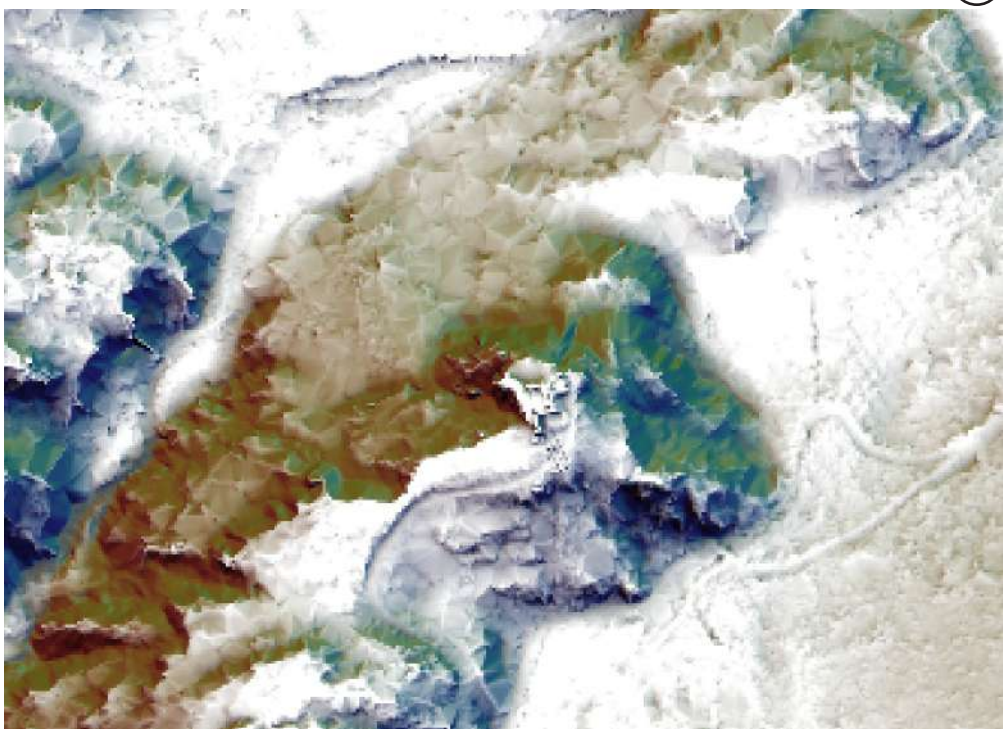




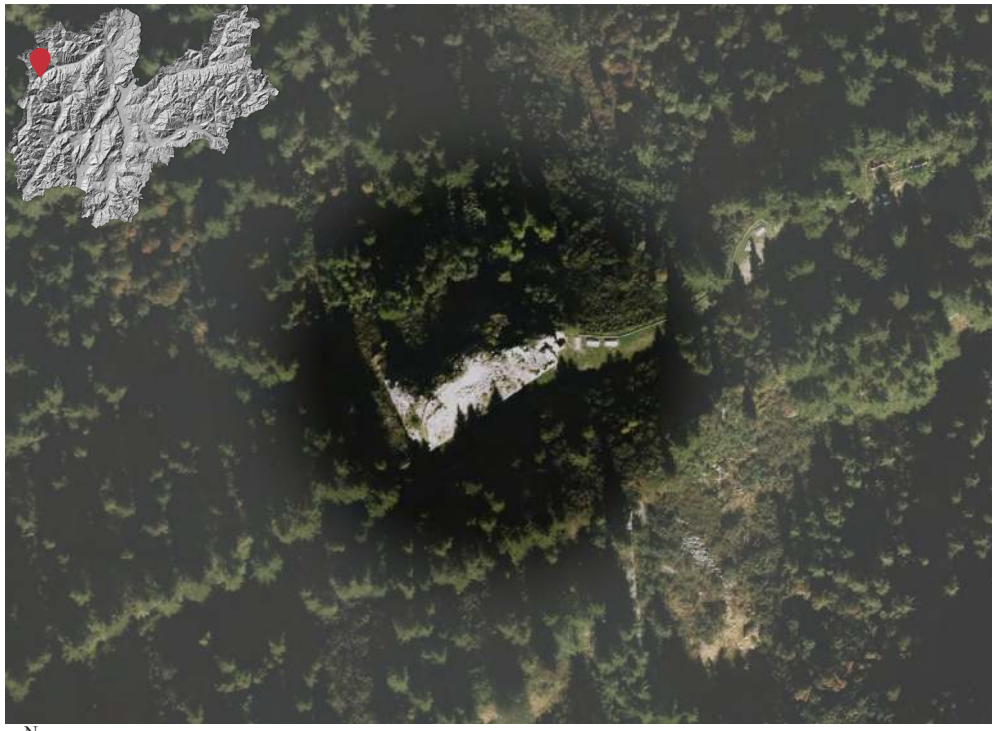
4A GENERAZIONE

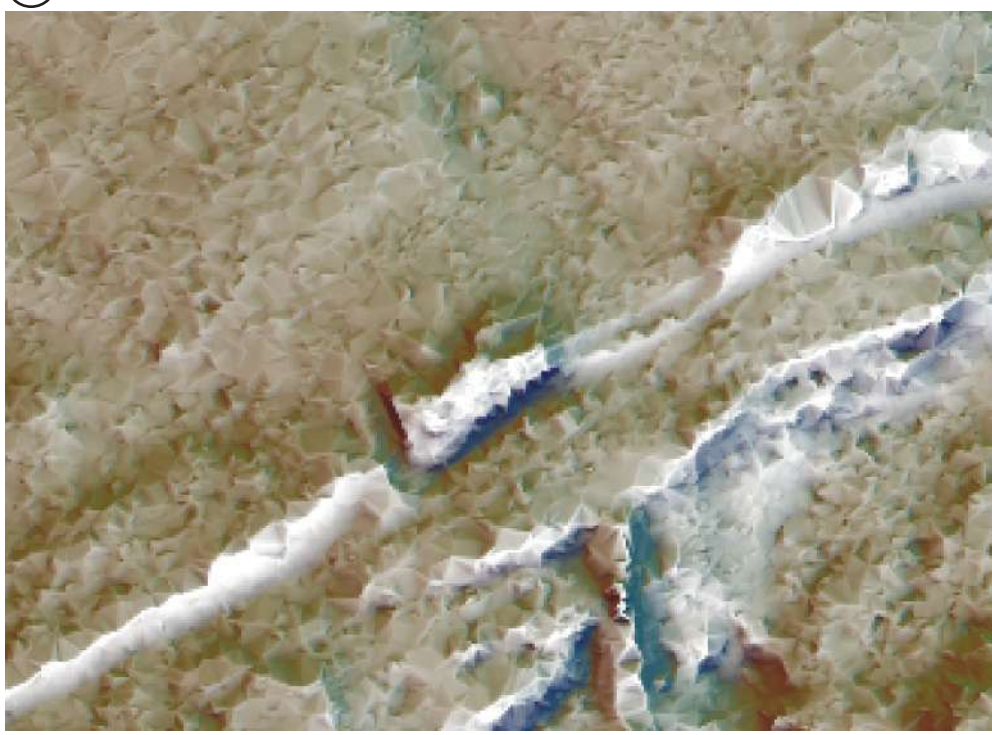
Forte Mero, 1911-1913

4^A GENERAZIONE



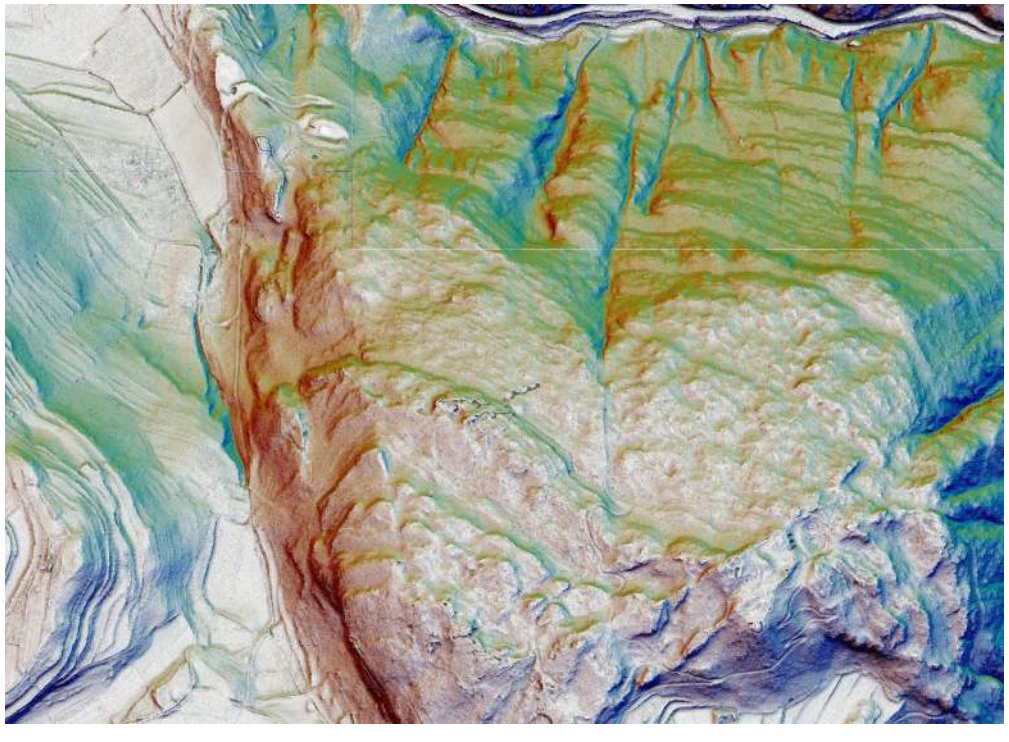
Blockhaus Peio, 1906-1908

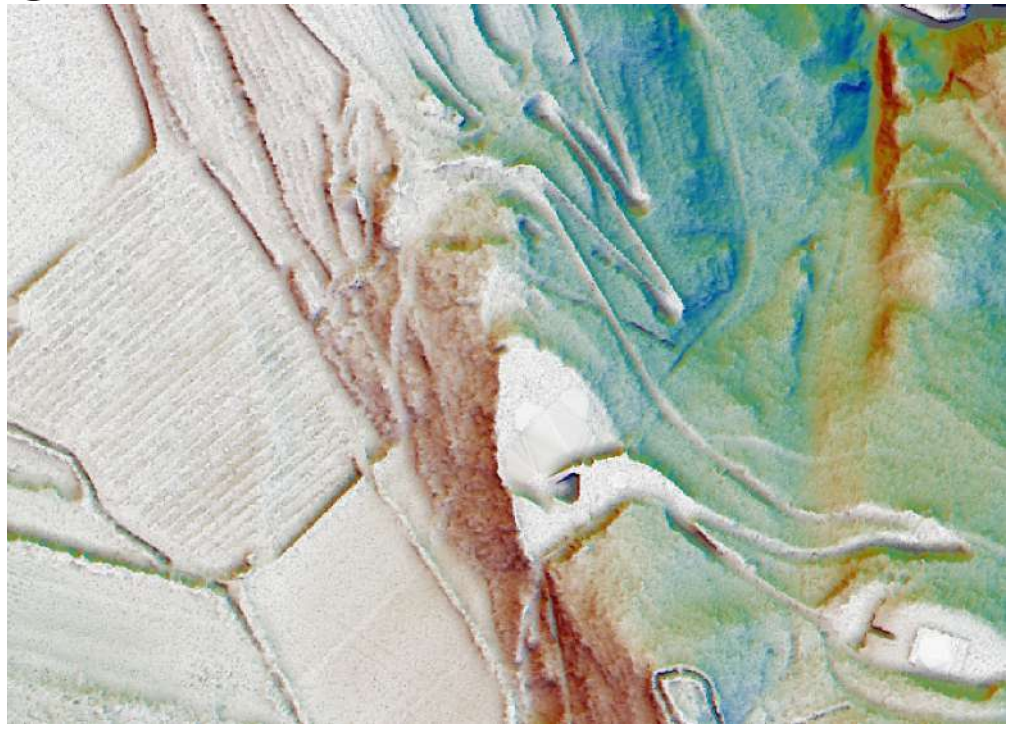




4ª GENERAZIONE

Forte Pozzi Alti, 1908-1912

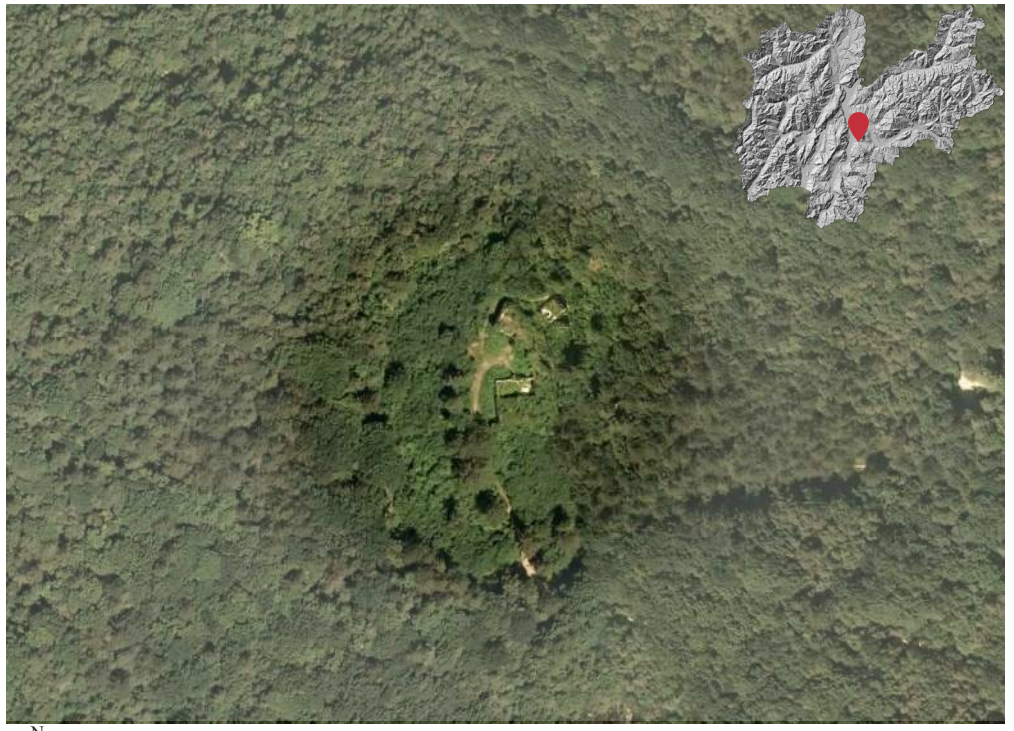


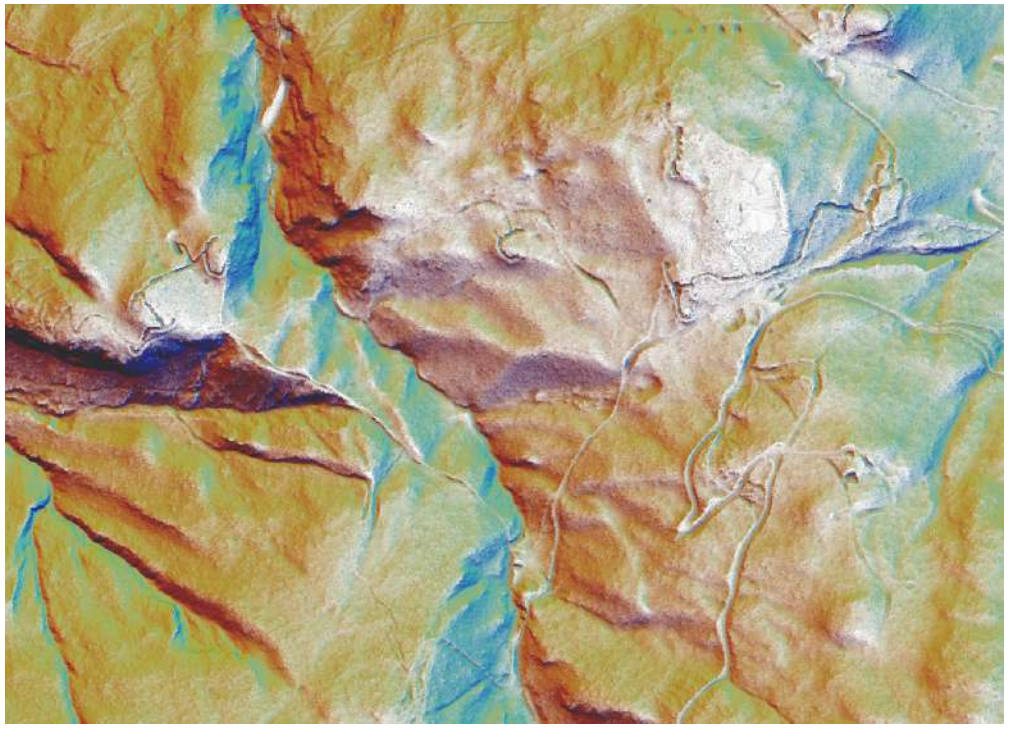


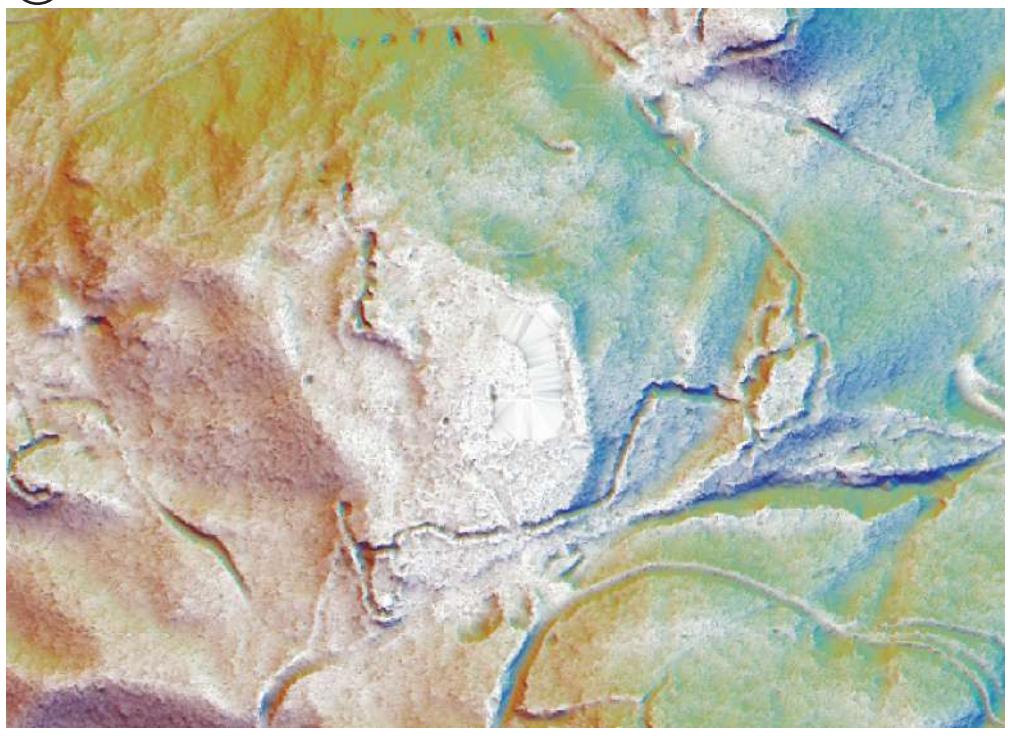
1ª GENERAZIONE

Forte Doss Sponde, 1860-1861

2ª GENERAZIONE

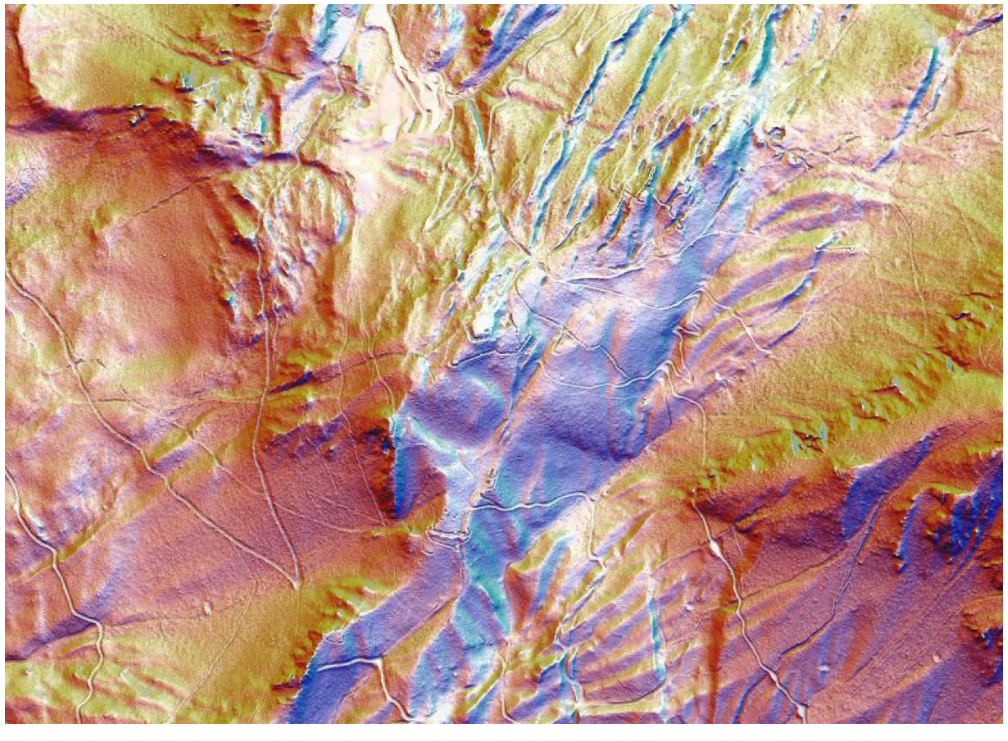




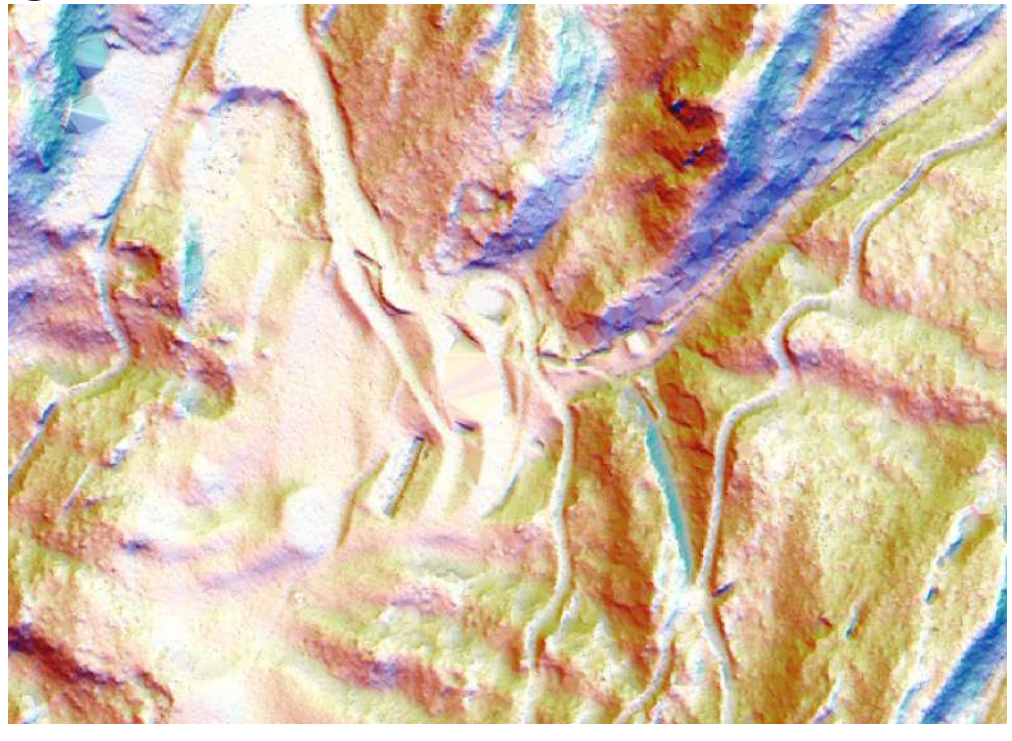


Batteria Doss Fornas, 1879-1880

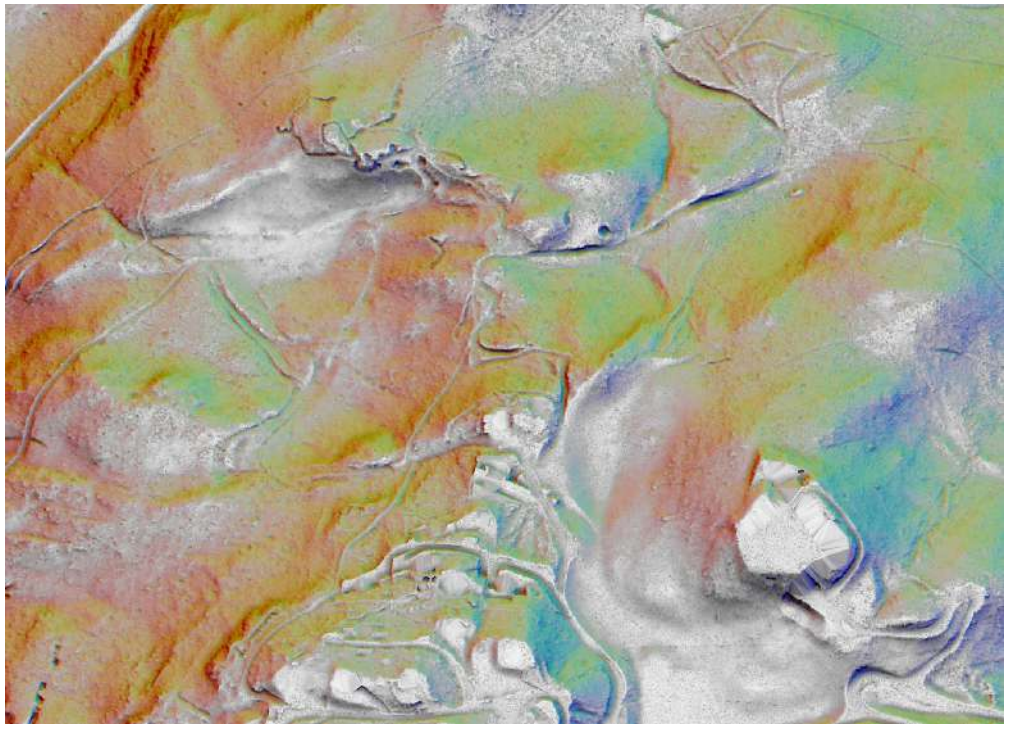

0 100 200 300 400 m

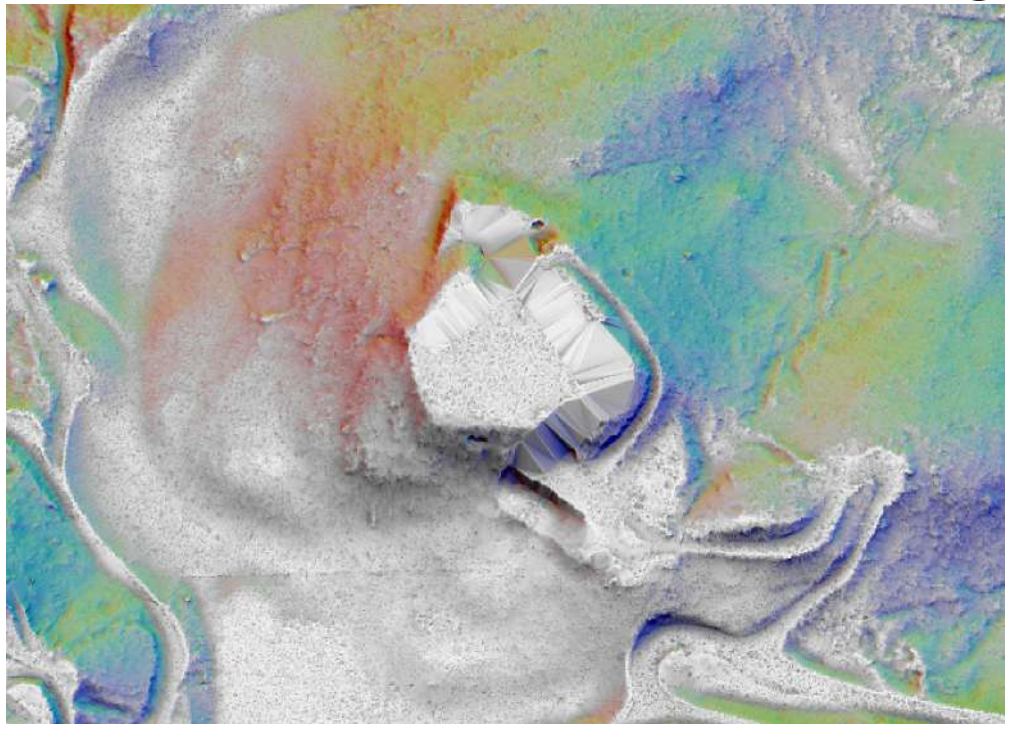



N
0 25 50 75 100 m

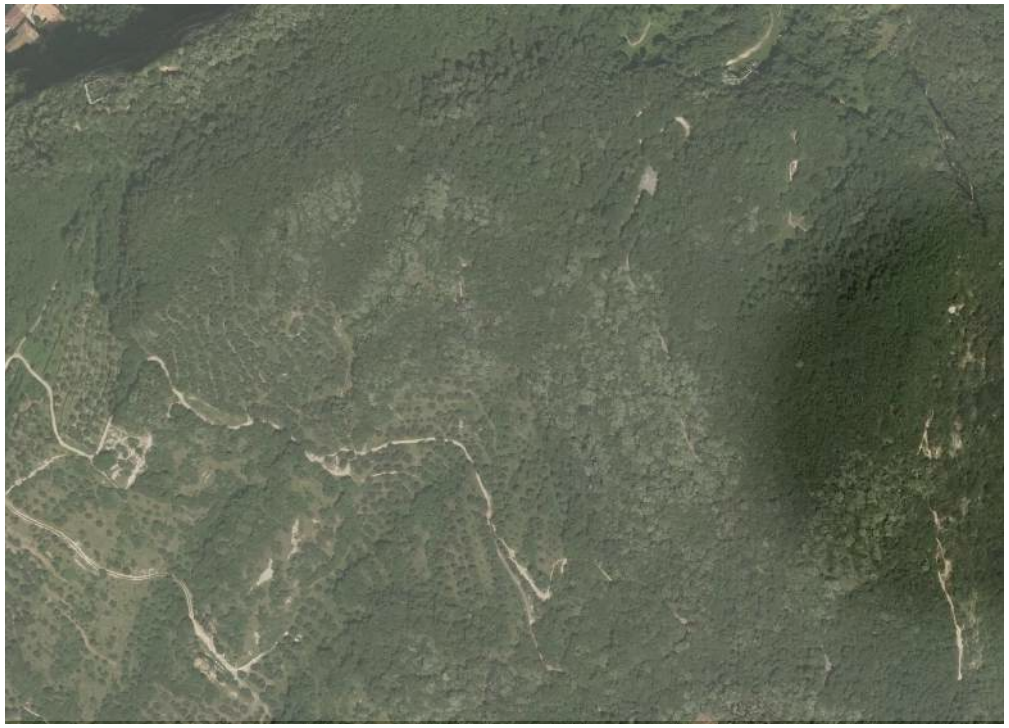


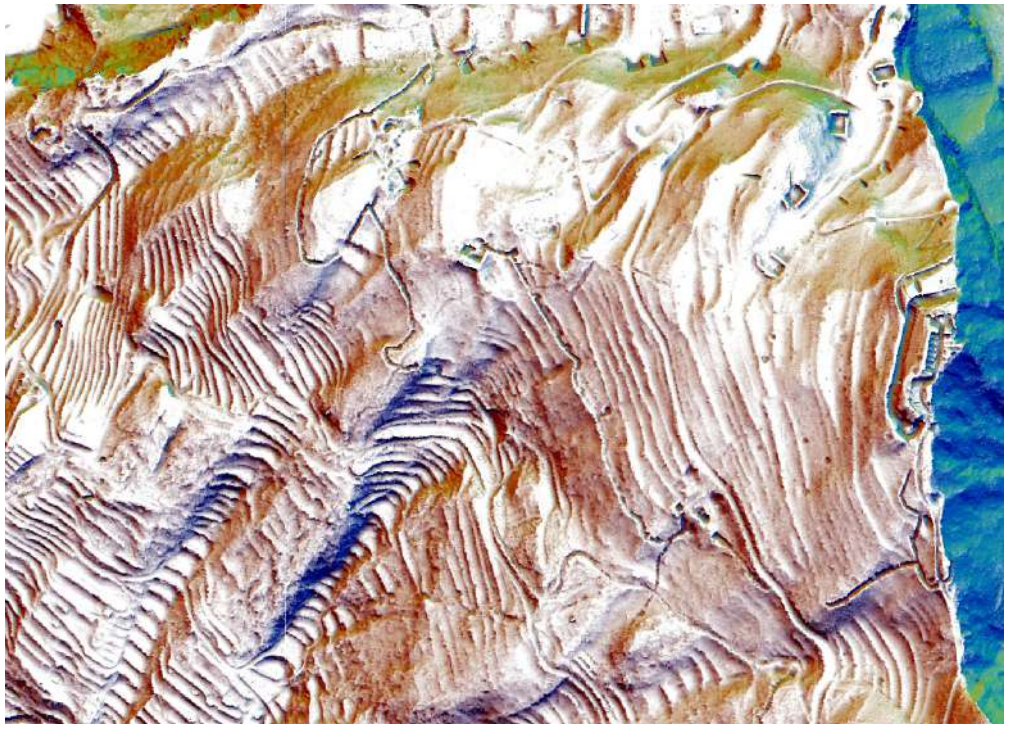
2ª GENERAZIONE

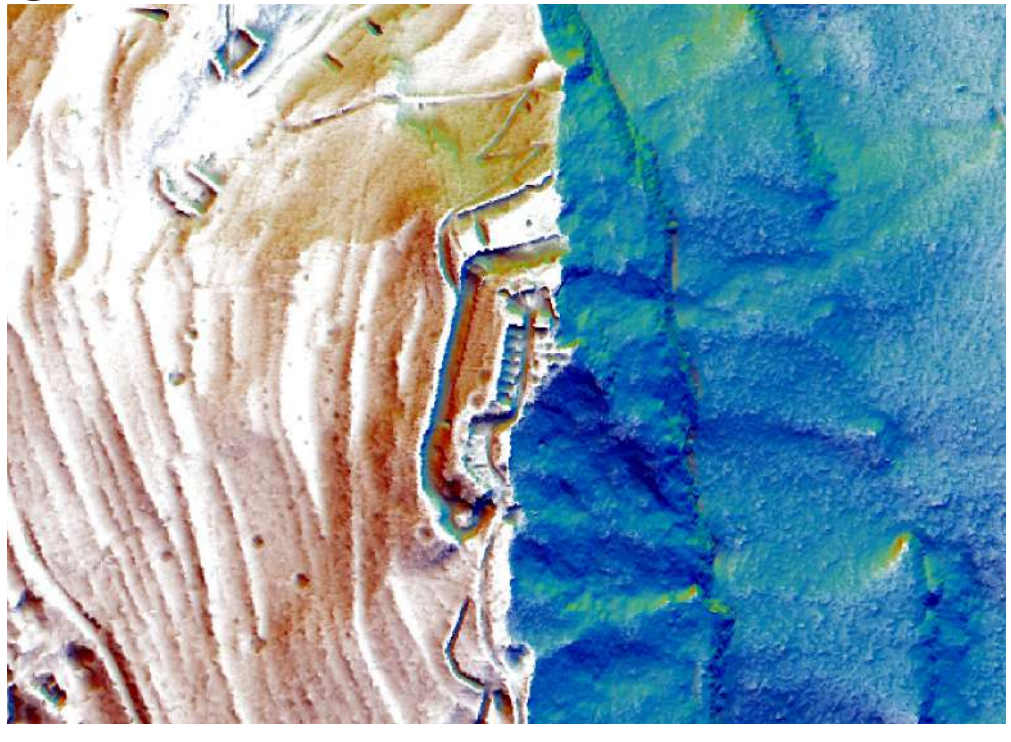




Batteria Mandolin, 1879-1880





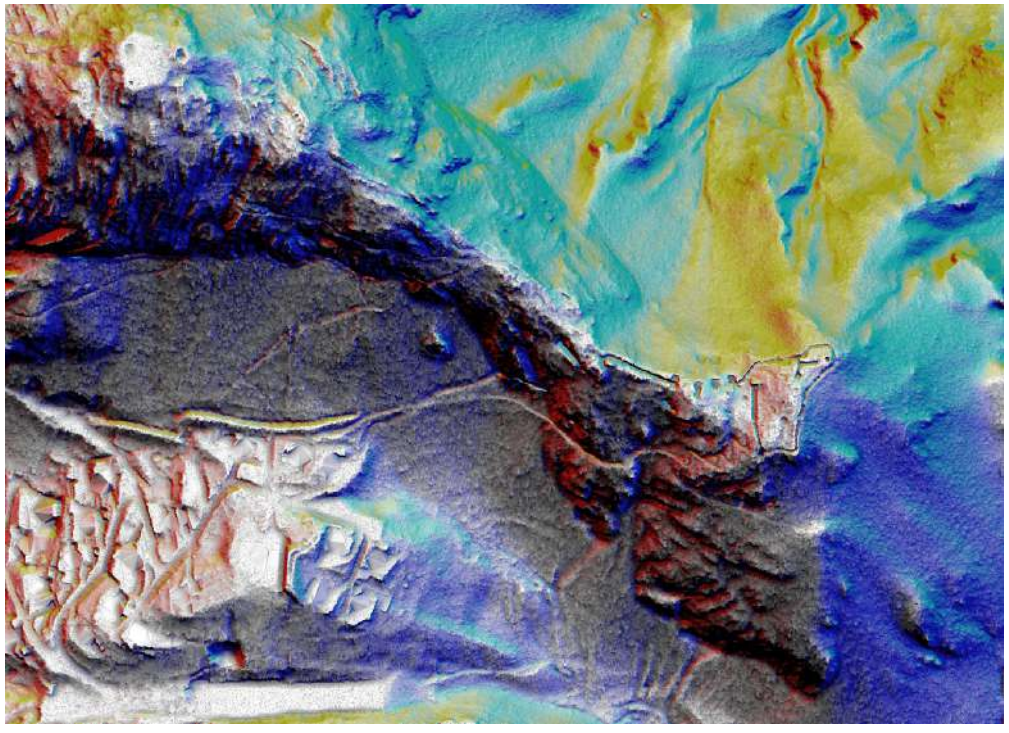


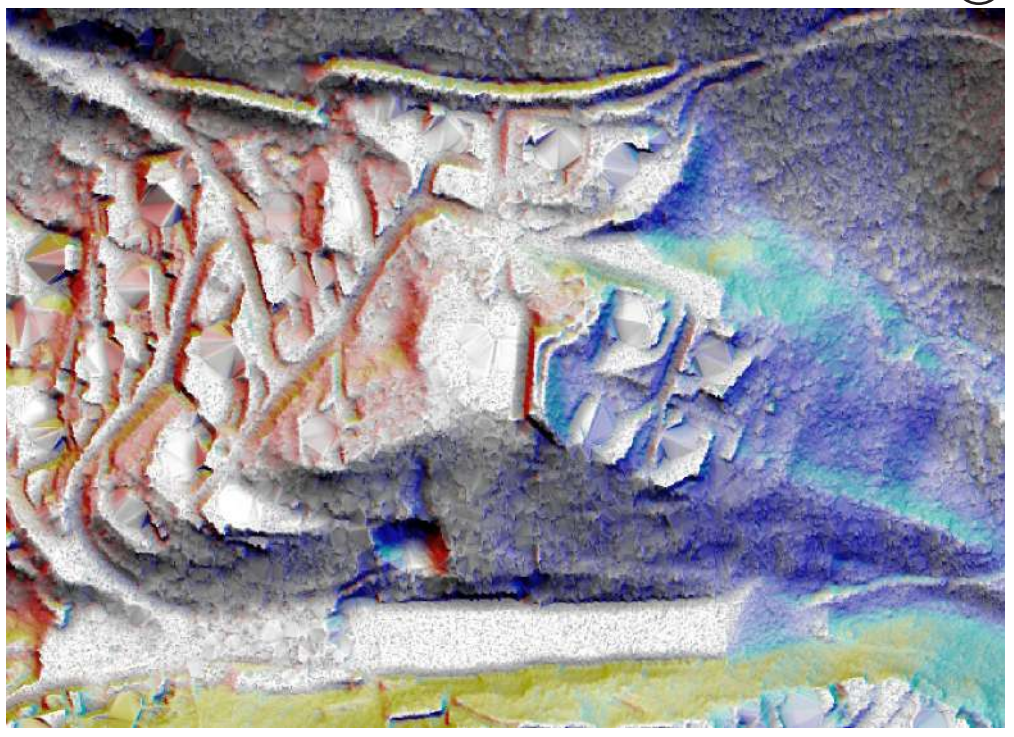
2ª GENERAZIONE

Forte Sant’Alessandro, 1880-1881

2ª GENERAZIONE

Batteria Roncogno, 1879-1880





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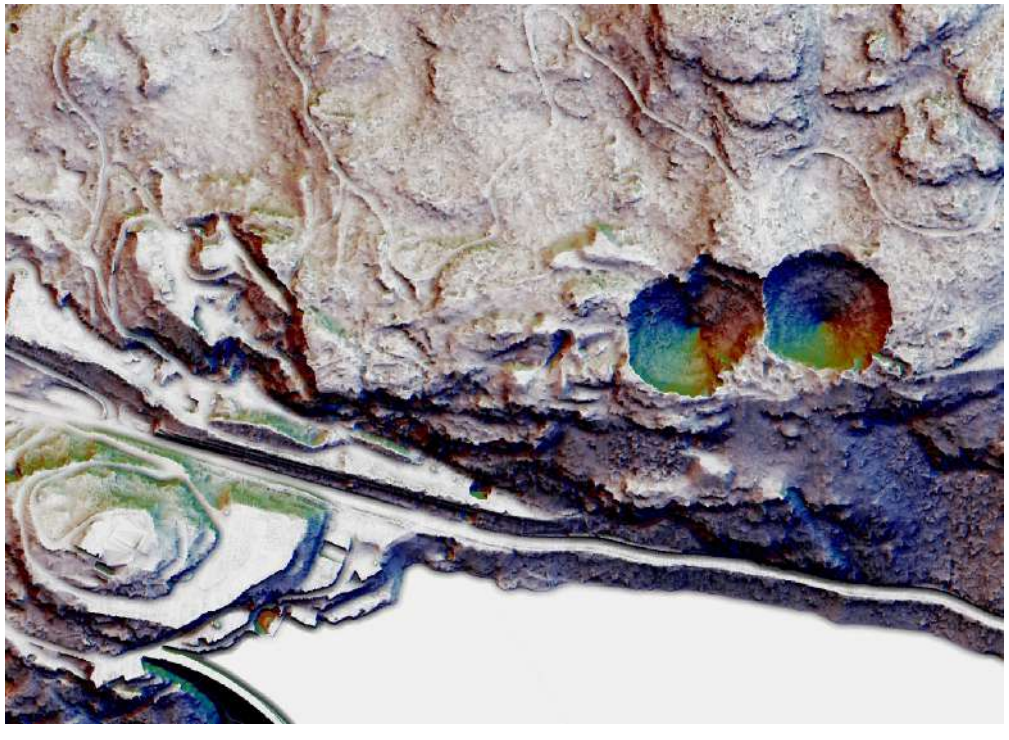
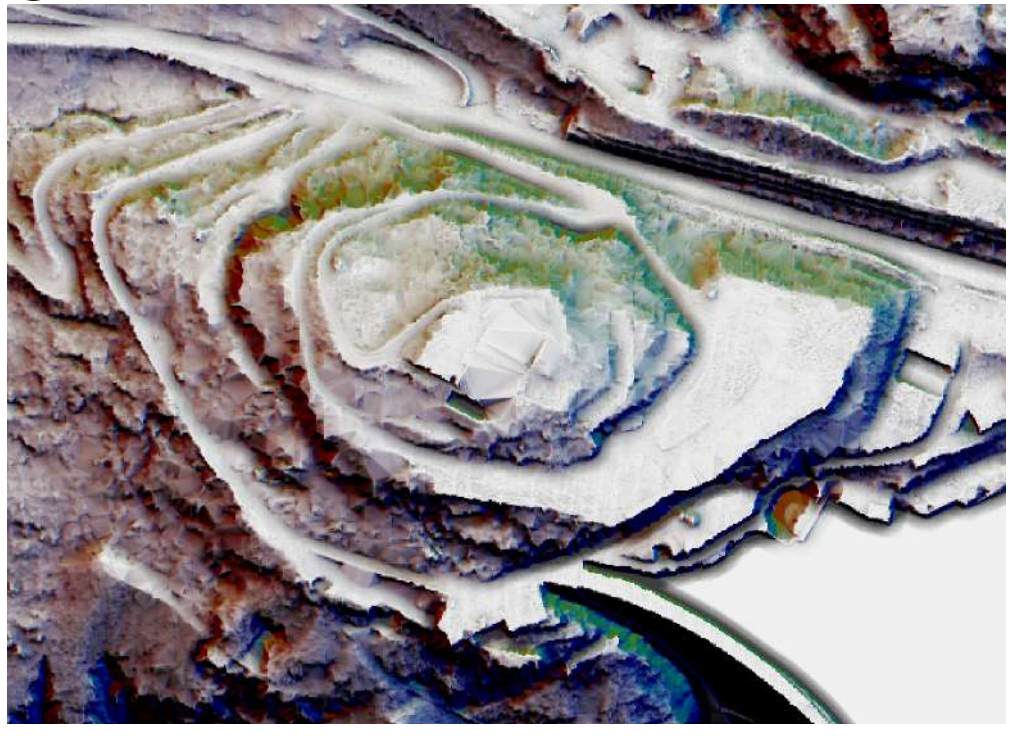


N

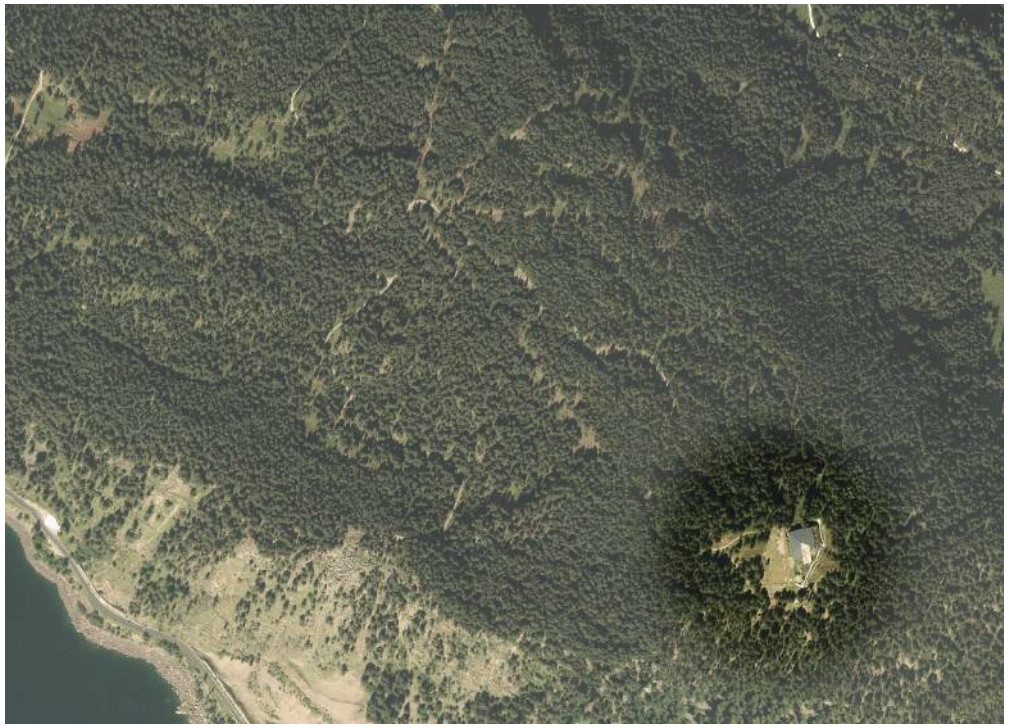
0 25 50 75 100 m

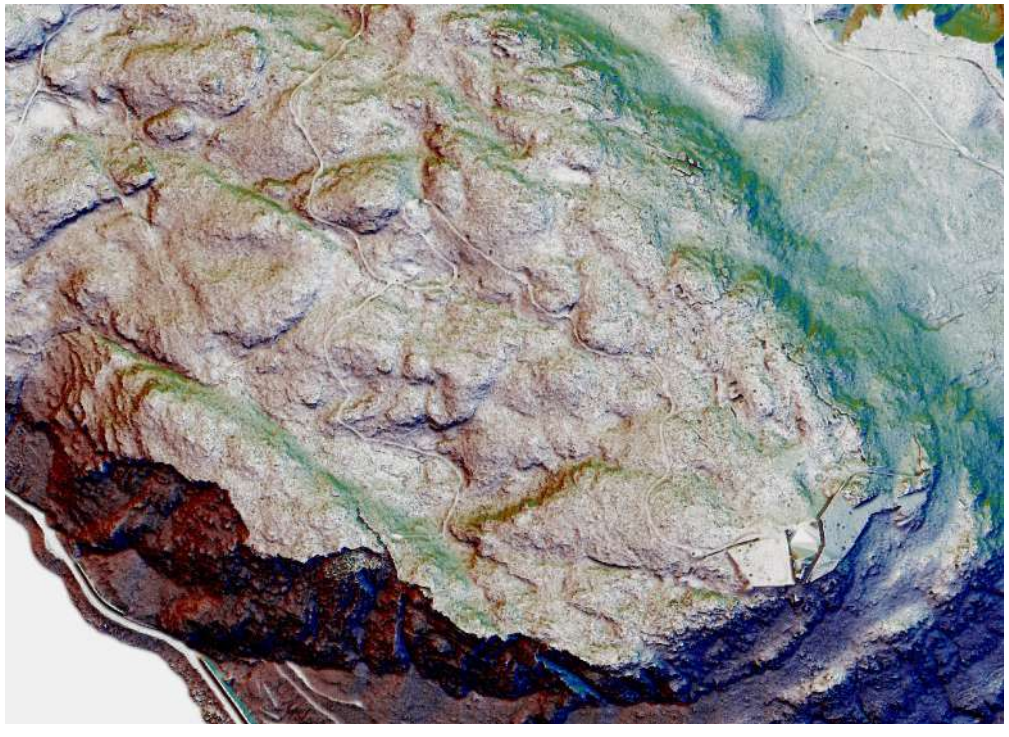


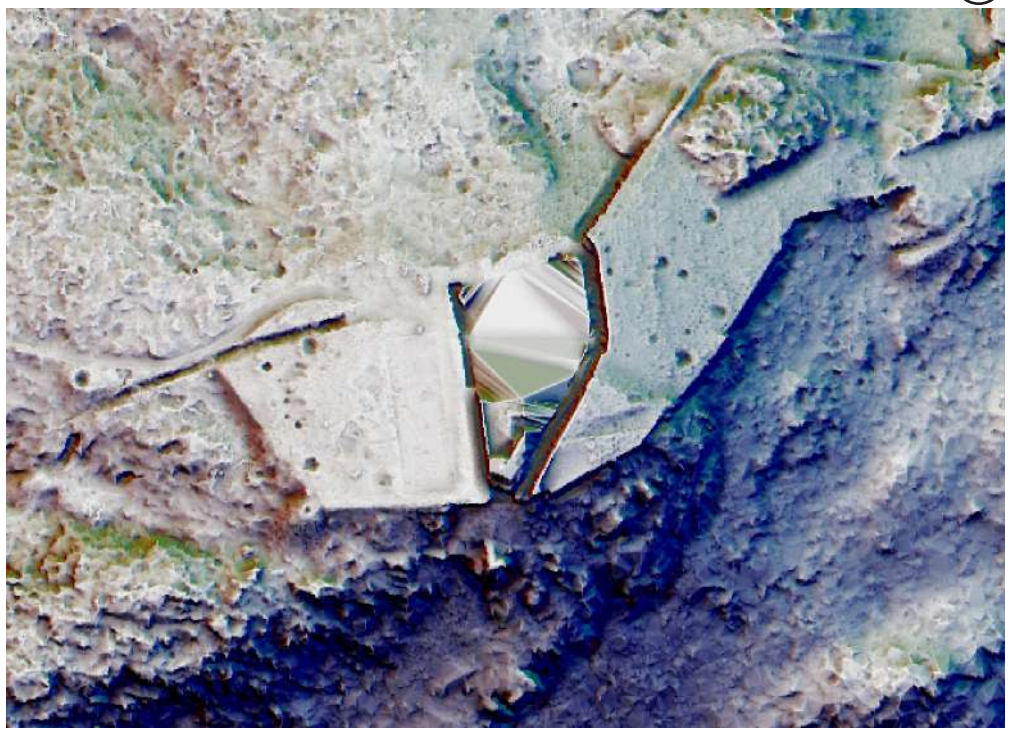
3A GENERAZIONE

Blockhaus Buso, 1895-1896

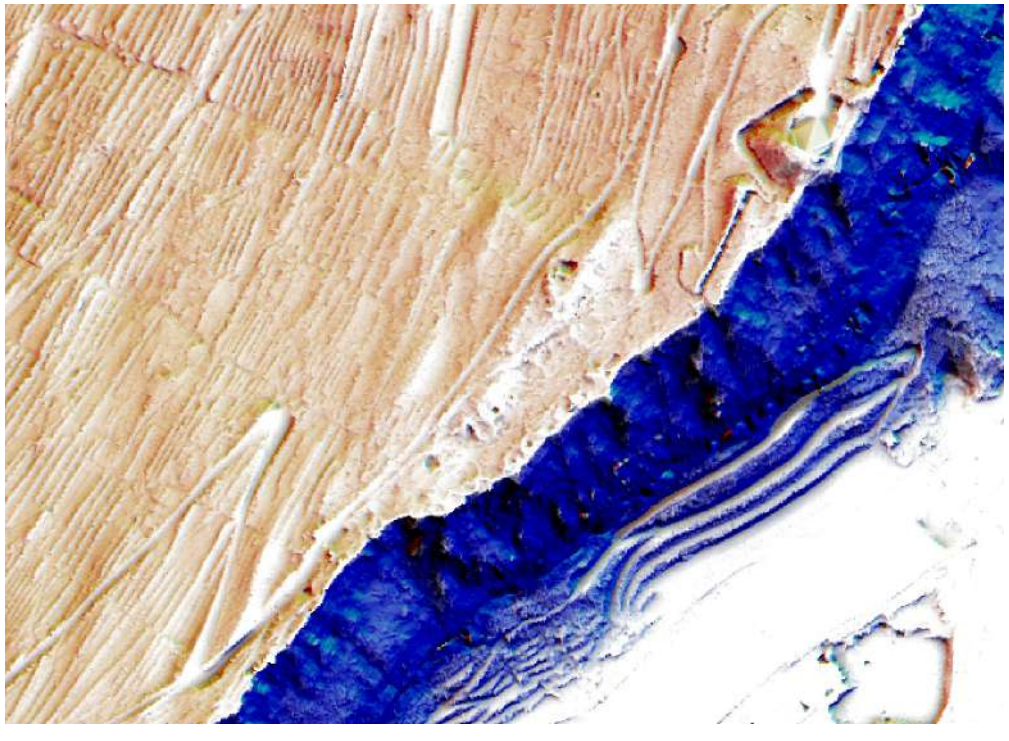
3ª GENERAZIONE

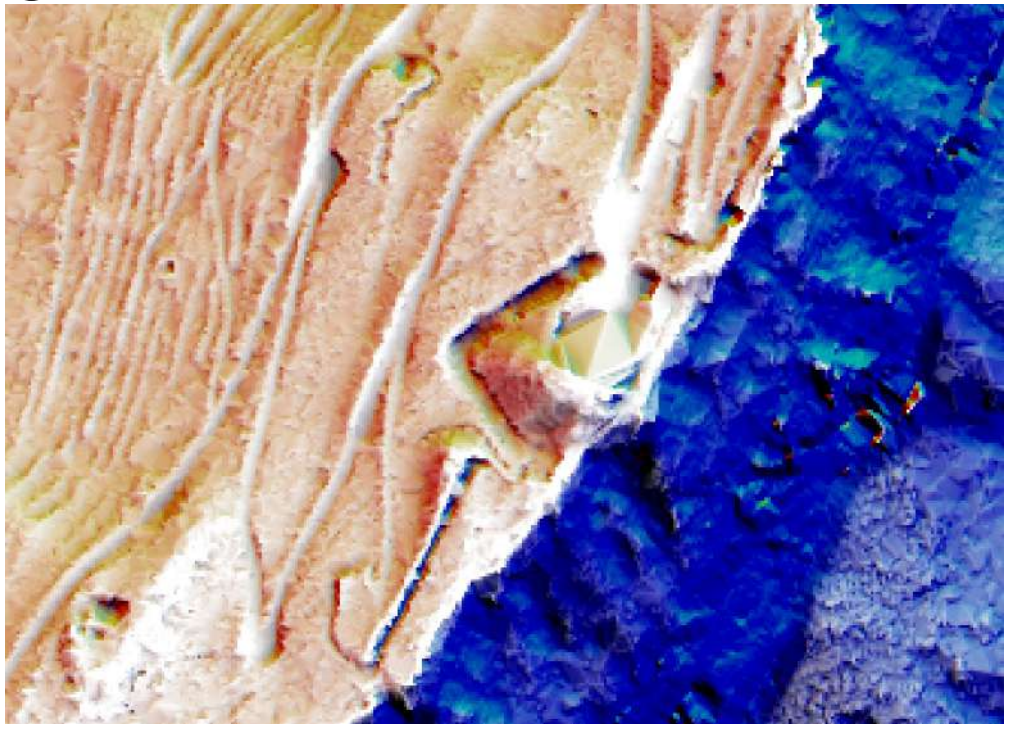






Forte Dossaccio, 1886-1900

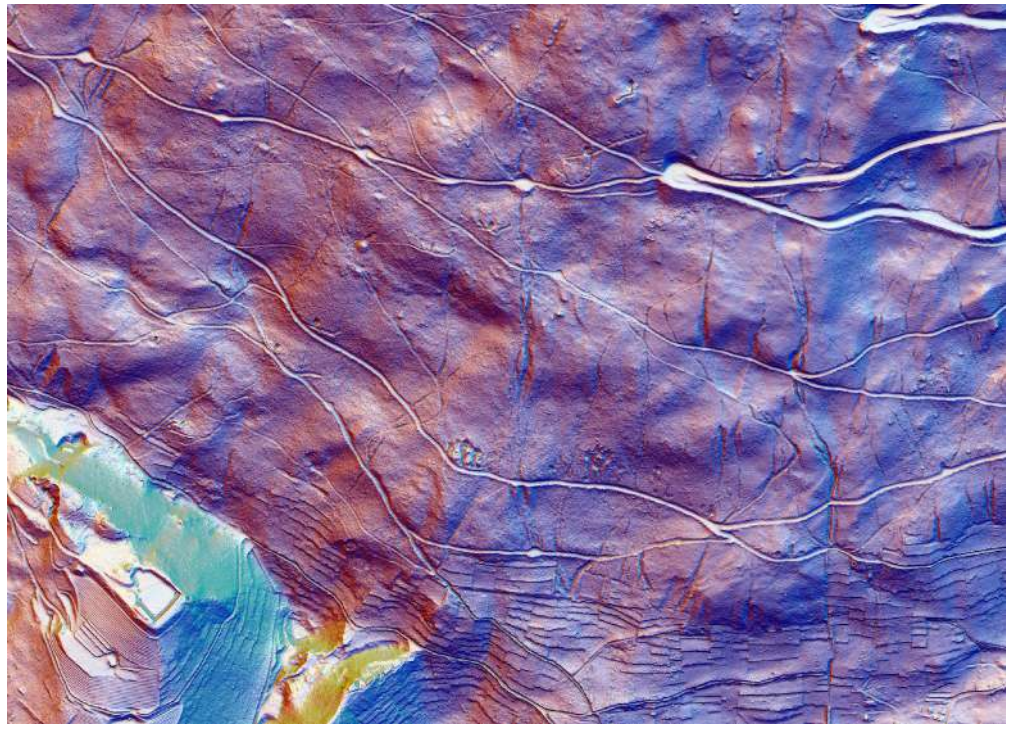


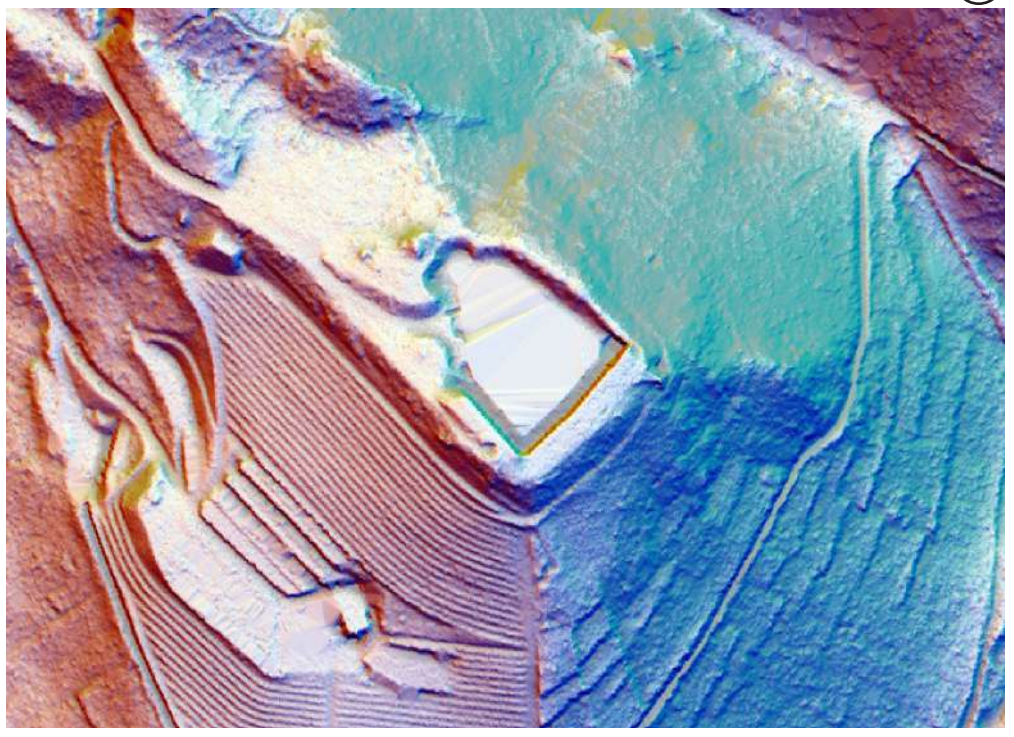


3ª GENERAZIONE

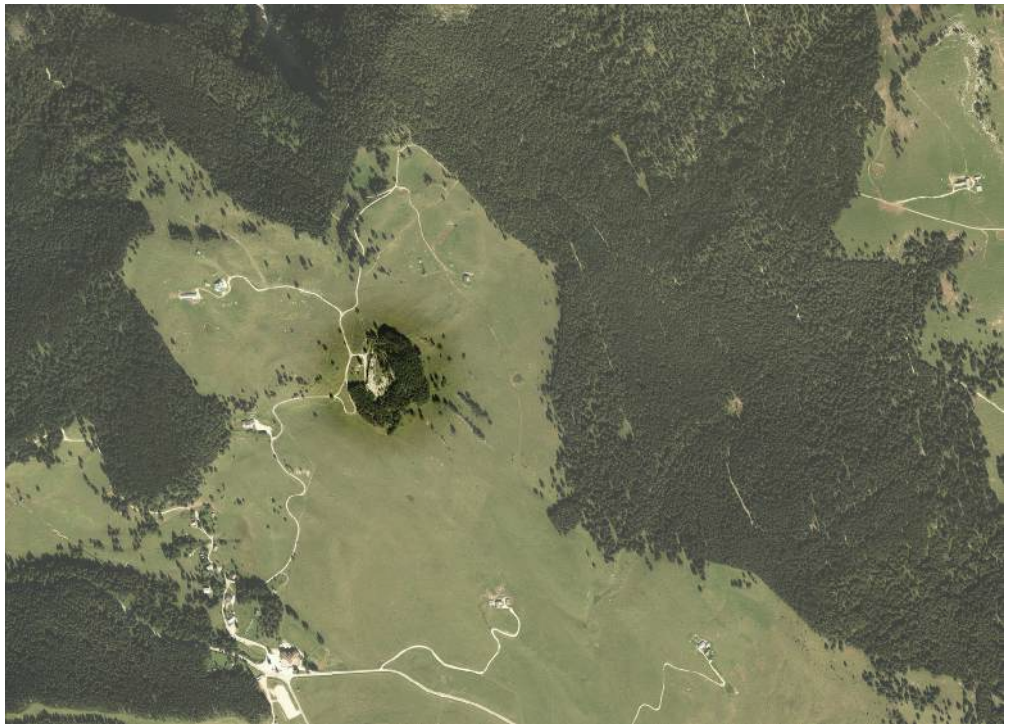
Batteria di Mezzo, 1898-1900

3ª GENERAZIONE





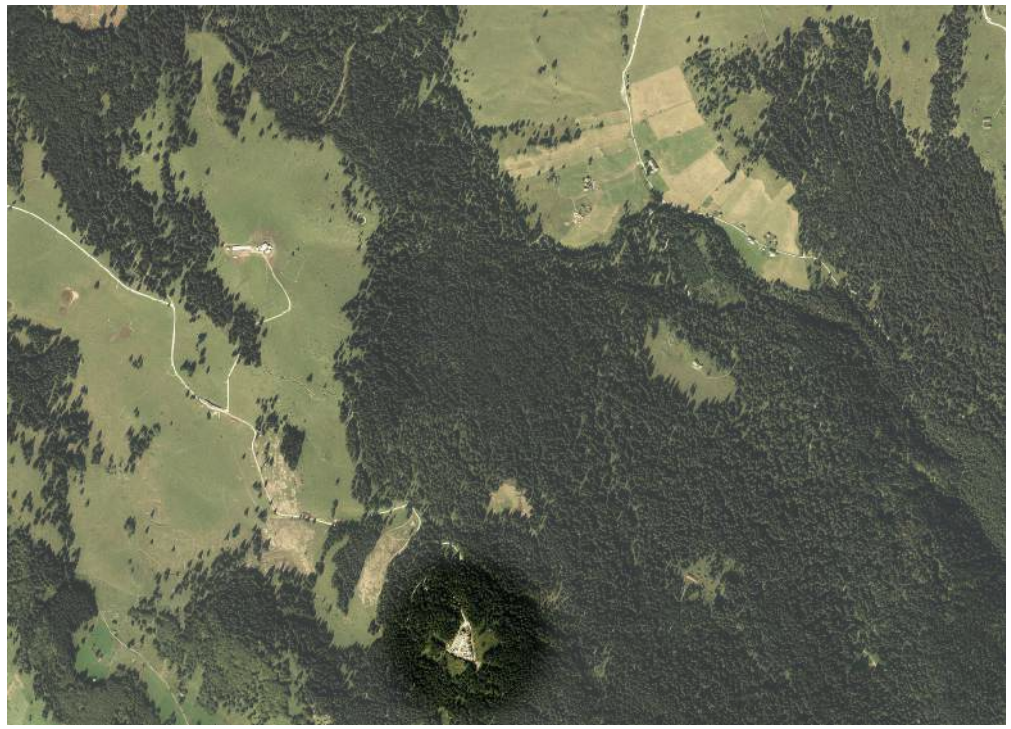
Forte San Biagio, 1884-1890

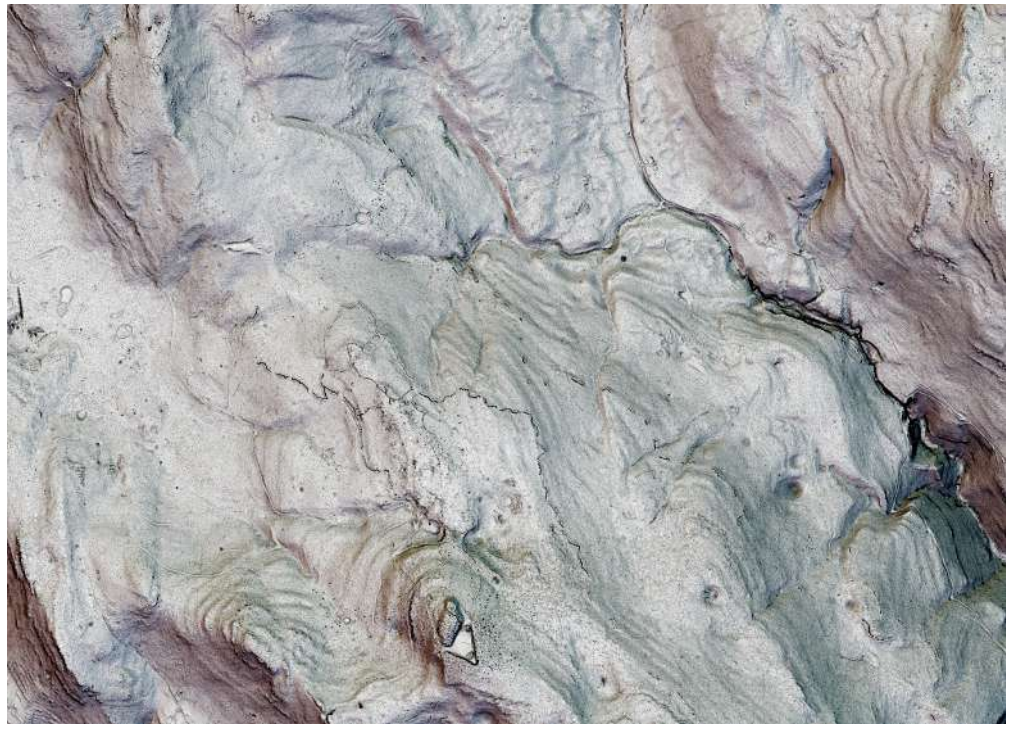


4ª GENERAZIONE

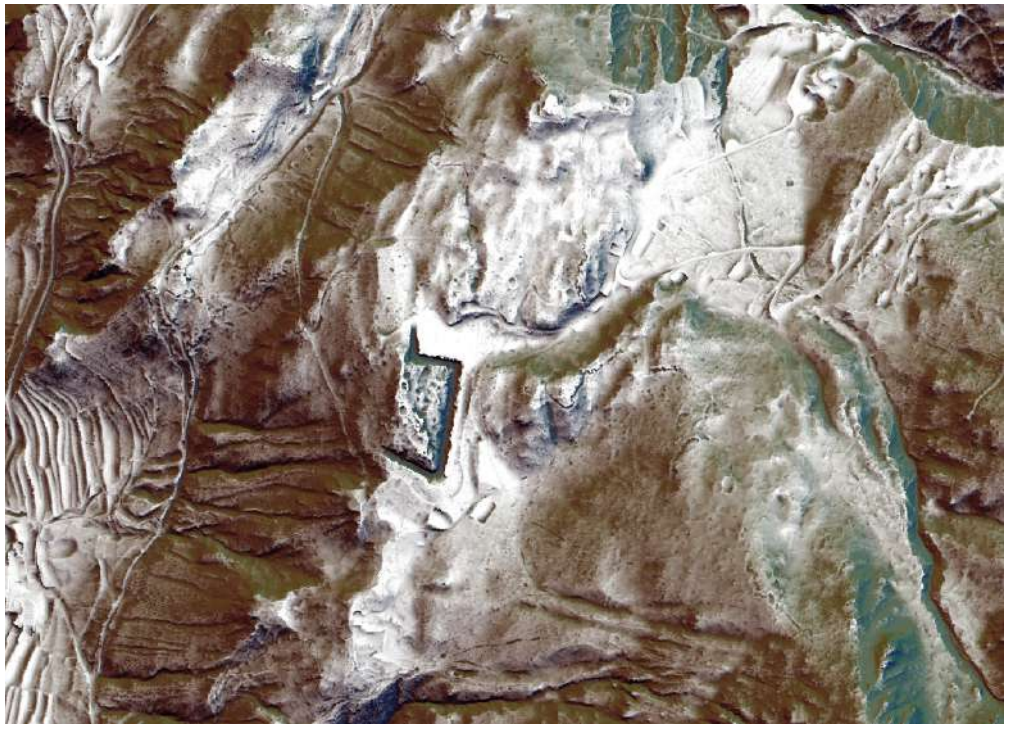
Forte Busa Verle, 1908-1913

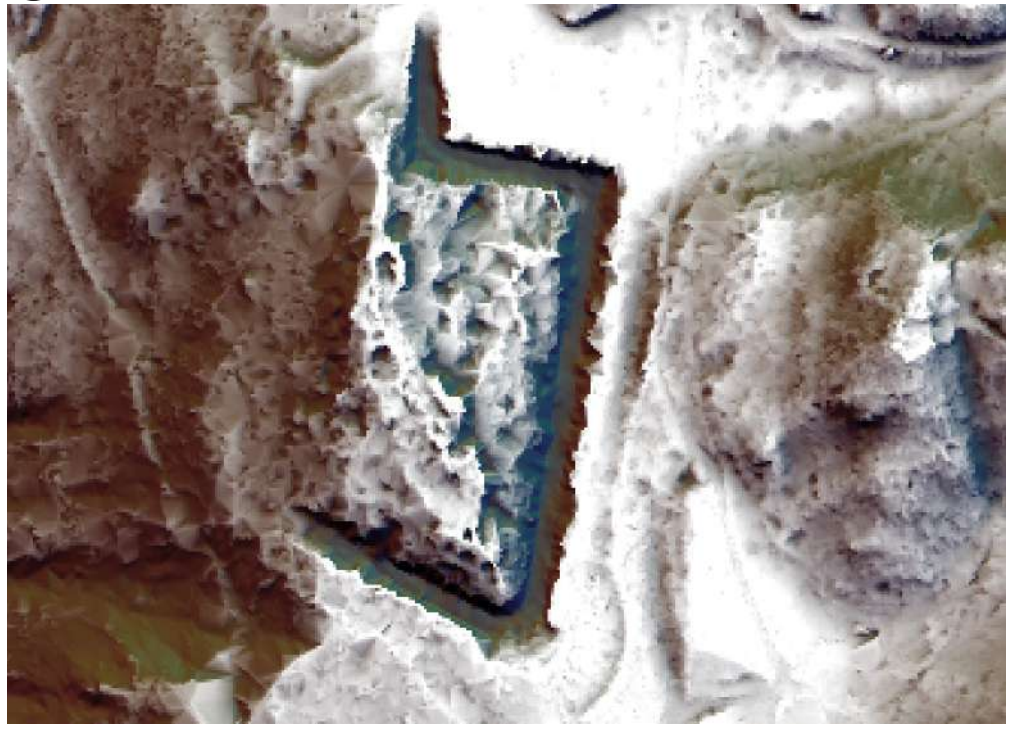
4ª GENERAZIONE





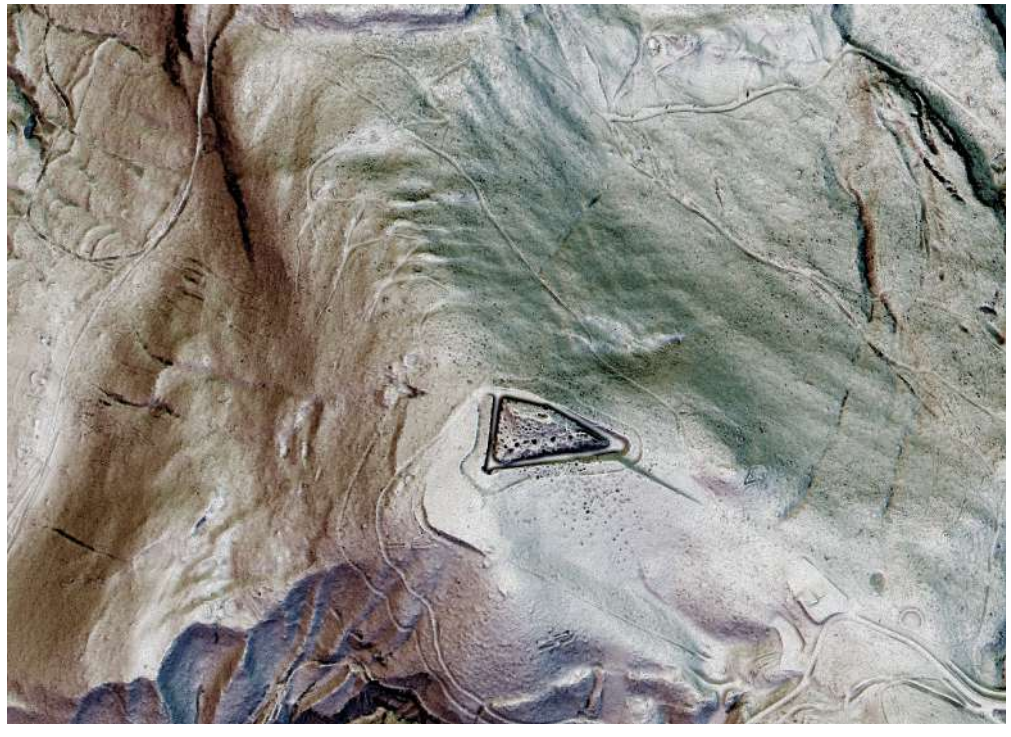
Forte Campo Luserna, 1908-1912



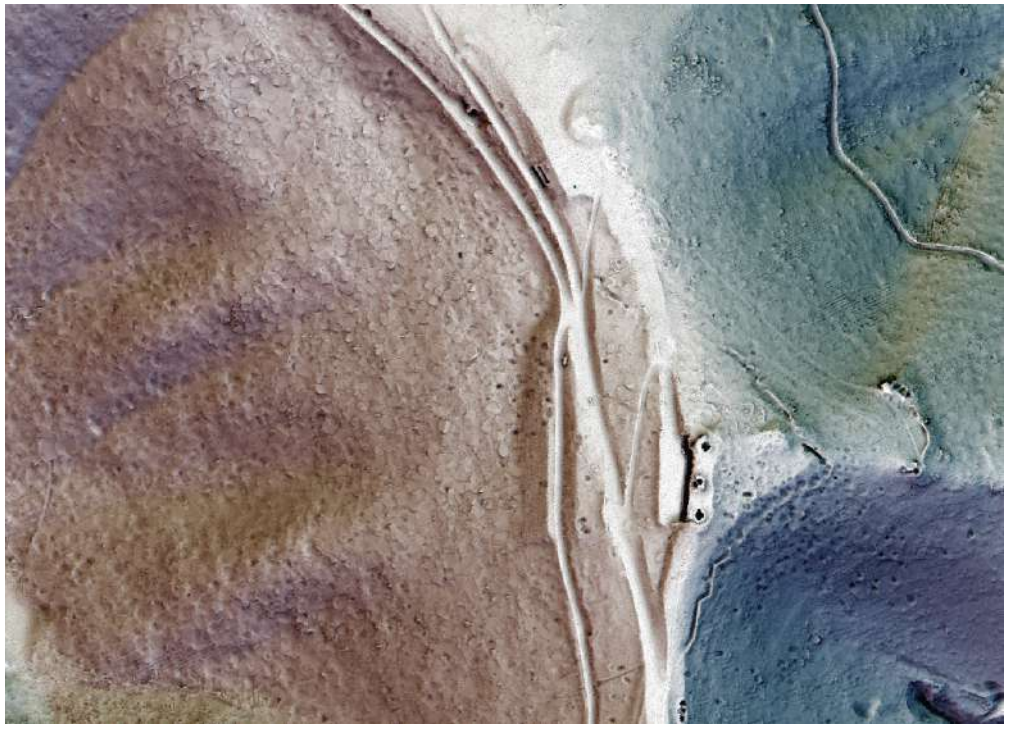


4ª GENERAZIONE

Forte Carriola, 1909-1915



Forte San Sebastiano, 1909-1913



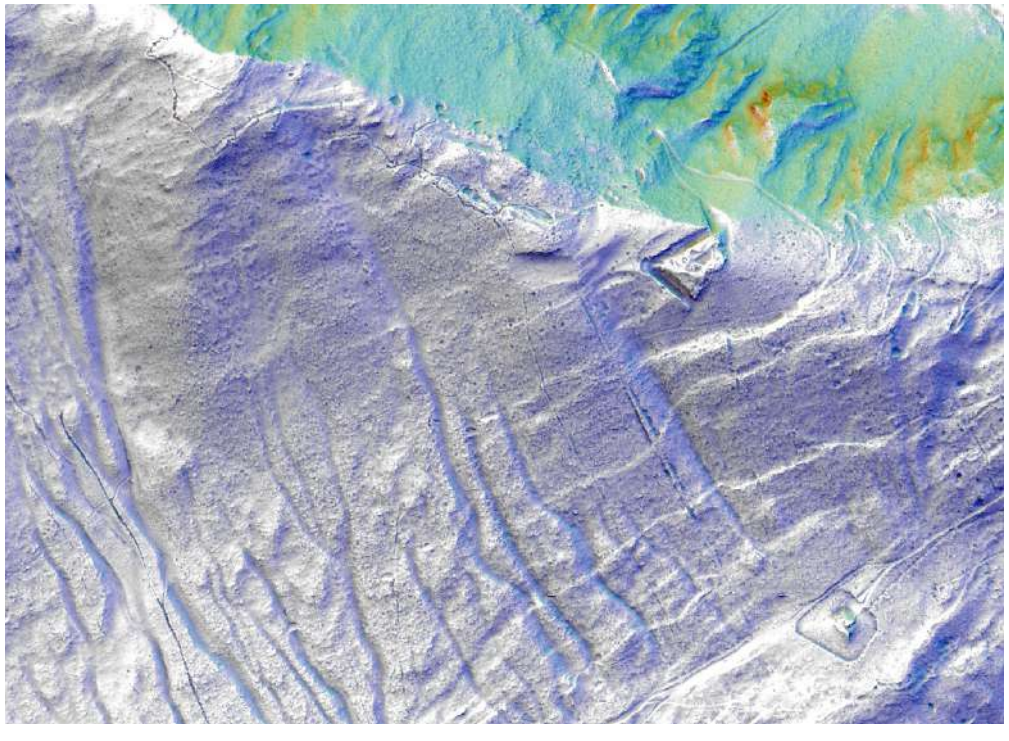
4ª GENERAZIONE

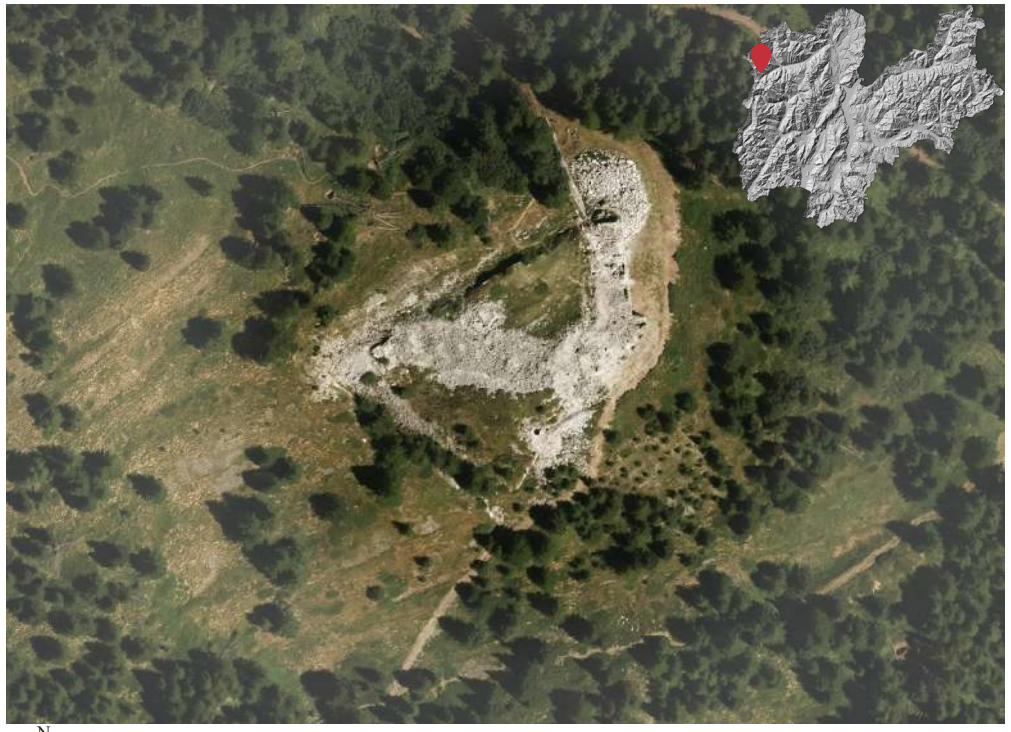
Forte Sommo Alto, 1911-1914

4ª GENERAZIONE

Forte Serrada, 1910-1915


0 100 200 300 400 m




N
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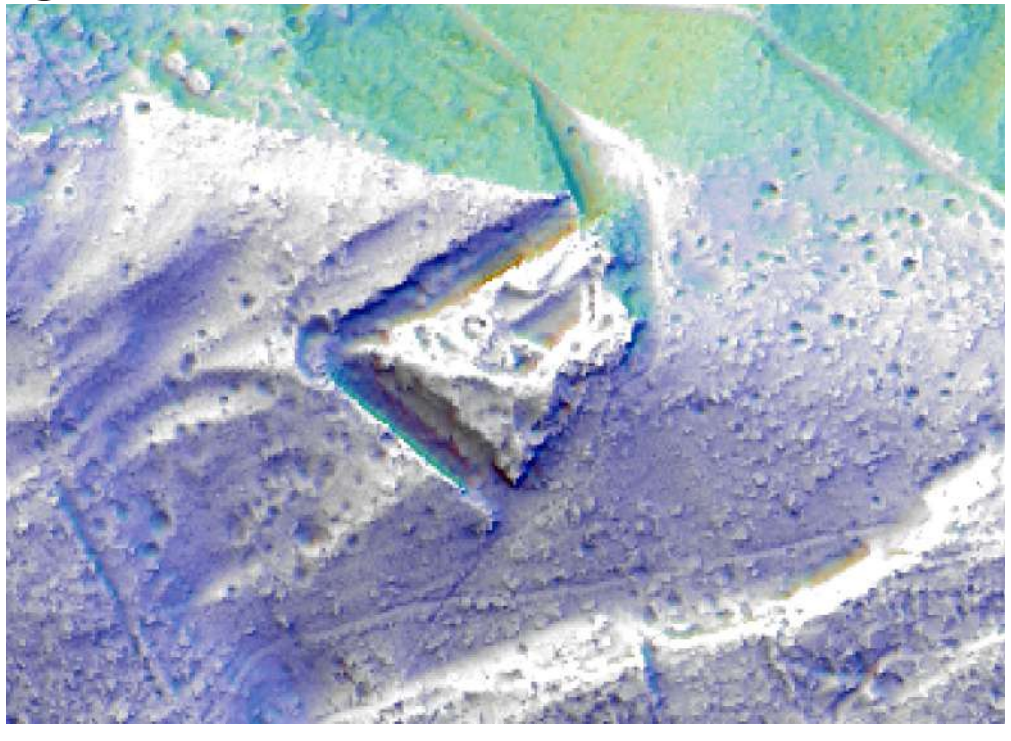
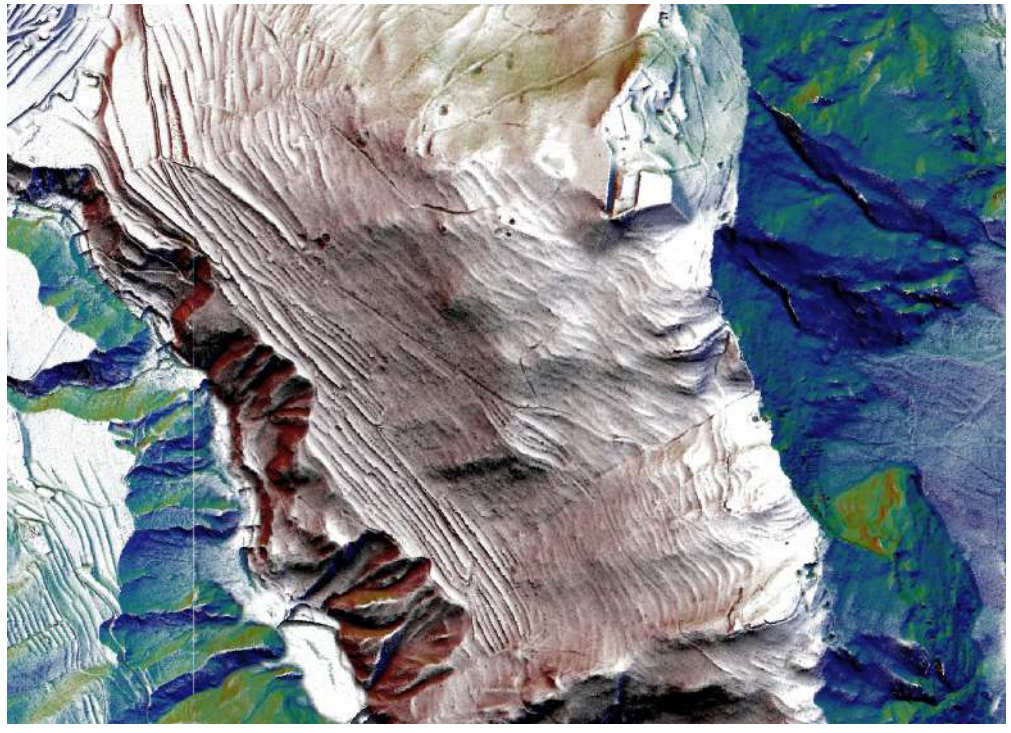
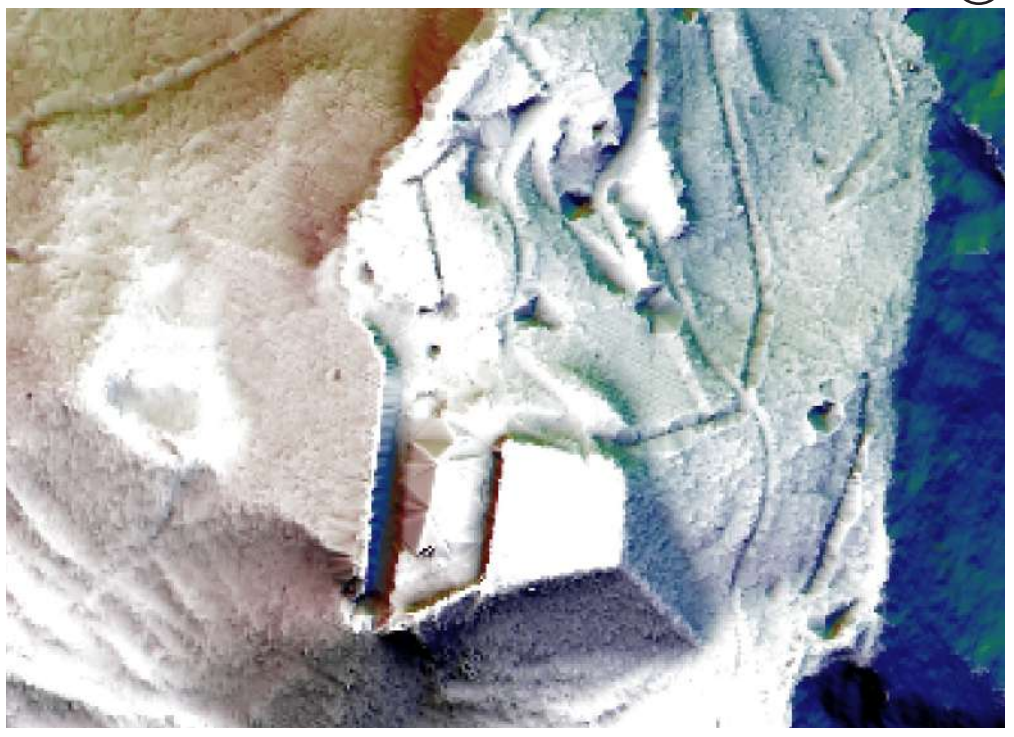
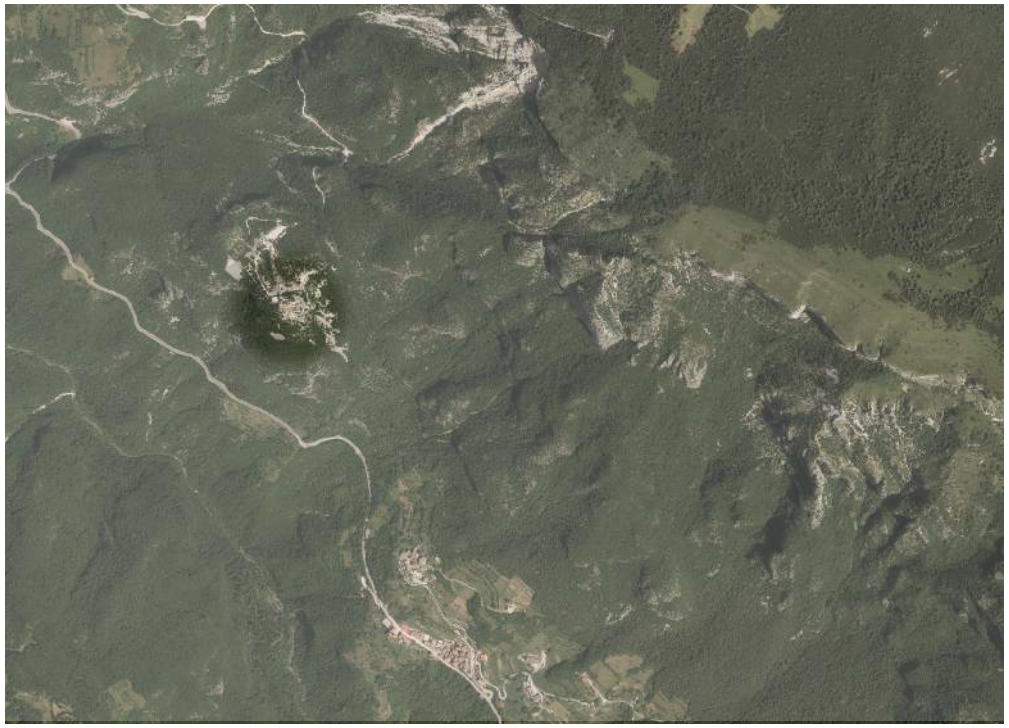


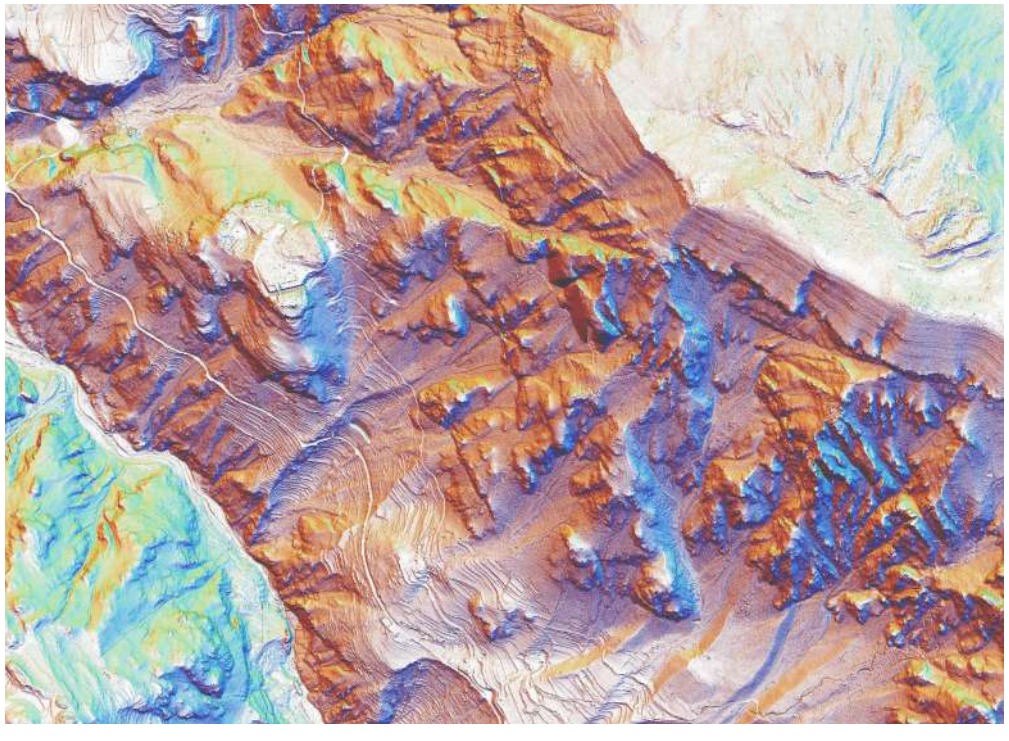
4ª GENERAZIONE

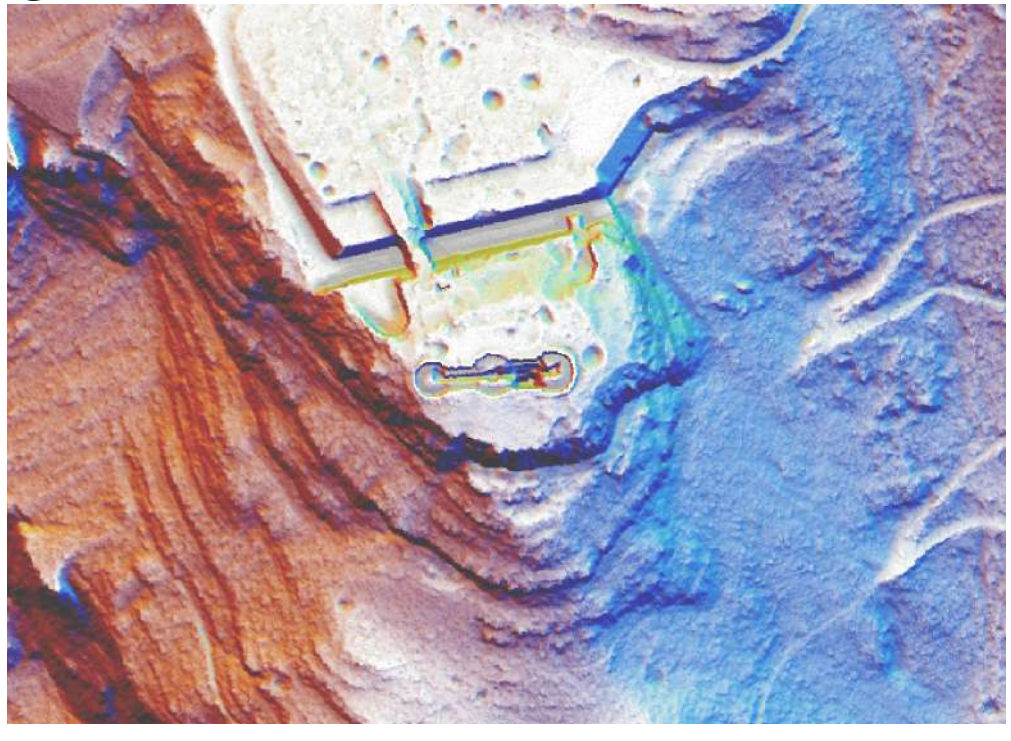




Forte Tombio, 1908-1912

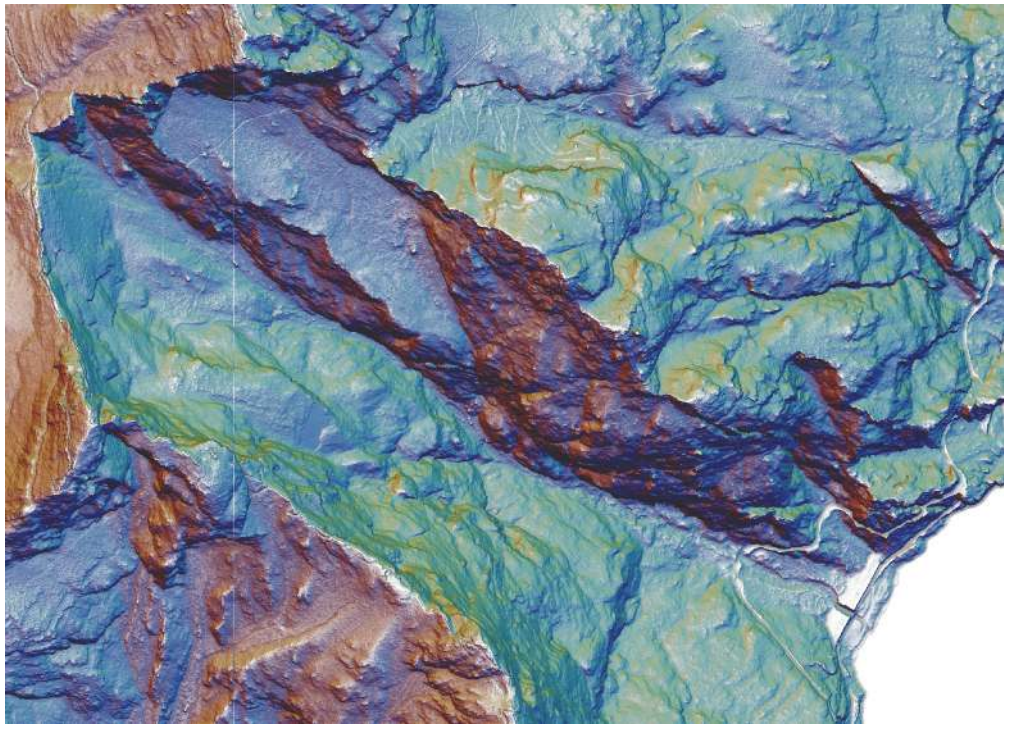


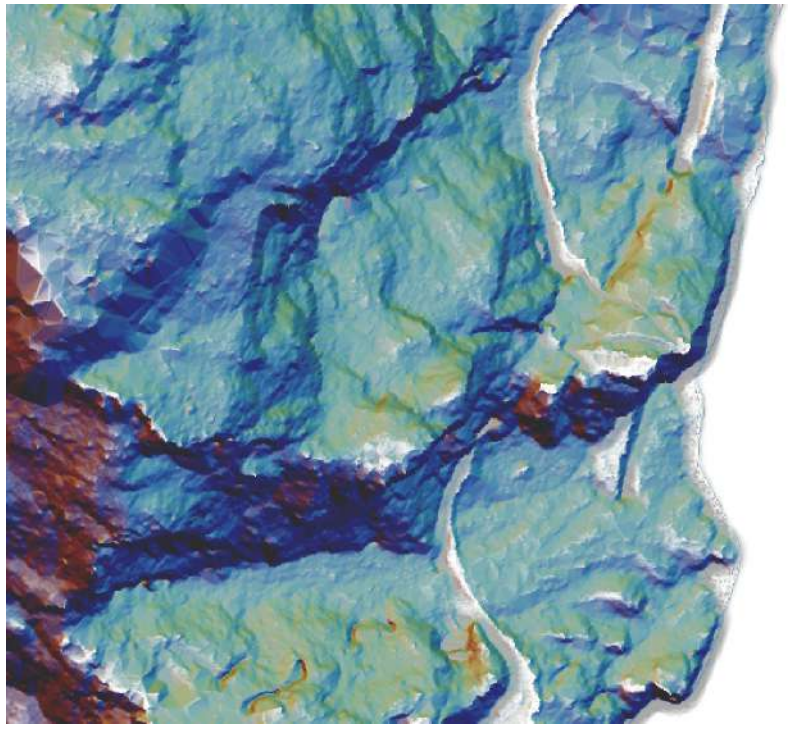




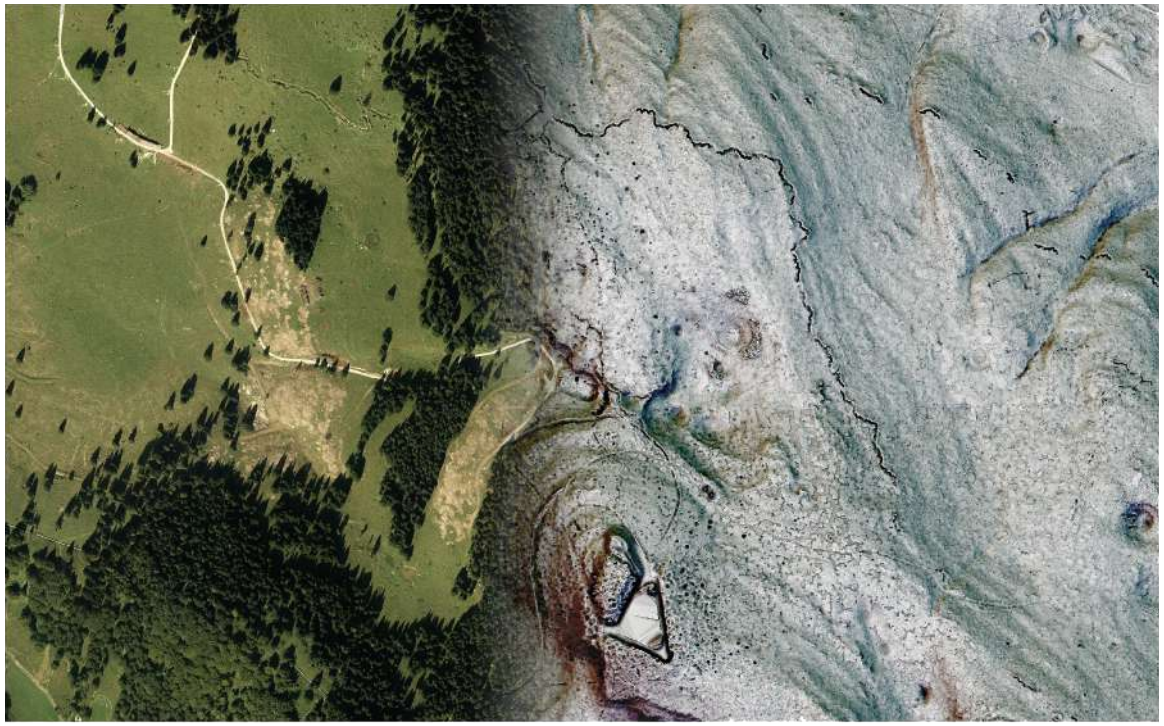
5ª GENERAZIONE

Forte Pozzacchio, 1912-1915





Tagliata del Ponale, 1860-1913



0 100 200 300 400 m

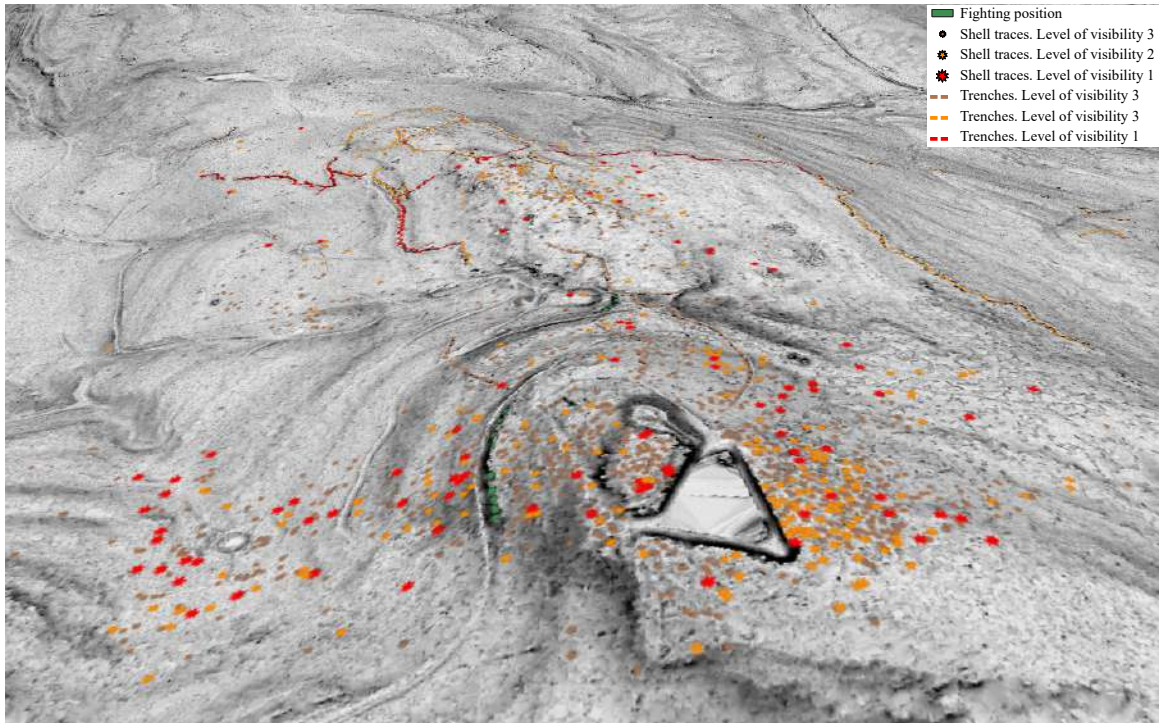


Table 1. Quantitative warscape recognition through orthophoto analysis

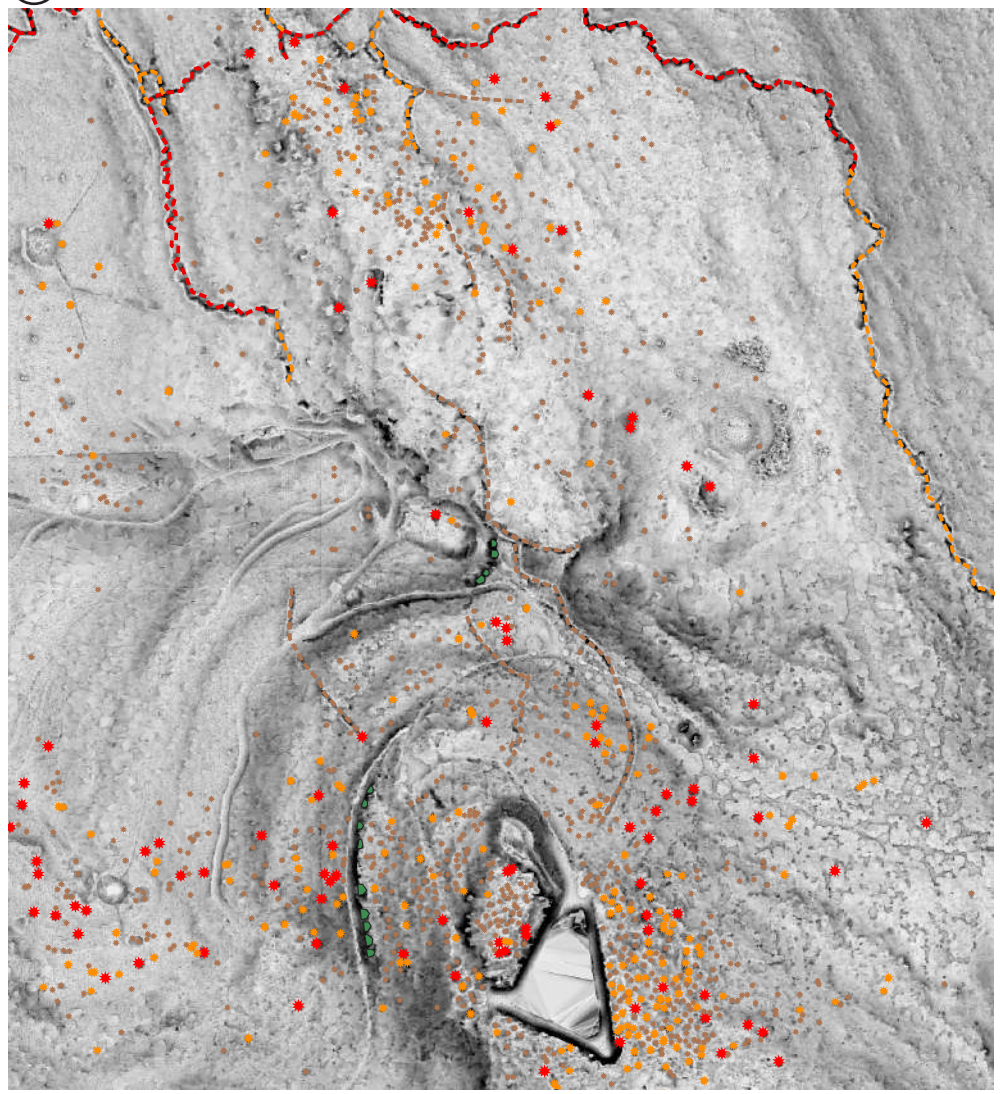
	Visibility Class 1
Shell traces	Nr. 103
Trenches	1381 m

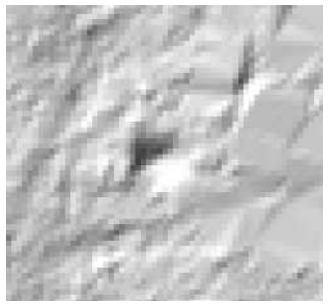
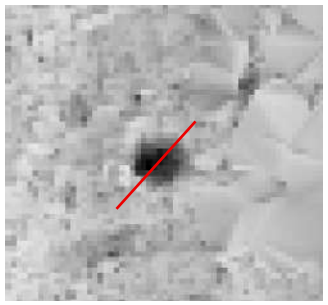
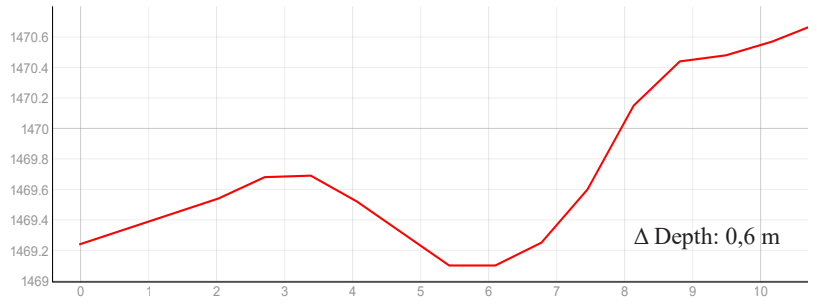
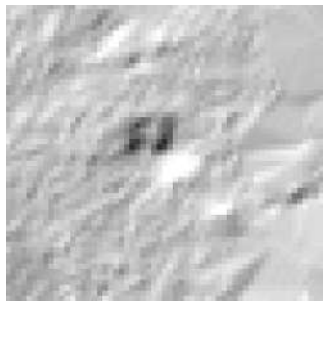
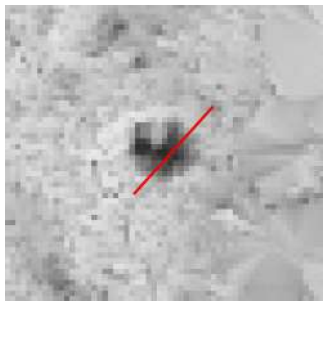
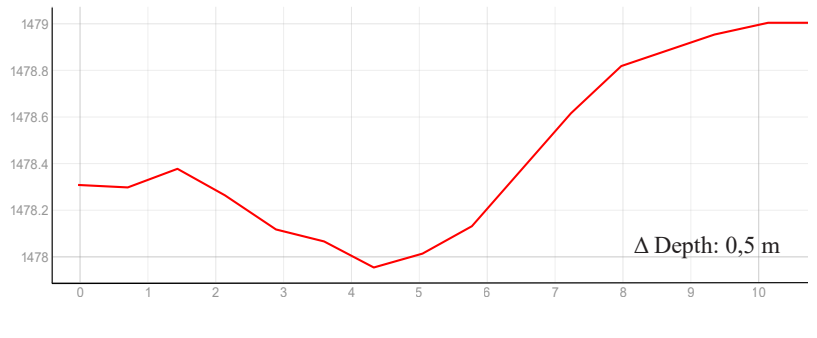
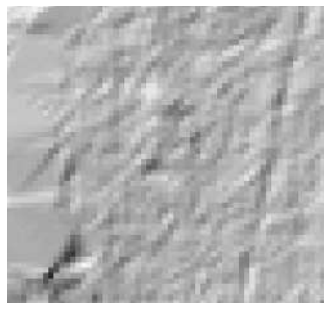
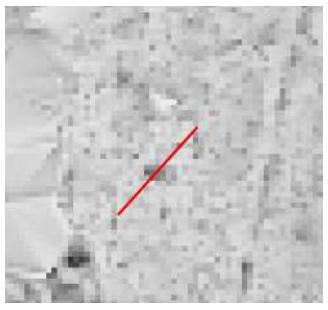
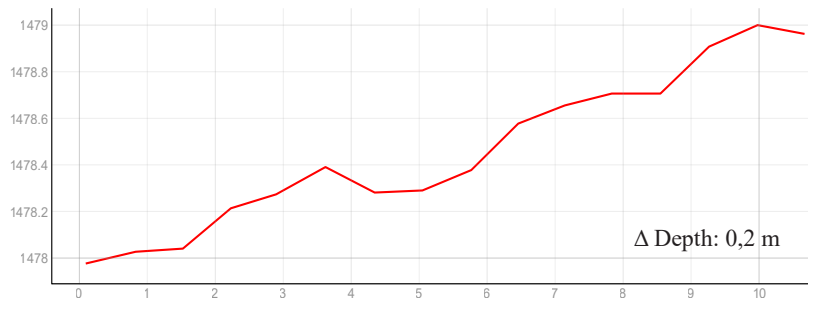
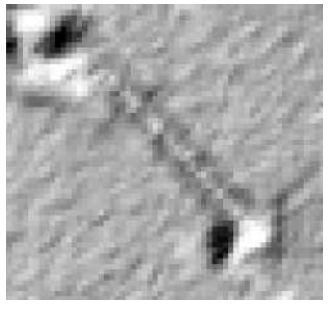
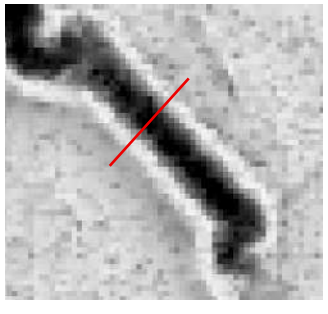
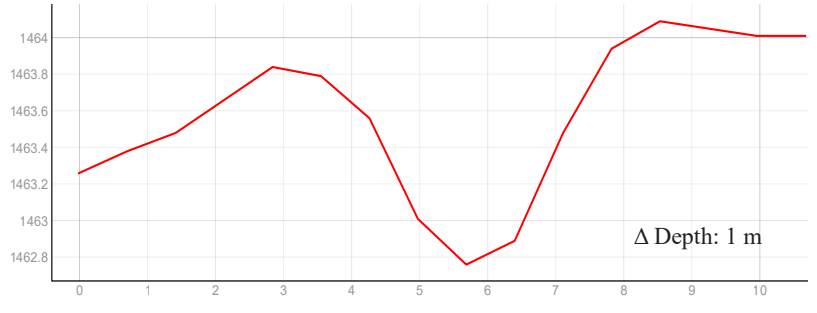
Table 2. Quantitative warscape recognition through Hillshade from multiple directions and Sky-View Factor

	Visibility Class 2	Visibility Class 3
Shell traces	Nr. 275	Nr. 902
Trenches	2378 m	969 m

N

0 50 100 150 200 m



	Orthophoto	Lidar	Hillshading	Sky-view factor	Profile (units=m)
Shell traces. Level of visibility 1					
Shell traces. Level of visibility 2					
Shell traces. Level of visibility 3					
Trenches. Level of visibility 1					

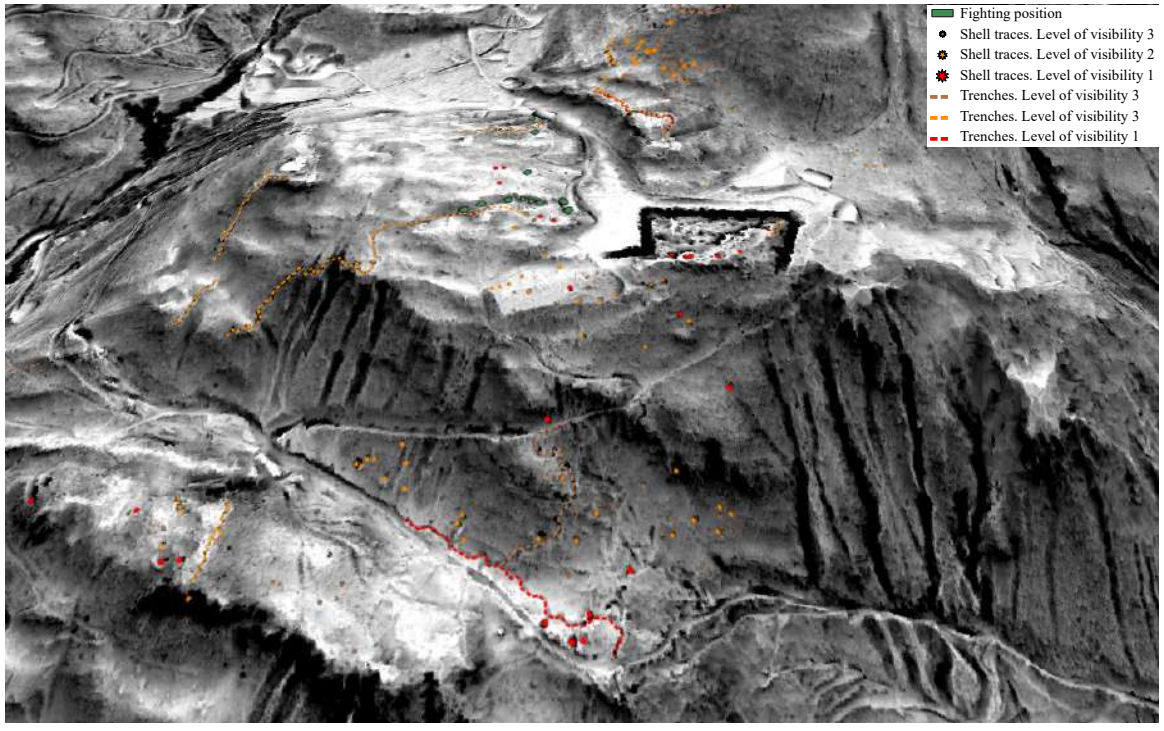


Table 1. Quantitative warscape recognition through orthophoto analysis

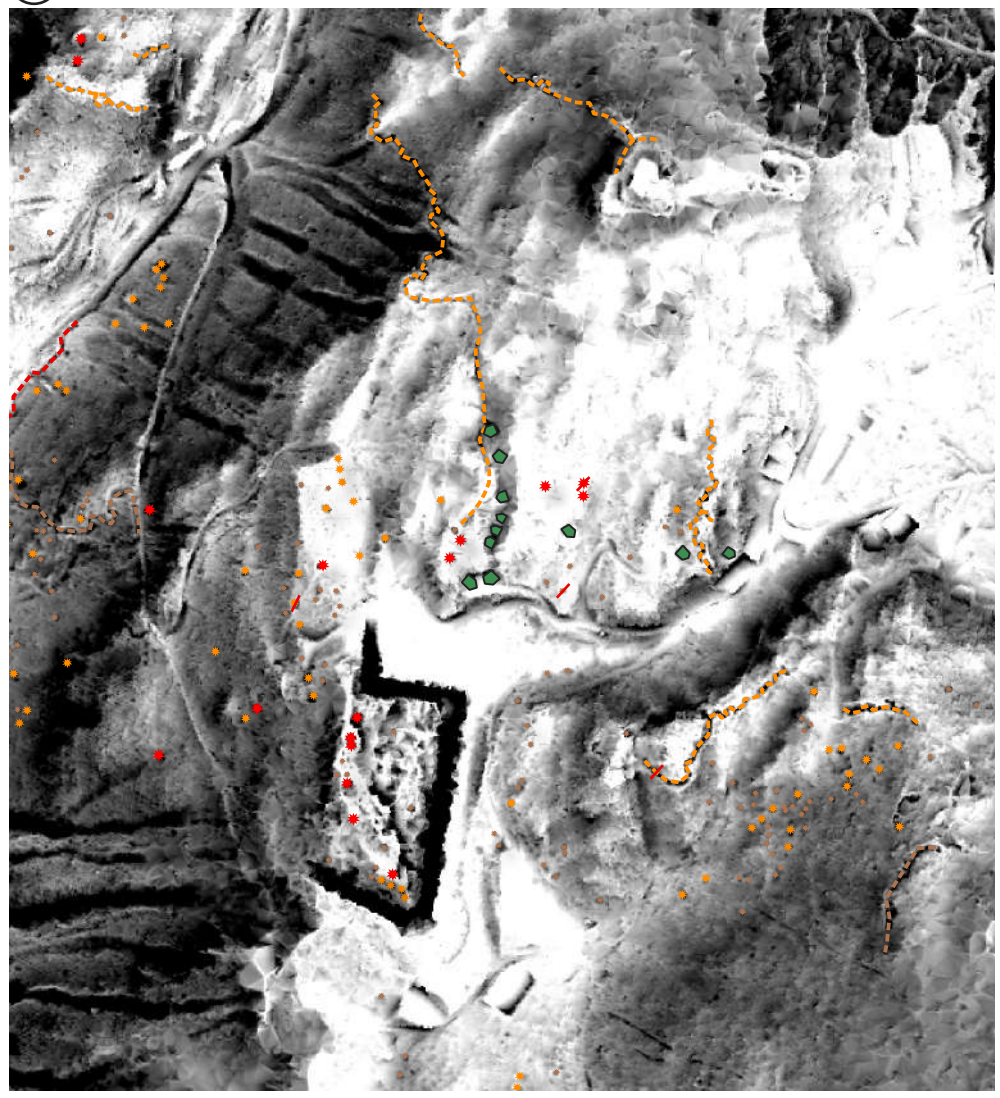
	Visibility Class 1
Shell traces	Nr. 24
Trenches	249 m

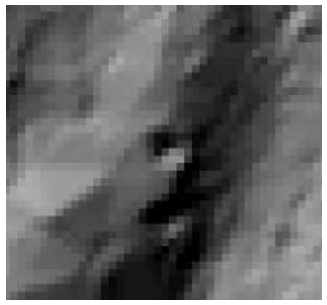
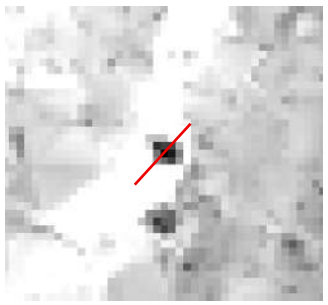
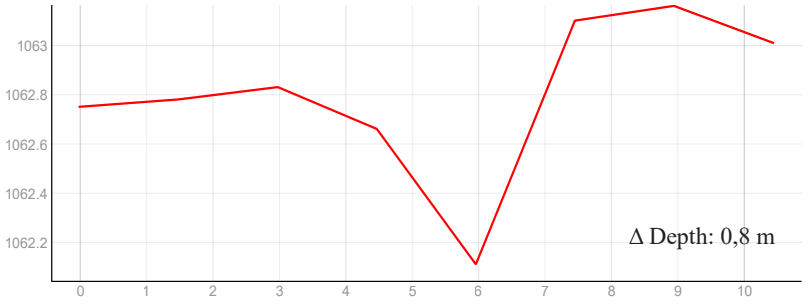
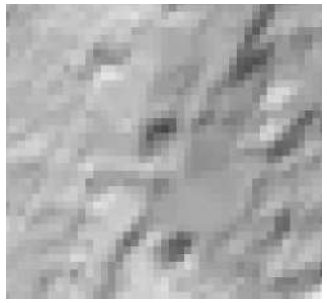
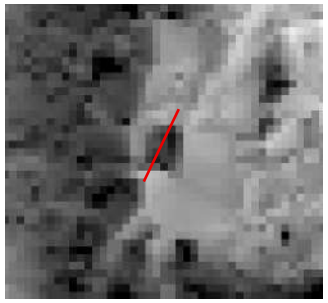
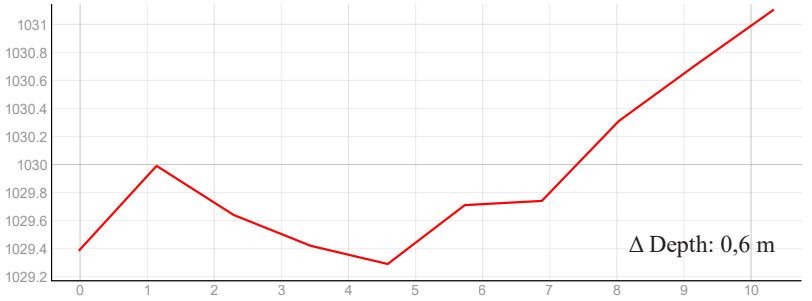
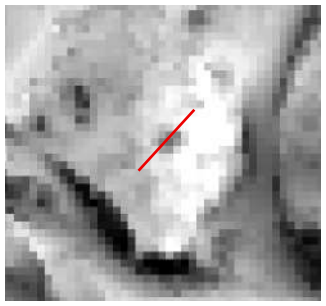
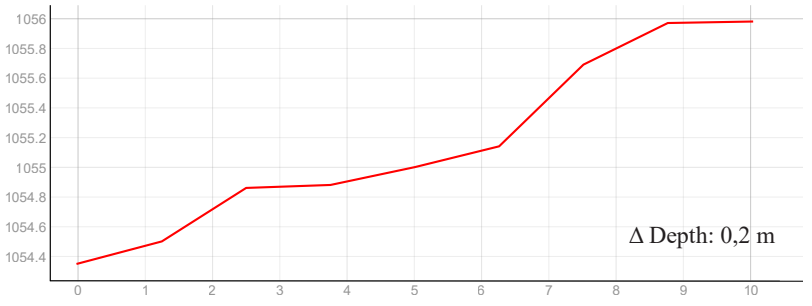
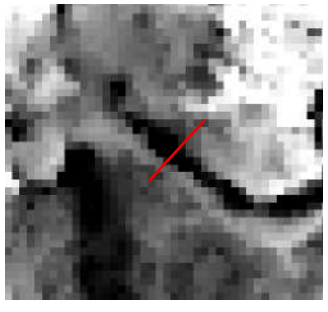
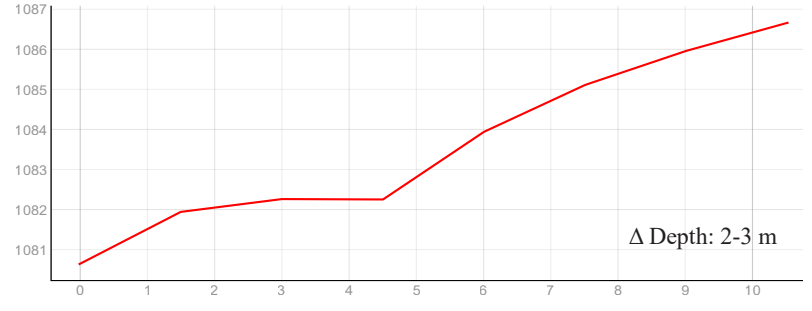
Table 2. Quantitative warscape recognition through Hillshade from multiple directions and Sky-View Factor

	Visibility Class 2	Visibility Class 3
Shell traces	Nr. 1102	Nr. 610
Trenches	340 m	597 m

N

0 50 100 150 200 m



	Orthophoto	Lidar	Hillshading	Sky-view factor	Profile (units=m)
Shell traces. Level of visibility 1					
Shell traces. Level of visibility 2					
Shell traces. Level of visibility 3					
Trenches. Level of visibility 2					

0 50 100 150 200 m

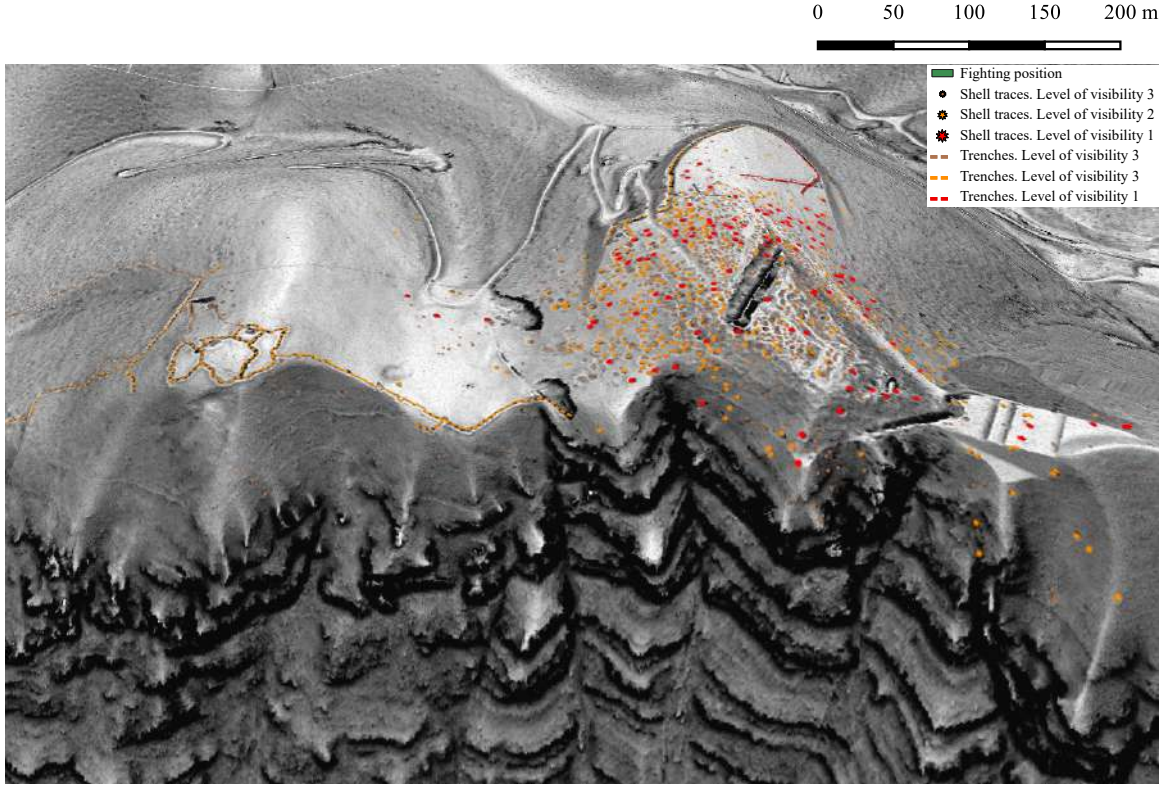


Table 1. Quantitative warscape recognition through orthophoto analysis

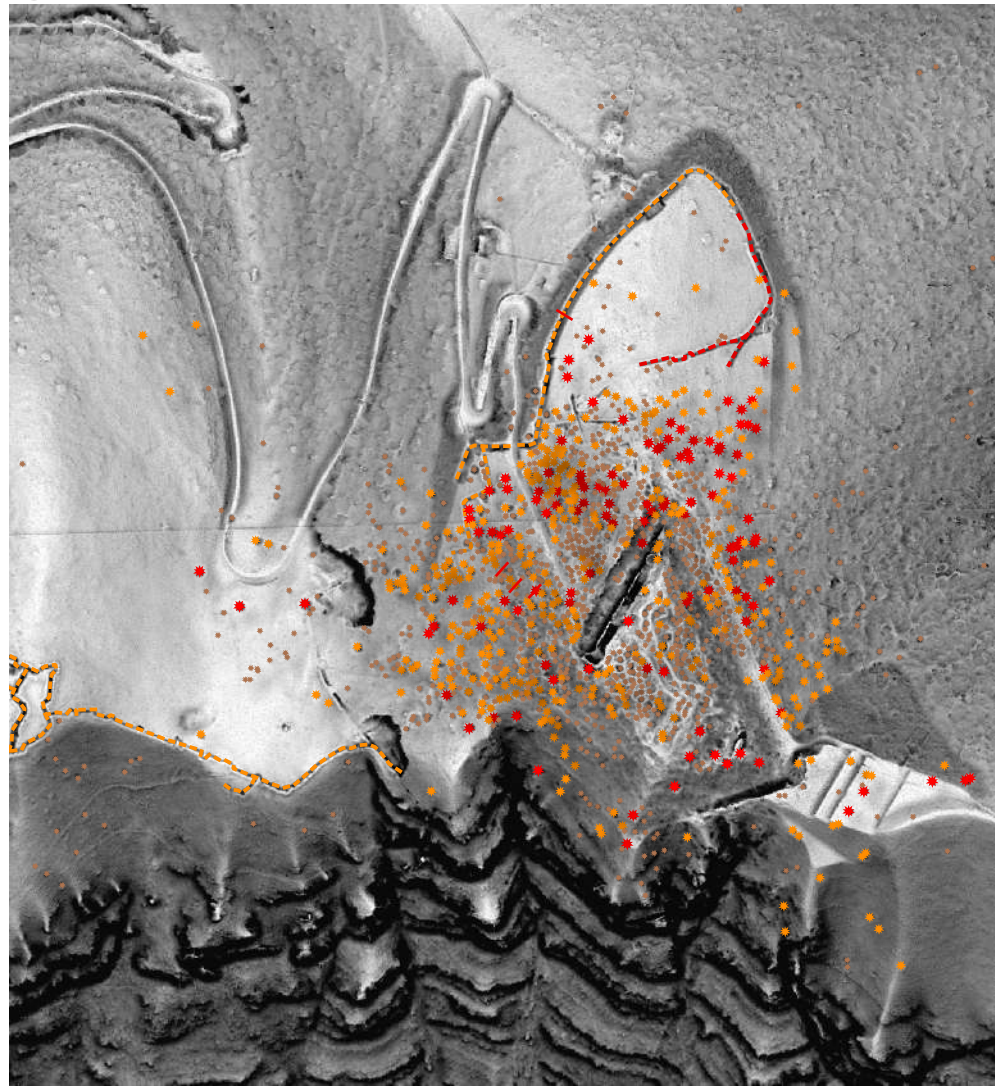
	Visibility Class 1
Shell traces	Nr. 121
Trenches	193 m

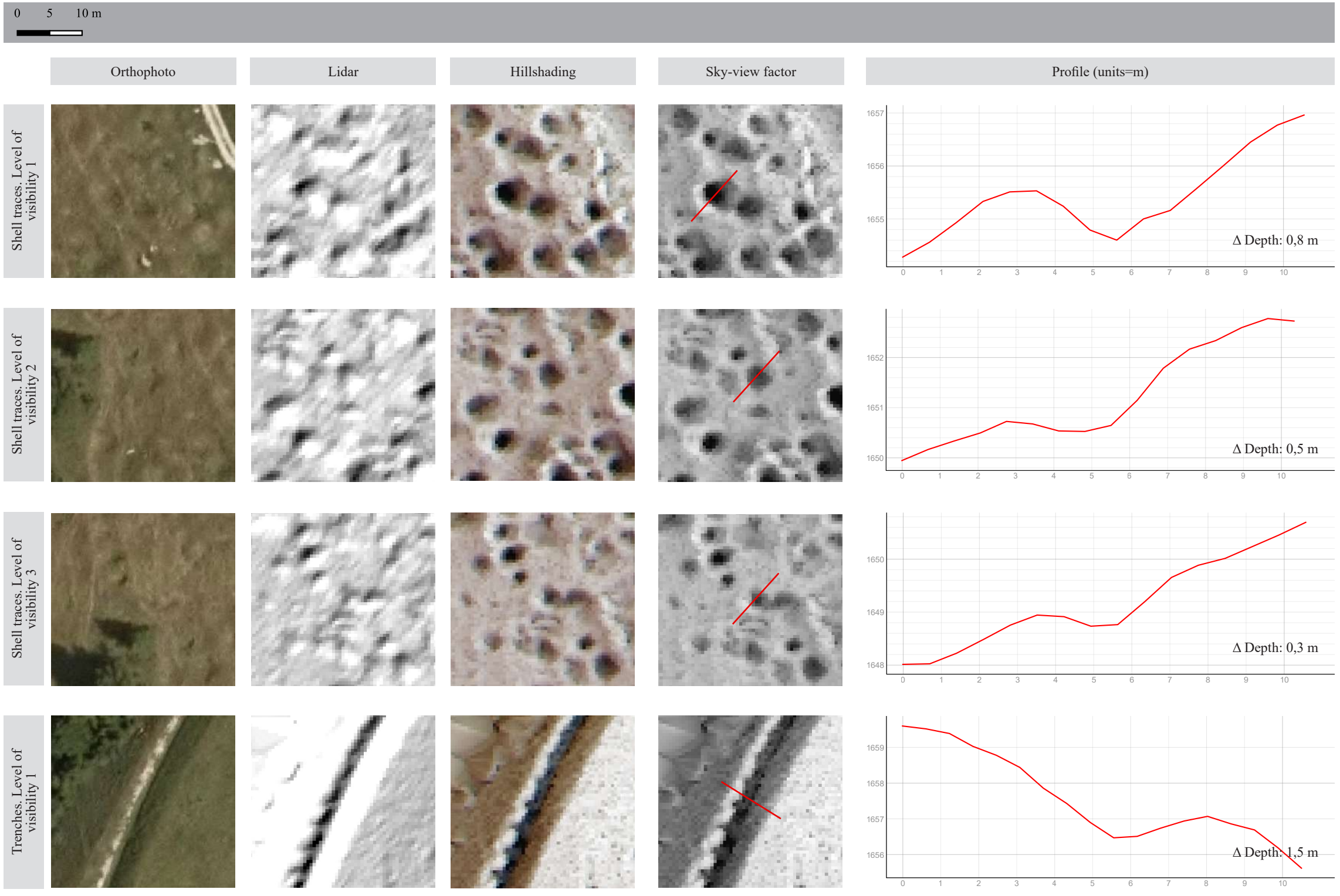
Table 2. Quantitative warscape recognition through Hillshade from multiple directions and Sky-View Factor

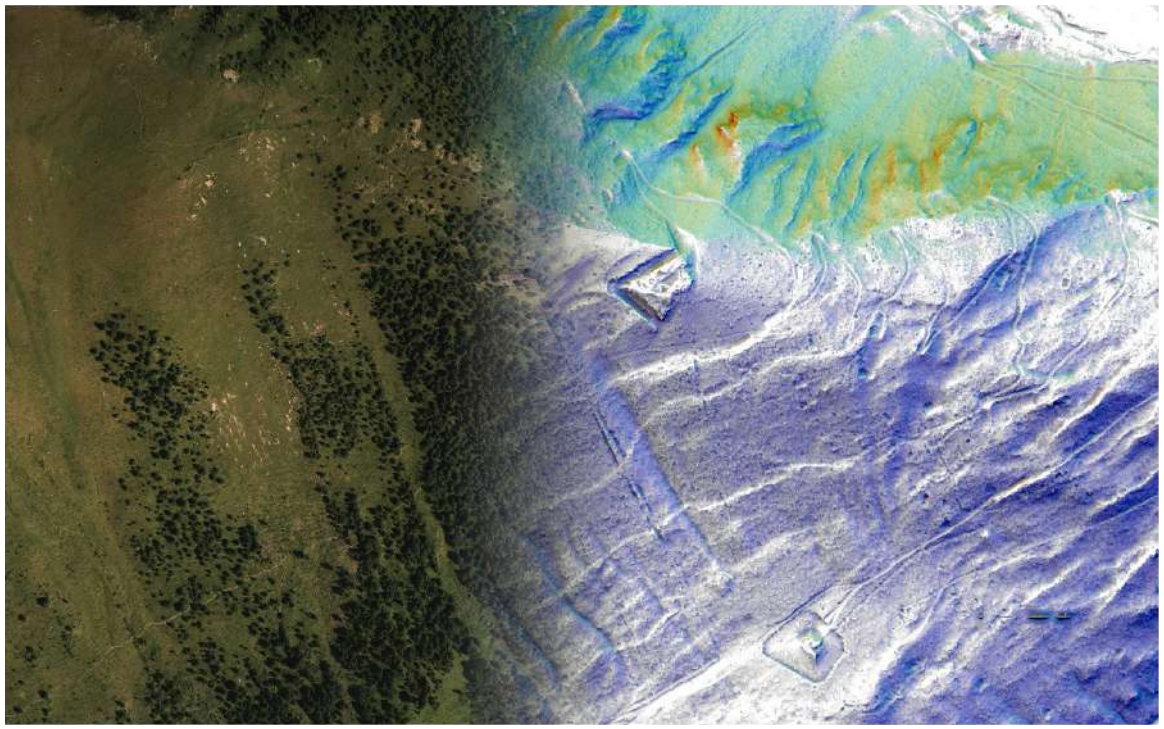
	Visibility Class 2	Visibility Class 3
Shell traces	Nr. 399	Nr. 857
Trenches	1856 m	634 m

N

0 50 100 150 200 m




0 5 10 m
Orthophoto
Lidar
Hillshading
Sky-view factor
Profile (units=m)
Shell traces. Level of visibility 1
Δ Depth: 0,8 m
Shell traces. Level of visibility 2
Δ Depth: 0,5 m
Shell traces. Level of visibility 3
Δ Depth: 0,3 m
Trenches. Level of visibility 1
Δ Depth: 1,5 m



0 100 200 300 400 m

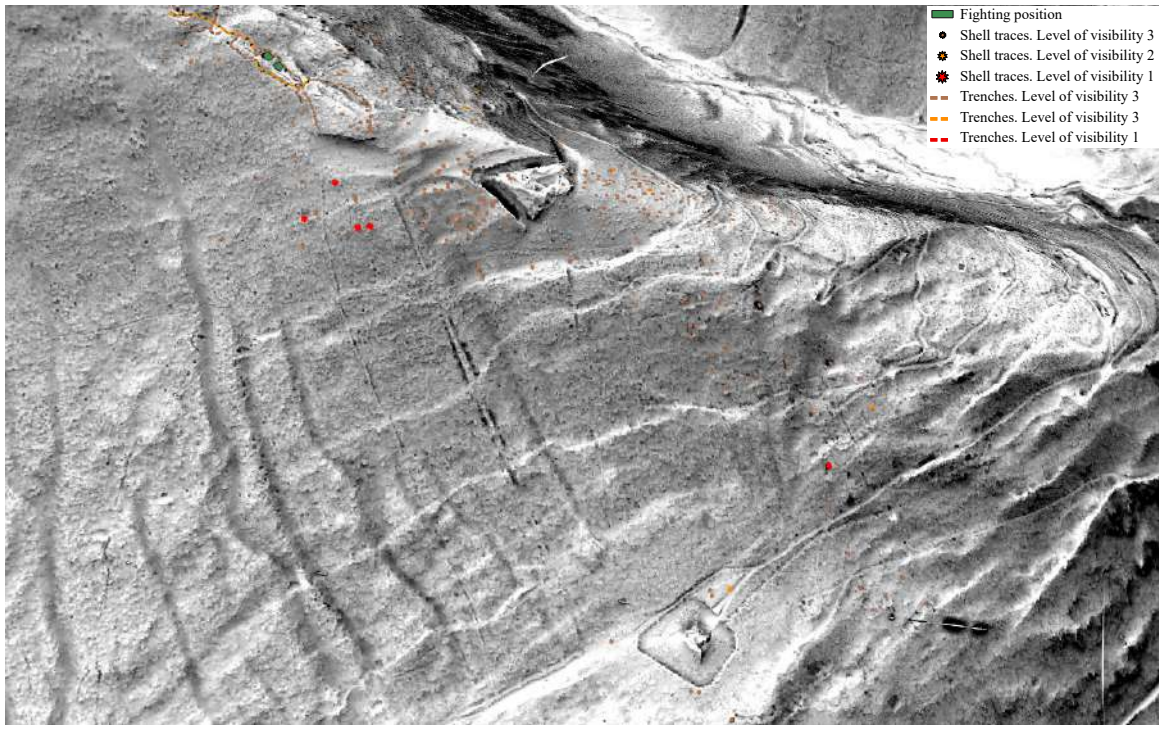


Table 1. Quantitative warscape recognition through orthophoto analysis

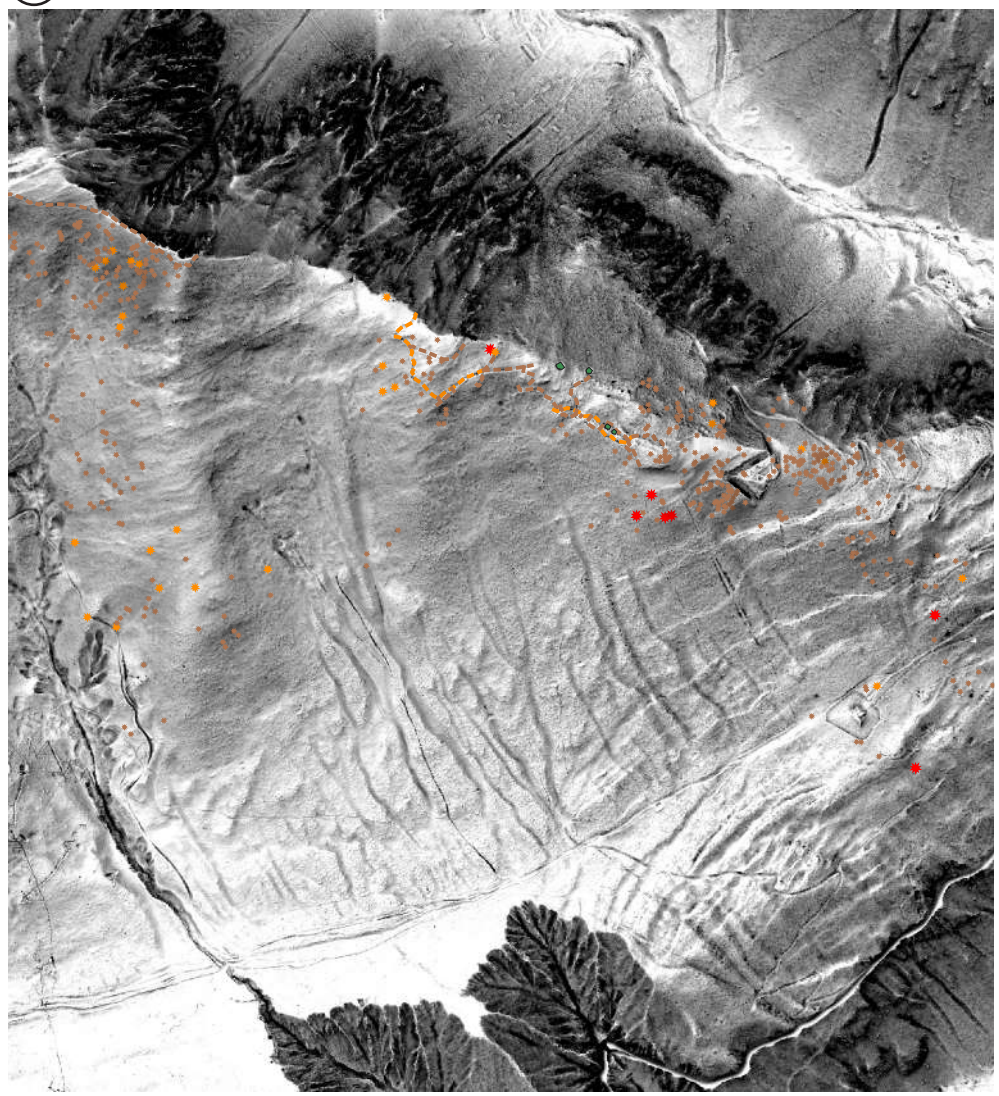
	Visibility Class 1
Shell traces	Nr. 7
Trenches	0 m

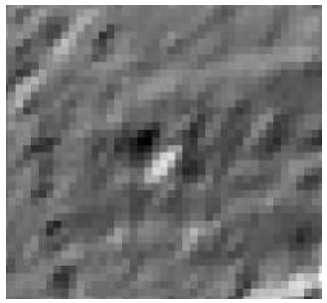
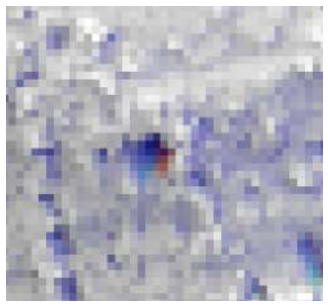
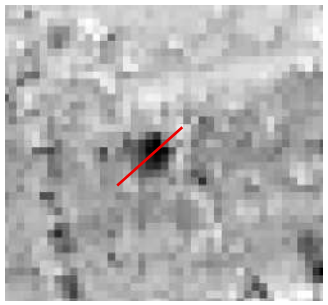
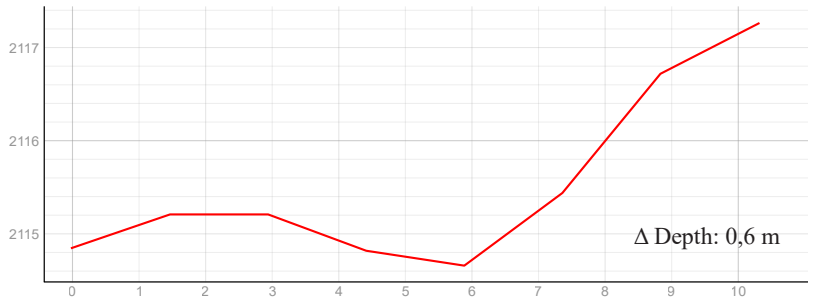
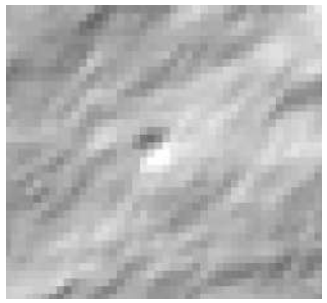
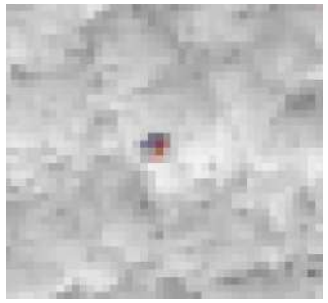
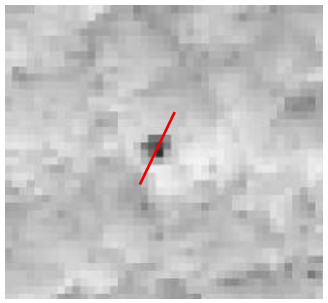
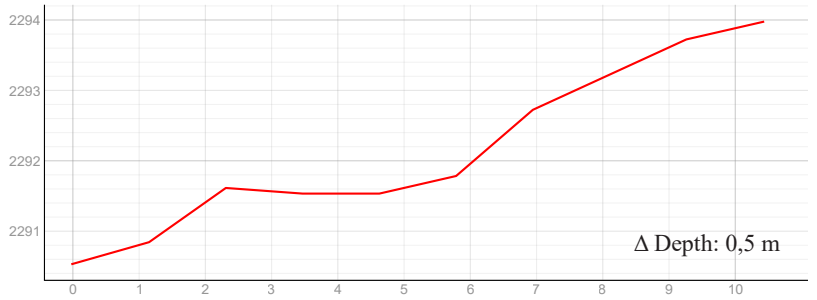
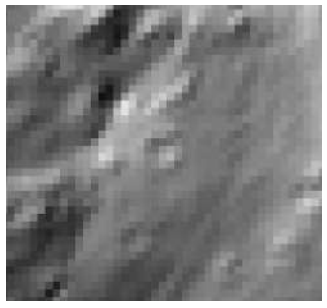
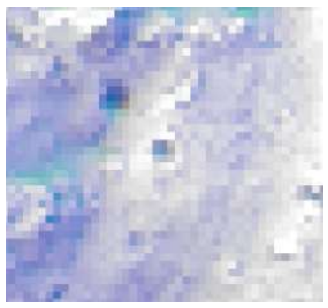
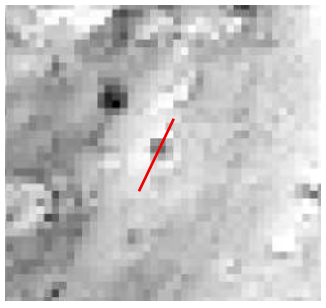
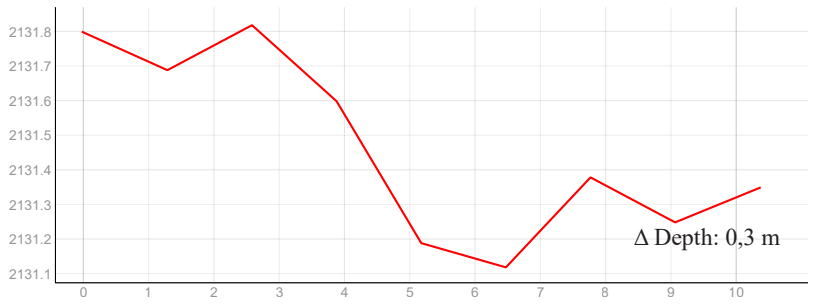
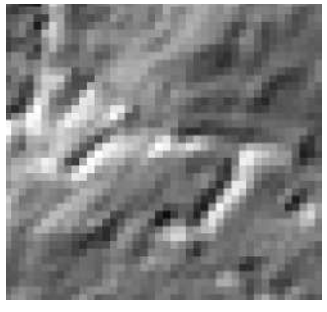
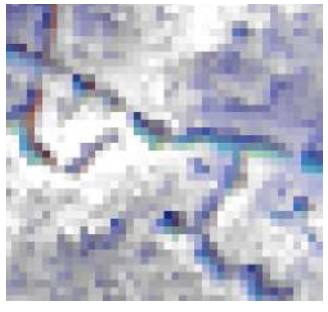
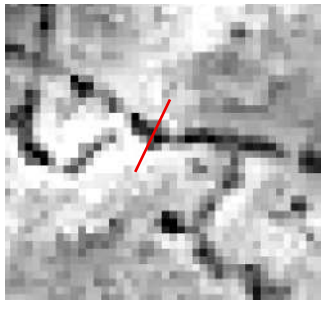
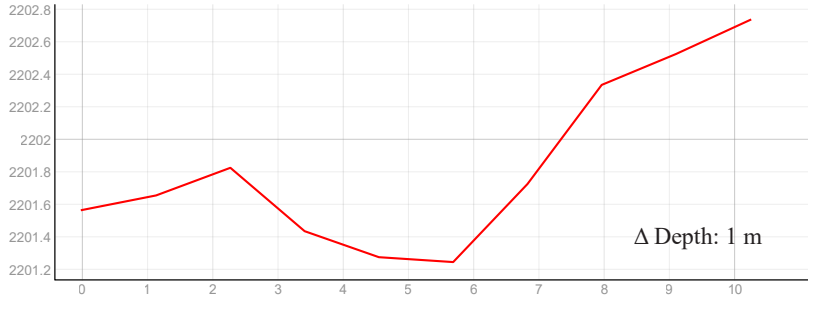
Table 2. Quantitative warscape recognition through Hillshade from multiple directions and Sky-View Factor

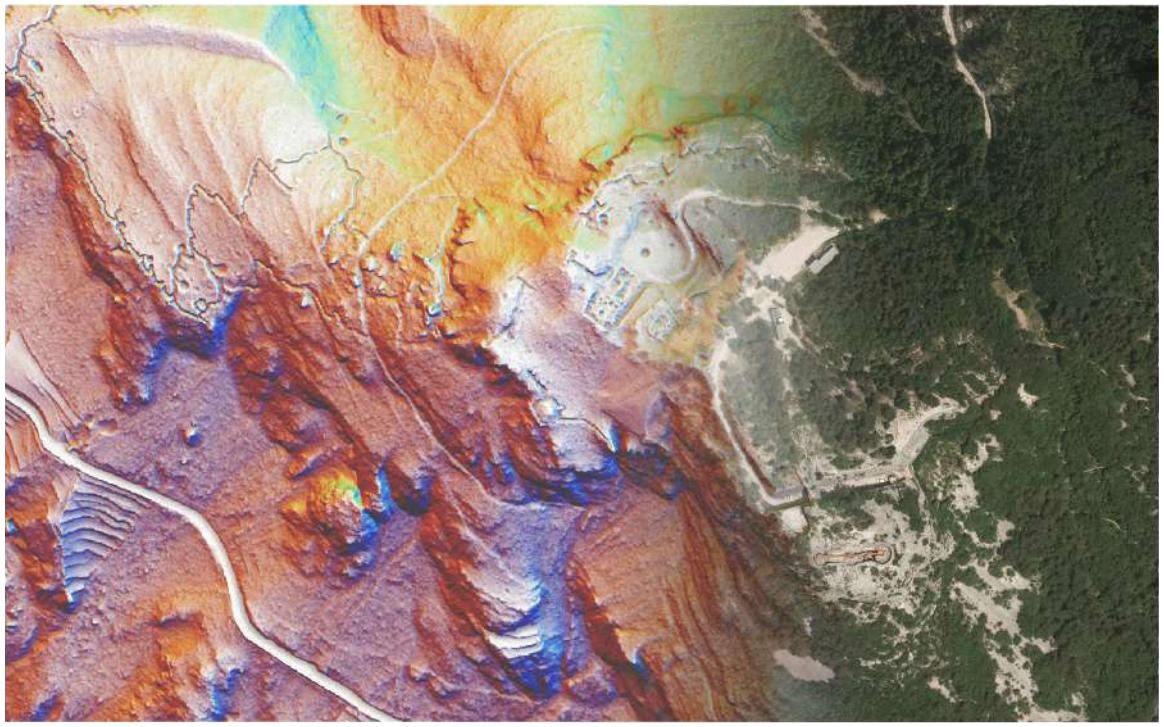
	Visibility Class 2	Visibility Class 3
Shell traces	Nr. 27	Nr. 449
Trenches	539 m	1465 m

N

0 150 300 450 600 m



	Orthophoto	Lidar	Hillshading	Sky-view factor	Profile (units=m)
Shell traces. Level of visibility 1					
Shell traces. Level of visibility 2					
Shell traces. Level of visibility 3					
Trenches. Level of visibility 2					



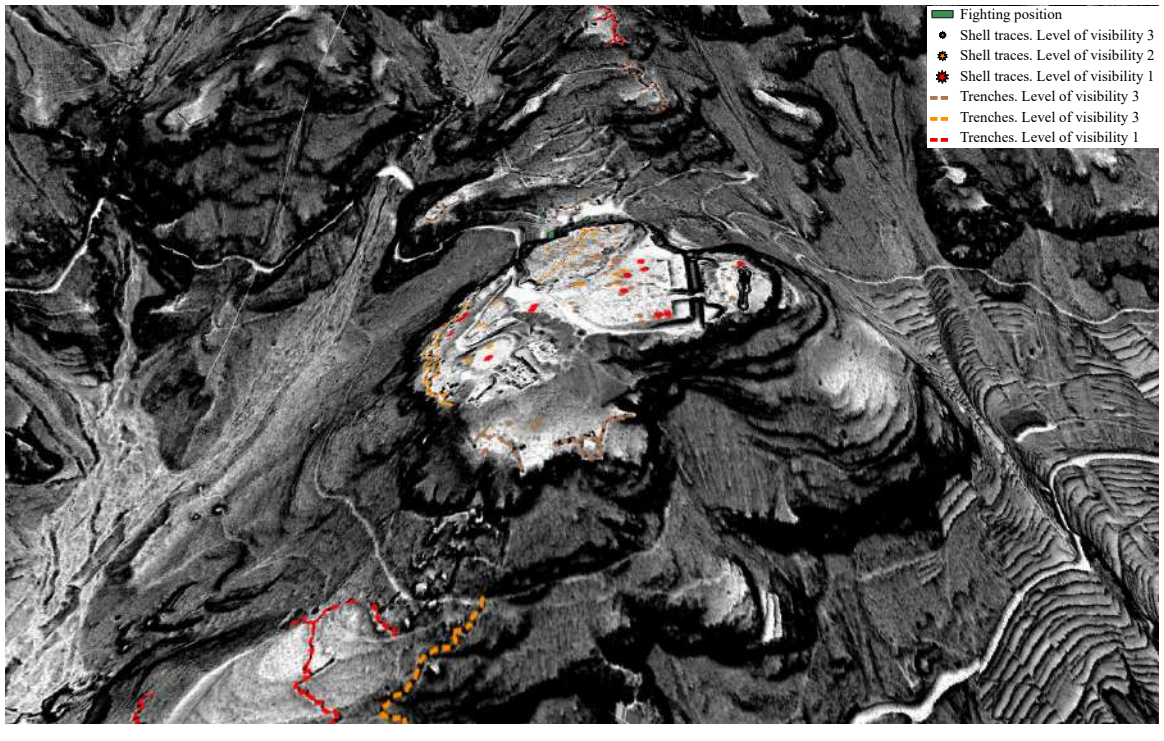
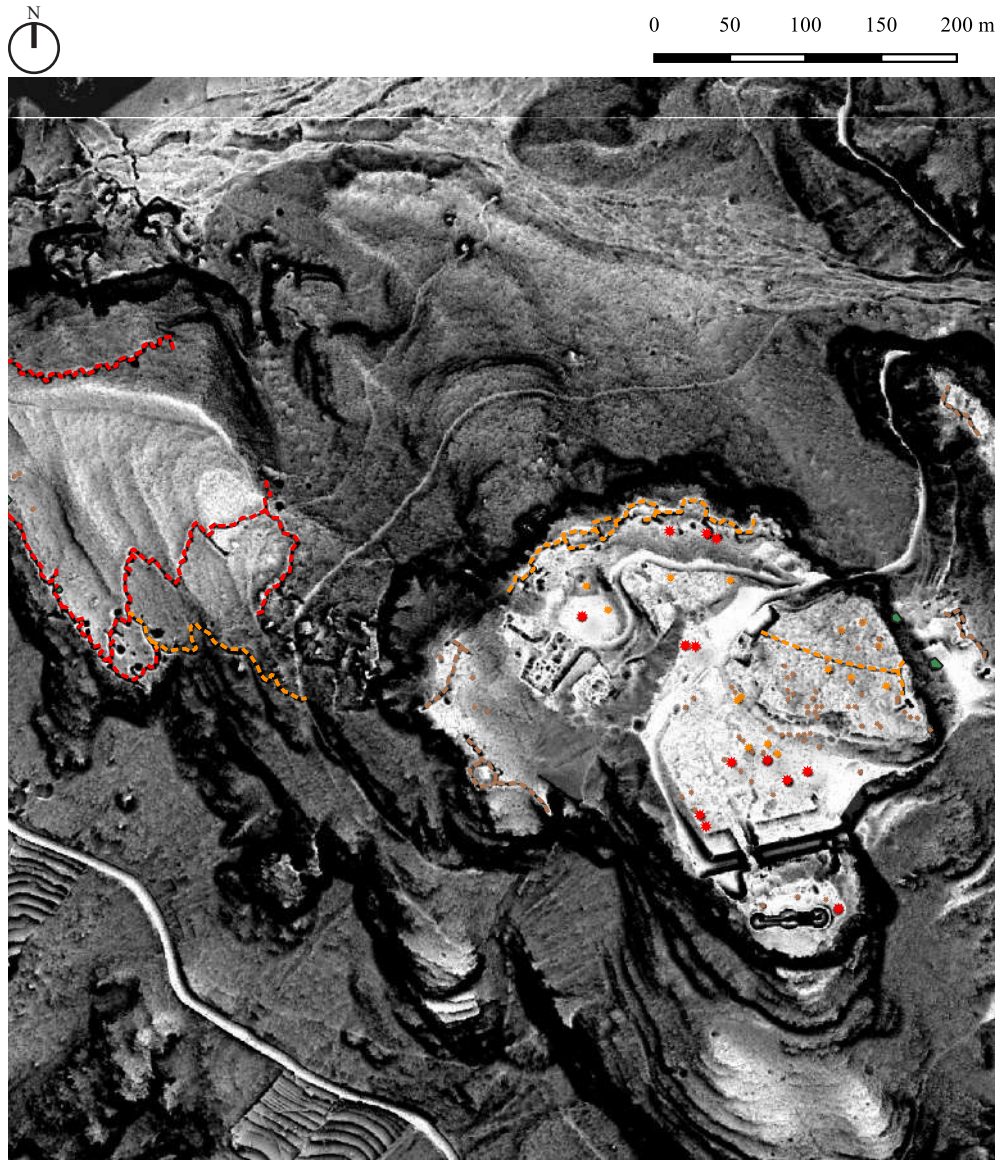


Table 1. Quantitative warscape recognition through orthophoto analysis

	Visibility Class 1
Shell traces	Nr. 13
Trenches	1706 m

Table 2. Quantitative warscape recognition through Hillshade from multiple directions and Sky-View Factor

	Visibility Class 2	Visibility Class 3
Shell traces	Nr. 15	Nr. 68
Trenches	772 m	505 m



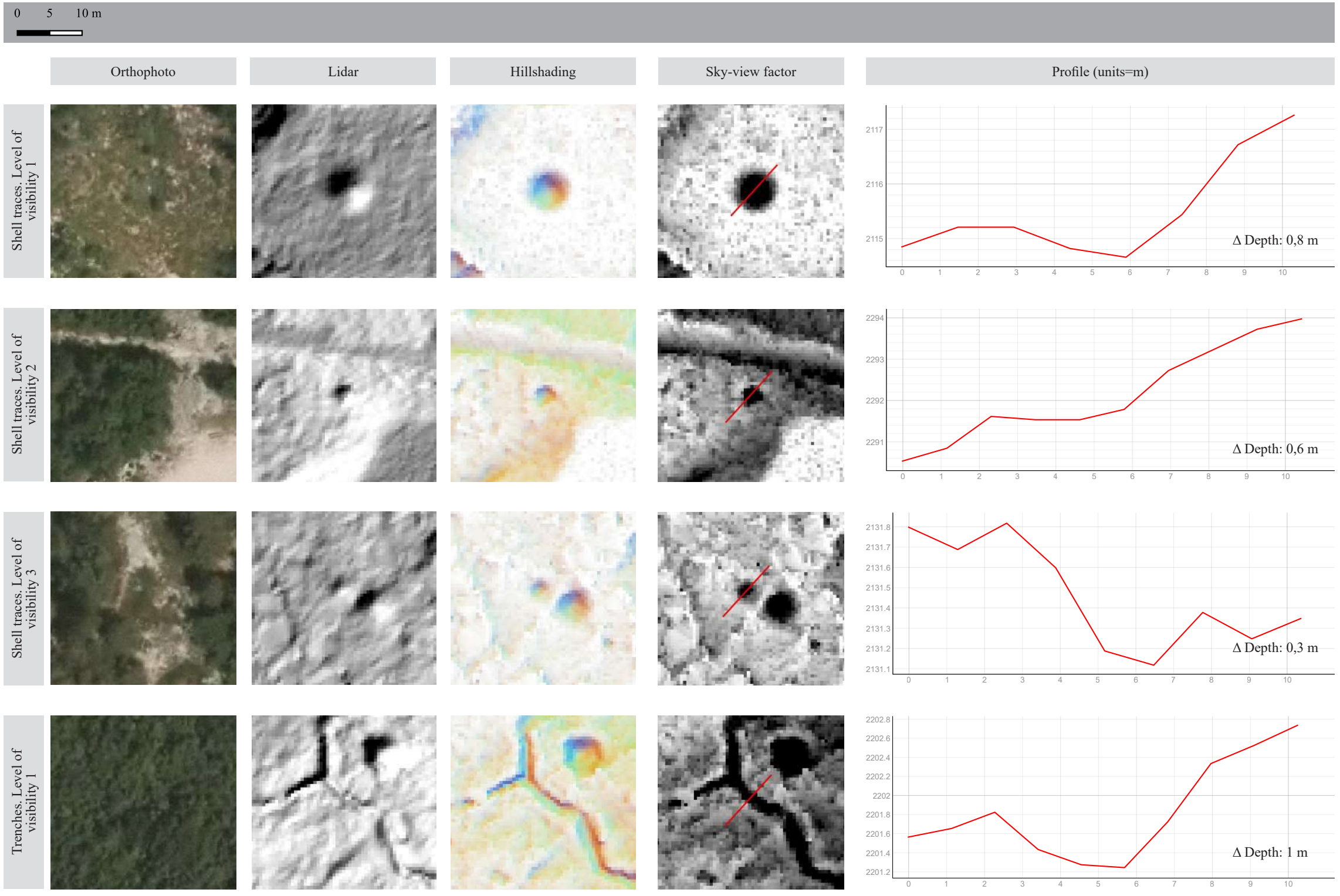

0 5 10 m
Orthophoto
Lidar
Hillshading
Sky-view factor
Profile (units=m)
Shell traces. Level of visibility 1
2117
2116
2115
Δ Depth: 0,8 m
Shell traces. Level of visibility 2
2294
2293
2292
2291
Δ Depth: 0,6 m
Shell traces. Level of visibility 3
2131.8
2131.7
2131.6
2131.5
2131.4
2131.3
2131.2
2131.1
Δ Depth: 0,3 m
Trenches. Level of visibility 1
2202.8
2202.6
2202.4
2202.2
2202
2201.8
2201.6
2201.4
2201.2
Δ Depth: 1 m
0 1 2 3 4 5 6 7 8 9 10

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Table pp. 613	Personal photographs J. Aldrighettoni
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Chapter 9

The new paradigm as a method for the “cure” of (Great War)-scapes: final considerations and future perspectives

“Just over a hundred years ago, the First World War profoundly disrupted the landscape of Europe: from the fields of Galicia to the French plains, from the Alpine arc to the coasts of the Baltic Sea, position and trench warfare brought about transformations by etching the land, carving out mountains, reorganizing territorial arrangements and original environmental ecosystems, leaving room for the stratification of new traces and meanings that, over time, have contributed to the construction of what is now universally recognized as a fragile cultural heritage of high complexity”.

These considerations have been used in the introductory chapter to declare the object of study of this research: a highly complex heritage already widely studied at the international level from multiple points of view but which, despite this, presents several critical issues and questions, challenging both to focus on and to try to solve.

To begin to understand this complexity, in Chapter 2, the dynamics of development and implementation of militarization plans elaborated by the different military Geniuses in close relation to the different territorial contexts of insertion were examined in detail. Thanks to the comparative analysis of the fortification practices implemented in the various countries that took part in the world conflict, it was possible to outline a more precise picture of the vastness and heterogeneity of permanent, temporary, and field works that represented the “constituent elements” of the great “war machine”: a veritable assembly of “functional components” reciprocally connected by an intricate system of tangible and visual infrastructures.

Thanks to the historical-critical excursus developed in chapter 2, it was possible to better understand, on a European scale, not only the dynamics underlying the fortification plans elaborated before and

during the conflict, but also the main driving forces that have influenced the remains from the first post-war period to the present day.

In fact, over time, these connective systems have been progressively weakened, and the vestiges themselves have experienced a gradual process of degradation and abandonment that has led to the current condition of fragility in which the majority of the "material remains" of the vestiges are located.

Thanks to the examination of the status quo of places and artifacts, it was possible to understand better how the remains of the Great War are still today a fragmented heritage at "risk of loss", despite the renewed interest that has developed towards this type of heritage since the '70s and up to the celebrations for the Centenary.

Operationally, a problem of scale has clearly emerged: the pregnant strength of the remains as a "system" deeply connected not only by a physical infrastructure of field fortifications, entrenchments, barracks and obstacle courses, but also by a dense network of intangible and visual relationships that substantiated its operation, is today increasingly weakening. In confirmation of this, the analysis files elaborated in Chapter 2.2 also showed how the fragmentation of the interventions and their management policies, at a general level, also reverberates at a detailed scale in the less attention paid by the majority of the projects carried out concerning the permanent fortifications and the articulated entrenched systems that surrounded them and constituted an integral part of them.

To solve this interpretative-operative gap, a multiscalar approach has been elaborated capable to grasp the intangible wholeness of the system-vestiges, today broken, focusing not on the fragments as "remains of a whole that no longer exists", but on the potential that they can still generate today if put in tension with each other: a magnetic field able to bind the different parts and recompose their meanings.

In this way, it was possible to begin to realize the intent, stated in the introduction of this research, to return to investigate the "landscapes of war" by setting up a new "search for meaning" to understand how these remains can continue to narrate their "being in time" to future generations, stimulating "possibilities of memory" and representing at the same time substantial resources, cultural but also economic, for the future. This has led to move away from the specificity of individual disciplinary knowledge to embrace instead a holistic approach across the board able to put at the center the warscape and analyze it in its entire nature and biography, through a cognitive process simultaneously inductive and deductive, studying not only the theoretical and methodological aspects of spatial analysis, but also the relationships between the socio-cultural, historical and anthropological factors that have defined its development.

Therefore, in Chapter 3, the dynamics of transformation of militarized landscapes stratified in different times (pre-war, wartime, and post-war) by multiple driving forces of different nature have been integrated with the considerations obtained through some unprecedented “way of seeing” of this heritage (from above, from inside, internal, transcendent). In this way, it was possible to begin to understand how the complexity of the different warscapes is not only linked to the vastness and heterogeneity of the “material remains” that constitute them but refers above all to the semantic multi-layering that they contain.

The awareness of this complex multi-layering with a strong impact both material and cultural has allowed us to understand how the conflict has not only deposited a “layer of signs” on militarized territories, but it has permeated them so deeply as to become themselves “warscapes”, multi-”signed” palimpsests, full of meanings and traces. In other words, through these analyses, it was possible to begin to recognize the indissoluble symbiosis between physical “signs” and intangible values deposited in different times as a specific peculiarity of the “character” of “war landscapes”, thus recognizing precisely in this mixture of material and intangible aspects the quidditas that distinguishes them from any other type of heritage and defines their most authentic specificity to be learned to recognize, understand and safeguard for future generations.

In this sense, it was possible to identify a sort of meta-realistic dimension of the different warscapes, concerning whose understanding should be set the future choices regarding the fate of this heritage, in terms of protection, conservation, and transformation. To this end, it was decided to go beyond the traditional cognitive approaches of the different disciplinary sectors to adopt a broader, holistic vision, able to recover the original systemic-military to put the warscape at the center and study it about how it is perceived by the man who observes and experiences it. In other words, a new transdisciplinary perspective has been gradually identified that moves from the need to recover a global knowledge of the organism-landscape, studying, in particular, its potentialities and fragilities starting from its internal connections and its constitutive links.

Operationally, this approach is declined through two contemporary levels of research.

In order to recover a systemic vision also in the analytical phase, as an essential moment to consciously set up future operative proposals, an order matrix was defined to re-read the complexity: by putting into system the building typologies with the different morphologies of the territories, it was possible to identify some “war-scape classes”, useful to interpret the fragmentary nature of the different “war landscapes” through the identification of both the driving forces that had determined their construction, in different times and the same ones that can determine

the trajectories of future change. Through this critical re-reading, it was possible to reinterpret the status quo of places and artifacts, already addressed previously, reducing the complexity without, however, "falling" into inappropriate semantic simplifications. In light of the considerations thus obtained, it was possible to elaborate a SWOT matrix of the most relevant potentials and criticalities to bring out the most significant issues concerning which to understand how future practices of conservation and enhancement can be set up. The considerations that emerged from the SWOT analysis immediately highlighted how the "war landscapes" constitute a heritage of high identity value, able to reactivate the memory in those who observe and cross it. In addition, the virtuous processes that can be developed from the recognition of this cultural capital can represent fertile opportunities for revitalization and development, including economic, for the territories in which the remains are included. As for the critical issues that have emerged, the "weak nuclei" that have been highlighted by this approach essentially concern three issues deeply interrelated: the fragility declined to the scale of individual artifacts, and therefore connected to the problems concerning the state of conservation of the remains and the level of degradation, including structural, in which they are located; the difficult recognizability of the set of remains as a "system", and therefore the deep links between permanent works and their entrenched surroundings in which the most fragile "signs" in terms of permanence are currently at "risk of loss"; the issues related to the management and enhancement of this heritage, particularly in the active role of the various stakeholders involved in the processes of conservation and transformation.

Parallel to these considerations, the second operational declination of the holistic approach outlined in Chapter 3 was translated into a reflection at the theoretical level concerning the recognition of the "landscapes of war" as "stores of memories". In order to fully understand the indissoluble symbiosis between the "material remains" of the relics and the intangible values deposited in them, it is, in fact, necessary to know the processes underlying the great theme of the "construction of memory" of the Great War, from the socio-cultural "wounds" downstream of the conflict to the "rhetoric of commemoration", in order to learn to understand the different warscapes as "high-capacity condensers of values" in which the intensity of the potential (the meaningfulness of meanings/new re-significations) is directly proportional to the charge that is generated when the relations between the different poles are strengthened (archipelago of vestiges as fragments). After a necessary historical-critical framework of the practices of narration developed from the first post-war period to the present day, in the second part of Chapter 5, the different reflections concerning the deep semantic relationships between "physical signs" and intangible values have been

put in order, managing to better define that “character of exceptionality” already introduced in Chapter 3, that quidditas of values whose awareness represents an essential requirement for those who want to “take care” of this heritage in order to safeguard “future possibilities of memory”. Elaborating on these considerations, it was possible to identify in the physical space of the threshold between “the visible and the submerged” the “dense and pregnant” place where the imprint of the war was more widely manifested, both on a physical level in the matter marked by the material traces linked to the conflict (fortified constructions, excavations, tunnels, bomb craters or mines), as well as in the network of relationships and in its more intangible aspects, which substantiated the palimpsest of the remains as a system and defined its specific “character” of unique and unrepeatable heritage.

In the light of all the previous reflections, the approach thus deepened has allowed to better decline and contextualize in this observatory of reference the concepts of “heritage”, in its different etymological meanings (legacy, inheritance, and patrimony), and of enhancement, understood as strengthening of the weak links emerged from the comparison between the different semantic cores through which the heritage can be characterized and the SWOT analysis previously conducted. Through the holistic view, it was possible to systemize the theoretical/analytical considerations developed to bring to the surface some semantic cores currently critical, concerning the strengthening of which consciously address the future orientations of priorities.

In addition to the need to propose new strategies regarding the policies of coordination and management of processes with particular attention to the importance of participatory aspects (issues identified but not examined in detail in this research), and the need to better understand some aspects of construction technology (related to technological experiments of reinforced concrete of whose structural behavior little is known), the priority issue, which emerged strongly, was the pressing need to develop new operational strategies to facilitate the recognition, within the contemporary multi-layered landscape, of the different levels of permanence of the remains, including in particular the most fragile “signs” in terms of permanence, currently at greater “risk of loss”.

In this perspective, the study presented here has developed a method to deal with the complexity of this heritage without reducing its semantic significance, proposing an innovative methodological approach based on the definition of a new paradigm that expands the recognition of the “testimonial value” at the landscape scale through the identification of areas with a different “testimonial gradient”, that is, areas in which the degree of significance of the remains persists at “different temperatures”. In other words, the operational proposal of this new paradigm is declined in the identification of a sort of new “cognitive

skeleton", called precisely "testimonial gradient", able to understand the value of testimony graduated about the variability of the cultural capital of the different elements that make up the complexity of the warscapes, as well as to infer, precisely concerning this "gradient", the possible potential of this heritage as a "flywheel of development" cultural, social and economic.

In an inter-scalar vision, this aspect has assumed even greater importance in the awareness that the ability to recognize areas concerning which the remains remain in the contemporary world at different temperatures is a necessary prerequisite for future projects to operate recovering that systemic vision lost today, ensuring the system-vestiges, as such, different margins of design, preserving our "possibility of memory" through its evocative potential.

In order to make the proposed method effectively operative, it was necessary to identify the modalities according to which to define and describe the "variables of the system", those parameters that connote the "testimonial value" function and for whose variability the gradient itself develops and modifies.

Before identifying these parameters, however, further consideration was necessary: as repeatedly argued in the course of the research (Chapter 6), the proposal to elaborate a "method in complexity" without "betraying" the "sense of place" of the different warscapes with inappropriate semantic simplifications of the phenomenological framework under analysis, brought with it the conscious acceptance of a sort of "methodological principle of indeterminacy" in cognitive processes, of an intrinsic difficulty to delineate a univocal form to this multiform complexity in continuous becoming, leading to the impossibility of arriving at the completeness of knowledge. Based on this awareness, it was evident how the same variables of the function "testimonial gradient" could not be closed parameters, static, invariant, and valid indiscriminately in every context. Therefore, four macro-categories of "cognitive indicators" have been identified, which aim to offer an interpretation as broad and complete as possible of the "best available knowledge" concerning certain aspects characterizing the specific warscapes to be studied, but which can be modified, implemented and better adapted to the different contexts of analysis. In other words, this is more of a methodological contribution than the definition of specific guidelines and best practices in absolute terms, as was already stated in the objectives at the beginning of this research.

As far as the proposed "cognitive indicators" are concerned, they reverberate, in reality, exactly the main "weak issues" previously emerged, that is, the historical-identity aspects, the typological-constructive knowledge of the artifacts, the degree of community involvement, and, above all, the legibility/recognizability of the

vestigial system. These indicators have also been described in more detail through the specification of a series of sub-parameters useful for bettering the relative general consistency.

To quantitatively translate the qualitative considerations expressed by the indicators and by the sub-criteria mentioned above, it was therefore decided to operationally decline this new paradigm through an analytical method consisting of a multi-criteria matrix of analysis capable of putting into system the “different temperatures” expressed by the indicators about the different areas under study. This method, based on what has been defined by the analysis of value, has provided for the assignment of specific weighting coefficients to the different parameters and sub-parameters previously defined, and the subsequent combination between them in order to quantitatively define the “weight” of the different indicators constituting the “testimonial gradient” function.

In general, through the application of this methodology, it has been possible to elaborate not only a mapping of the semantic density of a given warscape, but also a sort of “map of the risk and fragility” of the same, where risk means precisely the “risk of loss” of the cultural and memorial potential of these important contexts, that is, when the indicators identified return a lower semantic intensity of both their physical-material components (“materia signata”) and intangible components (value-memorial charge). The “cognitive indicators” are complementary aspects that, in their entirety and thanks to the interrelationships that are generated between them, allow not only to bring out the areas with similar peculiarities, but also to highlight the “weaknesses” and critical issues, to improve and strengthen concerning the objectives that we want to pursue in the future.

It is precisely in this perspective of meaning that the most important and innovative operational contribution of this method becomes evident: the setting of the new paradigm for the recognition of “testimonial gradients” becomes an accurate proactive tool towards the future practices of “care” of this heritage, in order to identify the main prospects for development and enhancement, to be calibrated precisely in relation to the recognition of the different “gradients”, to the needs emerged, or to the need to strengthen and improve precisely the weakest aspects belonging to different indicators. It is therefore a matter of metaphorically translating areas with different “testimonial gradients” into areas with different “design margins”, to which the planned interventions will have to be, at least orientatively, inversely concentrated for the semantic intensity identified precisely by these “gradients”.

In this regard, applying this methodological approach to the fortified system insisting on the plateaus of Vezzena and Luserna has allowed

us to better explain operationally what has been described above. Through the multi-criteria analysis, the different descriptive parameters have been defined and quantified in order to quantitatively identify the value of the three witnessing gradients corresponding to the fortified surroundings of Fort Campo Luserna, Fort Busa Verle, and Fort Vezzena. While Indicator 1 had a high value, and therefore an important semantic density, the gradient referring to Fort Busa Verle had a lower value due to the difficulty in recognizing the permanence of the vestiges and their compromised state of preservation. Explaining the dual potential of this approach, the identification of these "weaknesses" has allowed not only to develop a map of the semantic density of these places but especially to focus on the territorial areas (in this case, the area around Fort Busa Verle) and priority aspects (in this case, the difficult recognition of the most fragile remains, Indicator 3) on which to focus the attention of future practices of "care" and enhancement.

Ultimately, the experimentation on the "case study" mentioned above has shown how this methodological approach, at a general level, is not limited essentially to cognitive aspects (the identification of the different testimonial gradients) but provides a very interesting contribution to investigate, in proactive terms, different types of "diffuse heritage" (of which the remains of the Great War are an example), and consciously outline future actions of "care" in terms of priorities of intervention or selection.

Studying this innovative "methodological" approach in more detail and, in particular, the definition of the "cognitive indicators" described above, the present research has finally elaborated two further methodological investigations to provide a useful contribution to resolving some important critical issues that emerged in the above-mentioned applicative experimentation, which in reality re-proposed two "weak issues" common to the entire heritage of the vestiges and already highlighted several times in previous analyses. These are the fundamental problem of the recognizability of the most fragile material traces in terms of permanence within the multi-layered contemporary landscape (Indicator 3) and the aspects of construction technique/technology that are still poorly investigated but important for setting future choices in terms of use and structural safety (Indicator 2).

Concerning the latter, Chapter 7 investigated in detail the aspects of construction technique/technology (Indicator 2), starting with the study of military manuals, design aids, and compendia used in the various fortification schools, in order to build a knowledge base useful for recognizing specific construction technologies, technical details, and materials used in the remains of the remains. The knowledge of the developments of the art of fortification about the development of armaments and the specific study of the use of the new material

introduced after 1885 in the field of fortifications, i.e., reinforced concrete, testify to the informative potential that such studies can offer in the construction of a knowledge base that is indispensable for recognizing certain materials and construction techniques even in the “material remains” of the vestiges that remain in the contemporary landscape in a different “state of preservation”.

Specifically, the elaboration of tables comparing the “project drawings” proposed in the military manuals and the photographs showing the current condition of places and artifacts can be a useful operational tool to connect the “knowledge” not only with the “knowing how to recognize” these “signs” but also with the “knowing how to do”, that is to understand the real criteria of necessity useful to intervene in terms of conservation and protection in order to preserve these “material traces having a value of civilization” from the risk of loss and dispersion.

In this regard, in the present research, these considerations have been set at a methodological level while the specific theme of the new material “reinforced concrete” has only been introduced through the study of military manuals. However, future insights and research can better investigate the structural behavior of this material and provide further interesting considerations concerning its degree of structural strength in terms of vulnerability and collapse.

Finally, in the awareness of a necessary interdisciplinary collaboration, the present research focused on elaborating a further operational method to facilitate the legibility and recognition of the vestigial system within the contemporary multi-layered landscape (Indicator 3).

With the aim, therefore, of contributing to the unraveling of the wide and deep information basin in which the complex system of visible but also “submerged” vestiges has been recognized, in Chapter 8, the research proposed the elaboration of a cognitive method called “stratigraphic telescope,” a methodological tool capable of exploring the processes of construction/transformation of war landscapes by applying to the scale of the landscape the interpretive code of architectural stratigraphy, which interprets the history of artifacts as the result of processes of addition, subtraction, and transformation that have left physical traces linked together in a stratigraphic sequence.

In addition to an accurate comparative study of the documentary sources of design and photographic period/current and constructive characters-typological artifacts, this method integrates the knowledge gained from the interpretation of a series of data obtained through the potential offered by the techniques of high-resolution remote sensing (remote sensing) and non-destructive testing. Satellite or aerial remote sensing, through the study of orthophotos and LIDAR data, are particularly useful in order to investigate the dynamics of land transformation over time (Land Cover/Land Use Transformations), comparing the impact

of the war event of a hundred years ago (Impact Factor Analysis) with the current reconnaissance of permanences. In this perspective, the use of software for the creation of Geographic Information Systems such as ArcGis and QuantumGis has been fundamental, as these working environments have allowed overall coordination of the entire cognitive process: from the integrated management of the different input datasets (georeferencing of historical maps of militarization and military aerial photographs) to the processing of the expected outputs.

Metaphorically weaving the plots of the evolutionary biography of the contemporary landscape, this cognitive path has allowed us to unveil the different temperatures at which the imprint of the Great War remains in the current morphologies of the territories. In this regard, thanks to the information potential contained in the LIDAR data, it has been possible to investigate the current morphology of the territory in more detail in the areas influenced by the conflict, but with less impact. Concerning these contexts, some specific visualizations of the spatial datasets obtained through the implementation of GIS software with the Relief Tool Visualization have allowed probing in depth the microtopography of the contemporary landscape in search of any possible permanence of vestiges, perhaps "submerged" under the different post-depositional layers of degradation that over time have been layered on top of each other. After a careful evaluation of the different possibilities of visualization of LiDar data obtainable through the Relief Tool Visualization, the Sky-View Factor and Multihillshading visualizations were found to be the most effective ways to investigate the threshold-space between the visible and the "submerged", providing an important contribution to the unveiling of a further palimpsest of latent vestiges, of "fragile signs" hidden but still present and semantically pregnant, waiting to be revealed.

The validation of specific study cases, for example, on the system of Austro-Hungarian forts in Trentino (Italy) and on the entrenched system around Fort Busa Verle (Altopiano di Vezzena, TN, Italy), has allowed us to verify the effectiveness of this method not only qualitatively but also quantitatively.

In conclusion, it is clear that the proposed methodology, totally non-invasive, represents a fundamental contribution to the knowledge of the evolutionary biography of the different warscapes: the potentialities offered by GIS software have allowed to compare and integrate documentary sources of different nature such as vintage aerial photographs and territorial datasets obtained by remote sensing in order to develop an innovative multiscalar approach, that can recognize the different degrees of permanence of the remains within the contemporary landscape. Moreover, the combination of diachronic analysis with the "unseen glances" obtained through Sky-View Factor visualizations

has allowed to light the significance of a submerged heritage highly significant in terms of narrative potential.

In the light of these considerations, it is evident how the elaboration of the instrument “stratigraphic telescope” constitutes an important methodological contribution for a better definition of the different “cognitive indicators” and therefore, by reflection, for the recognition of the different “testimonial gradients”, concerning which to set future choices in terms of protection, conservation, and transformation. In addition to this, it is also evident how the elaborations obtained through the Multi Hillshading Visualization and SVF Visualization return new and interesting forms of visual narration, immediate and effective to spread in the community the knowledge of these warscapes, increasing awareness of its semantic significance and stimulating the development of a renewed ethical and educational responsibility towards the “care” of these heritages in order to ensure their “possibility of future”, the possibility to continue to narrate their “being in time”.

Ultimately, through the introduction of the “testimonial gradient” to recognize the expansion of the “testimonial value” at the scale of the landscape, this research provides an important and innovative methodological contribution to responsibly address the complexity of the heritage of the vestiges and to set future choices regarding their fate in terms of selection and priority of intervention, by making a dialogue between an approach that traditionally belongs to the disciplines concerned with the protection and conservation of monuments and “other knowledge” such as landscape architecture, geography, geomatics, environmental and nature sciences, archaeology, history, anthropology, and ecology.

In the light of what has been described above, it is clear that this work fully achieved, elaborated, and critically analyzed all the objectives that have been stated in the introduction, both on the methodological level (knowledge as the foundation for any future choice in terms of conservation, preservation, and transformation), on the semantic one (elaboration of a helpful method to recognize the permanence of vestiges, even the most minute “signs”, as “cultural semiophors” with a high memorial potential), and also on the operational one (the recognition of the different testimonial gradients opens the way to the possibility of elaborating future interventions with different designability margins).

In a continuous process that develops at different scales, the identification of the relative semantic concentrations is also a useful reference to understand the different “margins of feasibility” according to which the different areas can be protected, preserved, and transformed in order to strengthen the cultural capital preserved in them, also in terms of revitalization and development for the territorial contexts in which they are inserted.

Precisely in this regard, future research perspectives can implement the proposed method not only through experimentation on other reference cases, but especially enriching the definition of "cognitive indicators", to better recognize and describe the different "gradients", and developing in more detail the relationship between the recognition of areas with different semantic density with the specification of the relative graduated "margins of feasibility".

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