

## Preface: Proceedings of the FOSS4G 2024 Academic Track – Digital Revolution

Evelyn Uuemaa<sup>1</sup>, Marco Ciolli<sup>2,3</sup>, Marco Minghini<sup>4</sup>

<sup>1</sup> University of Tartu, Institute of Ecology and Earth Sciences, Landscape Geoinformatics Lab, Tartu, Estonia - evelyn.uuemaa@ut.ee

<sup>2</sup> Department of Civil, Environmental and Mechanical Engineering, University of Trento, Trento, Italy - marco.ciolli@unitn.it

<sup>3</sup> Center Agriculture Food Environment, University of Trento, Fondazione Edmund Mach, San Michele all'Adige, Italy

<sup>4</sup> European Commission, Joint Research Centre (JRC), Ispra, Italy - marco.minghini@ec.europa.eu

**Keywords:** FOSS4G, Estonia, Academic Track, Geospatial, Open Source, Open Science

Here, we introduce the proceedings of the Academic Track of the Free and Open Source Software for Geospatial Europe (FOSS4GE) conference – a longstanding annual event, which extends the global FOSS4G event organised by the Open Source Geospatial Foundation (OSGeo, <https://www.osgeo.org>). FOSS4GE takes place in the years when the global FOSS4G event does not take place in Europe and is dedicated to promoting awareness, collaboration, and advancement of open source geospatial software, strengthening established relationships, and nurturing new endeavours. In 2024, this conference takes place in Tartu, Estonia.

While in the 1980s, geoinformatics was advancing in the rest of the world, development in Estonia was hindered by the existing Soviet regime. The field of cartography was particularly impacted by the centralized and secretive approach of the Soviet regime. Information Technology (IT) solutions also did not develop in line with the rest of the world because computers were seen as potential military technology. Prospects improved with the collapse of the Soviet Union at the beginning of the 1990s. There were several driving factors for the adoption of Geographic Information Systems (GIS) in Estonia: (1) land reform; (2) environmental issues; and (3) the need for spatial planning (such as waste management and infrastructure).

In 1989, the first legal GIS software, PC ArcInfo, was introduced to Estonia at the Information and Technology Center under the Ministry of Environment. Still, initially, it could not be fully implemented due to insufficient computer capacity. Just a year later, in 1990, the Estonian Land Board and the mapping company Regio Ltd were established. Both were strongly related to the Institute of Geography at the University of Tartu and in 1993, geoinformatics was finally introduced as a part of the curriculum. These events laid the foundation for the development of geoinformatics in Estonia. With economic development, other GIS software also reached Estonia, first MicroStation and AutoCAD, then MapInfo, and a little later ArcView (Esri). At the same time, Estonia quickly started modernizing its society through digitalization. Key milestones included introducing electronic ID cards in 2002, which enabled secure access to various online services, and establishing the X-Road platform in 2001, facilitating data exchange between government agencies and service providers. In 2003, the e-Land Registry was launched, which contains information on all property ownership and rights for properties and land parcels.

Estonia had pioneered digitalizing the society, especially in introducing the digital identity ID card system, using strong open standards cryptography. The responsible government agency developing and maintaining the system also provides free and open source software for users to make use of the digital signature and encryption system. This allows citizens nowadays to conduct nearly all matters of banking, citizen services, and tax declaration securely and fully online. In contrast, the first 20 years of GIS were strongly dependent on proprietary software, and Estonia was a bit slower in embracing open source geospatial software.

The quick increase in geospatial data (remote sensing, mobility, etc.) availability during the last 10 years has created a need for more flexible tools, which in turn pushed many organizations to adopt FOSS4G. The industry and government agencies have since the last 10 years clearly made use of OSGeo software projects, but there is not yet a strong open source user community. The universities have, since the last 5-10 years, increasingly embraced teaching OSGeo software and enabling the new generation of GIS professionals and researchers with the skills needed to drive geospatial innovation to address the challenges of our societies. More and more organisations in Estonia have started to embrace the flexibility and power of FOSS4G and this in turn has boosted the use of geospatial data across many sectors and different domains.

FOSS4GE 2024 marks the first major open source geospatial software conference in Estonia. The event will be held in Tartu, Estonia's second-largest city. This vibrant student town is home to the University of Tartu, the country's largest and highest-ranked university. In 2024, Tartu is also designated as one of the European Capitals of Culture, making it an ideal venue for the FOSS4GE community to gather. The conference is crucial for raising the profile of OSGeo software and strengthening the national FOSS4G community. The conference is co-organised by OSGeo, the Estonian Geoinformatics Society and the Landscape Geoinformatics Lab at University of Tartu. The Estonian Geoinformatics Society (ESTGIS), established in 2010, is a non-profit association representing practitioners, professionals, and scholars in geographic information, cartography and other related disciplines in Estonia. Today, ESTGIS is the main organization that connects all geospatial professionals in Estonia.

Instead, the Academic Track of FOSS4GE is organised by the International Society for Photogrammetry and Remote Sensing (ISPRS) through its Intercommission Working Group IV/III/II "Openness in Geospatial Science and Remote Sensing". The last FOSS4GE conference at which proceedings were published in the ISPRS Archives was organised in 2017 in Marne-la-Vallée, France. We want to highlight the importance of openly sharing scientific knowledge in FOSS4GE conferences that unite users, developers, policy makers, professionals and academics. In this regard, we express our gratitude to ISPRS for making this possible and in particular to

Lena Halounova (ISPRS President), Sisi Zlatanova, Maria Brovelli and Hao Wu (President, Vice-President and Secretary of ISPRS Technical Commission IV) for actively supporting the publication of this volume.

In addition to this editorial, the proceedings of the Academic Track of FOSS4G Europe 2024 comprise 21 papers selected through a rigorous peer-review process conducted by the Scientific Committee, which began with over 30 submissions. We extend our gratitude to all the authors of the published papers, as well as to the 16 reviewers and members of the FOSS4G Europe 2024 Scientific Committee from across Europe, listed below.

**The FOSS4GE 2024 Academic Track Scientific Committee Co-chairs**

Evelyn Uemaa, Landscape Geoinformatics Lab, Department of Geography, University of Tartu, Estonia

Marco Ciolli, Department of Civil, Environmental and Mechanical Engineering, University of Trento, Trento, Italy

Marco Minghini, European Commission, Joint Research Centre (JRC), Ispra, Italy

**Scientific Committee**

Alessandro Sarretta, National Research Council, Italy

Alexander Kotsev, European Commission, JRC, Italy

Anca Angheloa, European Space Agency, Italy

Bianca Federici, University of Genova, Italy

Carlos Granell, University of Jaume, Spain

Desalew Meseret Moges, University of Tartu, Estonia

Ewa Grabska-Szwagrzyk, Jagellonian University, Poland

Gresa Neziri, SpaceSyntaKs, Kosovo

Holger Virro, University of Tartu, Estonia

Isaac Buo, University of Tartu, Estonia

Maria Antonia Brovelli, Politecnico di Milano, Italy

Massimiliano Cannata, Institute of Earth sciences, SUPSI-DACD, Switzerland

Paolo Zatelli, University of Trento, Italy

Peter Mooney, Maynooth University, Ireland

Stefanie Lumnitz, European Space Agency, Italy

Sven Schade, European Commission, JRC, Italy