Web Q-Model: a new approach to the quality

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CHI 2008, April 5 – April 10, 2008, Florence, Italy
ACM 1-xxxxxxxxxxxxxxxxx.

Abstract
In this paper, we propose an original quality model for websites, developed starting from existing proposals and general requirements for quality models. Different approaches were defined to evaluate websites quality, but most of them were created for specific web domains (cultural, academic, tourist, enterprise environment, etc) or they consider only some web quality dimension becoming vertical models. Main goal of our work is to extrapolate a general and holistic model, easy to apply and scalable for different domains, aimed at helping web designers to develop accurate and quick websites evaluation, to facilitate the collaboration with the management and to support, thanks to different quality levels, their proposals to the customers.

Keywords
Quality, evaluation, websites, metrics, quality models, usability.

ACM Classification Keywords
D.2.9 Management – *Software quality assurance*
H.3.4 Systems and Software – *Performance evaluation*
H.5.2 User Interfaces – *Evaluation/methodology*

Introduction
Software Engineering gave and continues to give a great importance to the concept of quality and its

related operations. In fact, in the last years, several processes and procedures were developed, until the definition of important standard characteristics for software product quality [3], including six main features (Functionality, Reliability, Usability, Efficiency, Maintainability and Portability) and four features about user's point of view (Effectiveness, Productivity, Safety and Satisfaction). Moreover, ISO (International Standards Organization) distinguished these characteristics according to three views (developers' view, manager's view and users' view) and so classified them in three levels of quality: internal, external and in use. Meanwhile, there was an important development of Web Engineering, that found its basis on the same concepts and principles but moved the focus from offline to online world. This increasing importance about the web applications needs more attention on user's experience than on the process phases, because user's perception and usability aspects can influence business possibility. Most of the living websites don't respect neither the basic quality principles. This lack of attention is due to several reasons, such as the easy use of web-oriented languages, the rapid evolution of technologies, the tolerance of browsers to display also incorrect code, the presence of many web developers without specific background or knowledge and the frequent and bad custom to assign few time and money to this aim. Fortunately, evaluating websites quality has became a more and more discussed and analysed issue in the last ten years.

Related works

Several quality models or usability-focused approaches derived from computer-human interaction research were proposed. Some of them are based on ISO or IEEE (Institute of Electrical and Electronics Engineers) standard metrics, some are instead designed beginning by marketing researches or business interests and defined for specific or domain-dependent websites, such as e-commerce or academic or tourist ones.

QEM (Quality Evaluation Method) [8] was proposed through a case study on museums, then it was applied to academic domain, specifying about eighty directly measurable attributes and four main areas (Usability, Functionality, Site Reliability and Efficiency). This model presents a very specific domain-dependent approach.

The 2QCV3Q-model [5] adds the seventh locus Quibus Auxiliis (Feasibility) to the 2QCV2Q-model [6] focused on six main dimensions corresponding to six loci: Quis (Identity), Quid (Content), Cur (Services), Ubi (Individuation), Quando (Management), Quomodo (Usability). This model was introduced to marketing purposes and was mainly applied in tourist environment.

MiLE (Milano-Lugano Evaluation method) [1] tries to combine inspection method with empirical testing. MiLE+ [11] is the evolution of MiLE method that introduces a clear distinction between the application-independent and the application-dependent analysis. Moreover it proposes a specific activity, called Technical Inspection, which aims at analysing the application-independent aspects and two evaluation activities for the application-dependent ones, called User experience inspection and Scenario-based user testing. This model is excellent about some aspects but doesn't consider accessibility for people with disabilities at all.

MINERVA (MInisterial NEtwoRk for Valorizing Activities in digitization) project [7] represents an important initiative to encourage the application of ten quality principles (Transparent, Effective, Maintained, Accessible, User-centred, Responsive, Multi-lingual, Interoperable, Managed, Preserved), includes assistive technologies features, but it's aimed at cultural websites (museums, libraries, archives and other cultural institutions).

Polillo [9] presented an evolution of ETNOTEAM model [2], including seven dimensions (Architecture, Communication, Functionality, Content, Management, Accessibility, Usability).

Signore presented a rigorous approach [10], based on five measurable characteristics (Correctness, Presentation, Content, Navigation and Interaction). He started his method from the limitations of other approaches, but he developed a model, aimed at the realization of an automated software, that is focused mainly on the technical aspects that can be measured, giving less importance to perceivable and communicative features.

In this context, we worked out a new quality model that aims at being an useful tool to realize a quick evaluation that takes into account three different quality levels and therefore different execution times, a very important aspect for project managers. Thus our model represents a complete method of websites quality in use evaluation that allows a constructive collaboration among web designers, developers and managers, and a growing consideration about quality in the web projects.

Our project

After the research work about the existing quality models, we summarized all the information collected and extrapolated a model from the best characteristics of each considered methodology. Rarely different models use the same term to refer to semantically equivalent characteristics. Often there are characteristics, called with different names, that have similar meaning or recall the same concept or belong to the same context. So, for this reason, in the first step, we assembled all attributes of all models and, in the second step, we separated them in a limited number of groups on the basis of their semantic meanings. At this point, we eliminated the existing repetitions and we well-finished and optimized the groups. The output consists of six dimensions, represented by the six groups assembled, listed below.

Interface Communication (IC)

1. Using clear, transparent, specific and univocal labels or titles
2. Using intuitive icons and symbols that follow standards and familiar conventions to web users, or whose meaning is easy to understand anyway
3. Using sharp images, of good quality and pertinent to site's communication purposes
4. Page layout: giving importance to elements distribution, taking into account possible conventions about their position; avoiding information overload or overcrowded pages; verifying page scannability and grouping adequacy of information units
5. Preserving coherence and stability of main elements within the pages

6. Visual identity: importance of Brand or personal identity; explicating site's property and mission, also using graphic style (colour, image)
7. Using colours to identify and distinguish website's areas and to attract user's attention on page's different element
8. Choosing adequate colours for the combination text/background not to make reading difficult
9. Choosing font type and size to facilitate reading
10. Identifying links with clear, conventional and coherent symbology to easily distinguish them among other elements
11. Showing link state change using a colour change
12. Using icons and widgets consistent and pertinent with site's colours and other graphical elements
13. Text layout: verifying paragraph division and text structure and alignment
14. Using graphical style and colours in coherent way within all pages
15. Multimedia elements (video, flash animations, etc): verifying their consistence, adequacy and coherence with site's graphical behaviour
16. Interface predictability: using interactive elements (symbols, icons, links, images, buttons, etc) able to anticipate their content and the interaction effects
17. Realizing a simple interface to allow the user to learn site's communication strategy quickly and to remember site's structure when he or she returns on the website after a period of not using it.

Content (CO)

1. Information quality: verifying if content is accurate, reliable, complete, detailed, impartial, correct
2. Verifying content currency
3. Considering website's domain coverage, depending on site's owner and user's aims
4. Verifying content conciseness
5. Verifying content selection and relevance
6. Making sure of content comprehensibility and readability (choice of language, terms and text style pertinent to users' profile; use of bullet or numbered lists, etc)
7. Providing at least a basic service in another language
8. Choosing multimedia content (image, video, audio, photo, etc) so that is strictly connected with the text to provide further adequate information.

Navigation (NA)

1. Site's structure (architecture and topology): verifying its coherence with content and if it makes navigation easy
2. Helping the user not to lose his/her orientation in the website (using breadcrumbs, link titles and other clues to communicate always where the user is and where he or she will be led)
3. Using adequate, easy and intuitive navigation tools (bars, search engine, site map, indexes, guided tour, image map, etc)
4. Supporting backward navigation ("Go back" button, history, back to Home)
5. Allowing the user to access each site's page in few click.

Management and Accessibility (MA)

1. Hardware and software requirements: verifying browsers and platforms (WebTV, mobile phone, PDA) compatibility; avoiding use of plug-ins and proprietary extensions

2. Controlling site's presence on the most famous search engines
3. Verifying code correctness (alt attributes, equivalent text for multimedia elements, HTML and CSS validation)
4. Optimizing pages view time (download + parsing + + rendering) and media streaming
5. Maintenance: site's monitoring, assuring uninterrupted availability and technical accessibility
6. Assuring functionality's adequacy and correctness
7. Using security policy and guaranteeing personal information correct use
8. Errors management: verifying system reactions, error scripts comprehensibility, deleting or repairing broken links and under construction pages.

Interactivity (IN)

1. Assuring user interaction functionality adequacy: naturalness, effectiveness, precision, transparency about user's actions consequences, recovery (undo availability)
2. Considering users' involvement and contribution (comments, hints, guestbook, community, etc)
3. Providing help and contact information
4. Assuring quick, pertinent, polite answers to users' questions and doubts
5. User satisfaction: making the website well-accepted, pleasant and easy to use; choosing the best position and width for elements and links (using, for example, Fitts' law).

Accessibility for people with disabilities (AD)

1. Conformity to W3C guidelines

Web Q-Model

Thinking about Von Dran et al. [12] and Kano Model [4] for the customer expectations of service or product quality, and after the formulation of our model's attributes, we also decided to classify them in three levels: Basic, Normal and Exciting. For each level we associated a symbol, in particular Q for the Basic, QQ for the Normal and QQQ for the Exciting. This choice is made to differentiate the attributes on the basis of their importance and essentiality in a good quality website design.

We present a general model, even if each feature can be more or less important depending on the purpose of the site or the users' profile. Moreover our model is characterized by a clearly visible scalability, because the different attributes will update their level membership depending on time, technology evolution and social customs.

Web Q-Model Classification

	Q(*)	**QQ(*)**	**QQQ(*)**
IC	1,2,4,6,7,8,9,10,17	3,5,11,12,13,14	15,16
CO	1,6	4	2,3,5,7,8
NA	1,2	3,4	5
MA	1,3,6,7,8	2,4,5	--
IN	1,3	4	2,5

AD	We consider W3C guidelines and checkpoints and their division in three level of priority. [13]

(*) **Q**=Basic level, the minimum acceptable, that is those features that the user takes for grant. **QQ=**Normal level, consciously stated user needs, whose absence will cause disappointment or a sense of disadvantage. **QQQ**=Exciting level that includes those characteristics that delight users because they don't know their existence or don't feel a conscious need for them.

Conclusions and future works

In this work, we proposed a new quality evaluation model for websites that is intuitive, scalable and easy to apply, facilitating developers and designers' work and the dialogue among them and the managers. In particular, the classification in three *Q-levels* will enable managers to propose different quality approaches to their customers, corresponding to different prices, work times and resources to employ. For the future, we want to submit a questionnaire to a large number of typical users to render our classification more shared and to improve our model.

References

[1] Di Blas N., Guermand M.P., Orsini C., Paolini P., Evaluating The Features Of Museum Websites: (The Bologna Report), *Museums and the Web,* 2002.

[2] ETNOTEAM S.p.A. The original methodology, developed in ETNOTEAM environment, was proposed in Tamai L. Thesis "Un modello di qualità per i siti web", Università degli studi di Milano, AA 1995-96. http://www.etnoteam.it/webquality.

[3] ISO/IEC 9126: Software Engineering - Product Quality, International Organization for Standardization, 2001.

[4] Kano, Noriaki, Seraku N., Takahashi F., Tsuji S., Attractive and Normal Quality, *Quality*, (14:2), 1984.

[5] Mich L., Franch M., Gaio L., Evaluating and Designing Web site Quality, *IEEE Multimedia, Jan-Mar*, 2003, pp. 34-43.

[6] Mich L., Franch M., Un modello per la valutazione dei siti web, http://www.cs.unitn.it/Internet_turismo/modello2qcv2q.pdf

[7] MINERVA Working Group 5, Quality Principles for Cultural Websites: a Handbook, 2003. http://www.minervaeurope.org.

[8] Olsina L., Godoy D., Lafuente G.J., Rossi G., Specifying Quality Characteristics and Attributes for Websites, *LNCS 2016, Springer-Verlag Eds.,* 2001, pp. 266-277.

[9] Polillo R. "Il check-up dei siti web – Valutare la qualità per migliorarla", *Edizioni Apogeo*, 2004. ISBN 88-503-2282-8.

[10] Signore O., A Comprehensive Model for Web Sites Quality, *Proc. WSE2005*, ISBN 0-7695-2470-2, pp. 30-36.

[11] Triacca L., Web Usability - Enhancing Effectiveness of Methodologies and Improving their Communication Features, Ph.D. Thesis, University of Lugano, 2005.

[12] Von Dran G., Zhang P., Ruth S., Quality Websites: an Application of the Kano Model to Website Design, *Proc. AMCIS 1999.*

[13] W3C Web Content Accessibility Guidelines 2.0 http://www.w3.org/TR/WCAG20/