REQUIREMENTS FOR A TOOL TO SUPPORT EVALUATION OF WEB SITE QUALITY BASED ON THE 2QCV3Q MODEL

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ABSTRACT

In this paper we describe the set of requirements for a tool to support the evaluation of the quality of Web sites. At a theoretical level, the tool provides a model to identify the characteristics that determine the overall quality of a Web site; such model is called 2QCV3Q, developed by our research group and first applied in 1997. The experience gained in these five years—through direct application of the model in diverse contexts with different objectives—has made it possible to identify the most critical elements in the process of evaluating the quality criteria for a Web site. Moreover, to more easily identify the requirements for the tool, we have developed an explorative prototype. This paper is part of a process of getting feedback on the set of requirements and validating it.

KEYWORDS

Quality of Web sites, 2QCV3Q framework, Quality evaluation support tool, Requirements

1. INTRODUCTION

The widespread diffusion and strategic role of Web sites has served to highlight the importance of quality, as well as the challenges arising when attempting to measure quality. This difficulty stems essentially from three elements:

- A Web site has several diverse components, thus requiring different competencies—technological and non-technological—for its design; in fact, the field of Web Engineering has emerged in response to this need (see, for example, Deshpande et al., 2000), aiming to integrate the seemingly divergent skills that go into designing a Web site.
- A Web site must satisfy the needs of many actors. Sites must respond to the needs of customers/users; consideration must also be given to the owners of the site, as well as to the professionals and technicians involved in designing and maintaining the Web site.
- A systematic approach to evaluating Web site quality that aims to take into account these two points (the diverse components coming together at a Web site and the importance of satisfying the needs of all actors) implies a process that is intrinsically qualitative and subjective.

Emerging from these considerations are some requirements that our research group determined to be fundamental for a model to evaluate quality. First and foremost, the model must take into account the communicative and interactive nature of a Web site; in addition it should be domain independent, robust, user friendly and general purpose.

There are several models in the literature that can be classified in three principal categories (an extensive bibliography is available at: http://www.cs.unitn.it/WebSiteQuality): 1) models adapted from those introduced for software (for example, ISO or IEEE models); 2) models that focus on usability and which are

connected with the research of HCI (Human Computer Interface); 3) models introduced specifically for the evaluation or design of Web sites, which are diverse in terms of number of elements to evaluate—ranging from a few to several hundred—and of the evaluation modality. An analysis of existing models showed that none of them responded fully to the needs of our research group, needs which led to the definition of an original model or framework called 2QCV3Q; the name derives from the initials of the loci used in Cicero's rhetoric. In this paper we present the initial nucleus of requirements for a tool to support the evaluation of quality in Web sites, which on a theoretical level refers to the 2QCV3Q framework (which provides information about what to evaluate). The experience gained through the application of the framework in diverse domains and with different objectives made it possible to identify the most critical elements in Web site evaluation—a vital factor in setting up the initial criteria for an evaluation. Moreover, to facilitate requirements identification (functional and non-functional) of the tool we have developed a discovery (requirements) prototype which can be used to solicit useful feedback from the evaluators. The paper is structured as follows: the next section briefly presents the 2QCV3Q framework and a general model of the Web site evaluation process. The third section looks at requirements analysis as a support tool to evaluate quality. The conclusion contains some indications for future developments of the tool.

2. EVALUATION OF QUALITY IN WEB SITES USING THE 2QCV3Q FRAMEWORK

Using our previous experiences and analyses of existing models, we translated the loci of Ciceronian rhetoric into seven dimensions for Web site evaluation (see table 1).

Table 1. Dimensions of the 2QCV3Q framework

QUIS? (Who?)	Identity
QUID? (What?)	Content
CUR? (Why?)	Services
UBI? (Where?)	Location
QUANDO? (When?)	Maintenance
QUOMODO? (How?)	Usability
QUIBUS AUXILIIS? (By what means?)	Feasibility

The seven dimensions thus identified constitute the general framework of a "quality model" that are independent of the site itself. To permit a more specific design and evaluation of a specific site, it is necessary to adapt the model by identifying the quality criteria that describe the dimensions considered. For some of our projects we have created a table that identifies two or three attributes for each dimension, with two sub-attributes for each dimension, for a total of 26 characteristics to evaluate (see for example, Mich, Franch, 2000). This calibration of the model is the most delicate part initially in the evaluation of the quality of a Web site in that it determines the level of detail at which each dimension must be analysed (quality requirements) and it must be done taking into account the purpose of the evaluation (e.g., to design a site by also considering the performance of the competitors' sites, to make a classification scheme of sites for a competition, etc.); of the type and domain of the site (or sites) to be evaluated; and of the objectives of the owner and of the users of the site. Finally, a trade-off that is always part of an evaluation of quality derives from the necessity to take into account the resources (time and financial) available. The 2QCV3Q model makes it possible to identify and classify the aspects that determine the overall quality of a Web site, but its application to a site does not impose a particular process of evaluation. In projects realised thus far we have followed some general guidelines for adopting a problem-solving approach in the evaluation of quality. A general model of the evaluation process is given in figure 1. In short, the evaluation process requires an initial set-up phase, which includes the analysis and specification of the evaluation requirements, a design phase in which the evaluation plan and techniques are defined, and a final realisation phase. The principal objective of the design phase is to identify the appropriate assessment modalities for the attributes of the model 2QCV3Q, in agreement with the quality requirements defined in the set-up phase. In this phase it is necessary to determine the survey modalities, which can vary depending on the techniques and tools adopted as well as on the number and role (competency) of the evaluators.

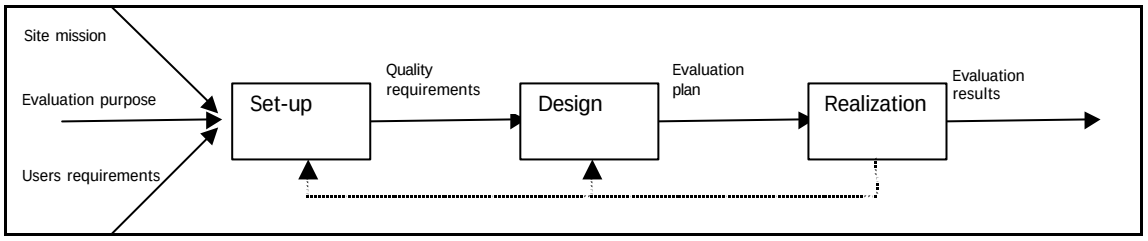

Figure 1. Evaluation process

The realisation phase moves on applying the techniques of survey and the measurement modalities specified in the evaluation plan for the dimensions of the 2QCV3Q model. Normally the evaluation is based on one or more visits to the site but in some cases it may be necessary to access files or information only available at web-master, for the check-up of the site, for example. The results obtained are compared—using appropriate methods—with the "quality profile" defined in the first phase. This comparison can be facilitated through the use of graphic representations of the evaluation results, an example being radar diagrams, in which the weak points of the site can be highlighted. Whatever the purpose of the web site evaluation, the results can be grouped in a report whose structure reflects this objective. The content can be organized according to the items of the 2QCV3Q model. Given the dynamic nature of quality, it is important to see the process as iterative, so that the activities of different phases can be repeated, for example in different versions of the site or at different times of the site's life cycle.

3. REQUIREMENTS FOR THE QUALITY EVALUATION TOOL

Assuming that the tool has to support all phases of the quality evaluation process, its logical design can be described referring to these phases. In particular, as regards the functional requirements, in the set-up phase, the tool has to support:

- the definition of the purpose of the evaluation
- the identification of the goals of owner of the site/s
- the elicitation of the different target users' needs
- the input of data necessary for the evaluation (the addresses of the sites to be evaluated, the date of the visit of the sites, the domain of the sites, etc.)
- the definition of a quality profile based on the 2QCV3Q model.

The last element involves the definition of quality criteria for each dimension, a level of detail that takes into account the information gathered in previous steps.

In the design phase, the tool must help to choose the evaluation modality that is best suited for the project. Such modalities can foresee the assignment of numerical points (for example, from 0 to 4) or linguistic levels (for example, insufficient, sufficient, adequate, good, very good, excellent), the use of metrics like those adopted in (Olsina et al., 2001), or of boolean questions (Elliot, 2000). Moreover, in this phase, for it is necessary to indicate the importance of each quality criteria, attributing to it a numerical weight. Such weight must consider the information gathered during the set-up phase regarding the objectives of the owner and the target of the Web site.

Finally, in the evaluation phase, the tool must calculate the performance of the quality criteria and provide the functionalities for a description and graphic representation of the results.

Some further functionalities were also identified that must support cross process activities:

- inquiry and reporting
- documentation
- help on line (for example, o explain the meaning of a quality criteria)
- demo (training).

The high-level non-functional requirements are the following:

- multilingual: Italian, English, Spanish; this latter language is necessary to favour the collaboration with an Argentinian research group;

- user-friendly: the users of the tool all have different levels of competence;
- integratable with other tools so that the output can be imported into the productivity software that is used individually and in common;
- based on standard hardware and software;
- easily interfaceable with tools that support automatic evaluation of some criteria (in the applications thus far realised they represent a very low percentage (see Mich et al., 2003); A list of these tools is given at www.usableweb.com; see also the Web Design Group site www.htmlhelp.com/tools);
- ensure that some functionalities are accessible only to the analyst and not to the person doing the final evaluation.

Finally, the tool must feed a repository with the quality criteria, the levels of detail and other information regarding evaluations already completed, thus making it possible to support the decisions taken. Useful information is thus available for a multi-level analysis of various projects. Another important functionality emerging with the use of the requirements prototype—realised in Access—regards the automatic creation of electronic forms to be filled in on the Web or attached to e-mail messages.

4. CONCLUSIONS

In this paper we have presented the requirements for a tool to support the evaluation of quality of Web sites. Some of these requirements were identified using a discovery prototype. The requirements identified (such as the need to automatically produce electronic forms or to feed a repository to support decisions based on completed evaluations) are also those that seem to be the most critical for the overall effectiveness and usefulness of the tool. We are now designing the tool and we will use it first to evaluate the quality of regional PTBs in the Alps. This paper should be part of a process of getting feedback on the set of requirements and validating it.

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