

USABILITY HEURISTICS FOR XML-BASED WEB DEVELOPMENT

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Abstract: Heuristic evaluation is a usability engineering method for finding the usability problems in a user interface design. This paper discusses a set of rules to evaluate the level of usability of an XML-based Web site. Taking advantage that XML separates the contents of a document from its presentation, heuristics grouped by content and presentation are defined in an analogous way, allowing a suitable evaluation for that type of applications.

1 INTRODUCTION

Heuristic evaluation is a rapid, low-cost and easy method used to find usability problems in a user interface design (Nielsen and Molich, 1990).

Heuristic evaluation is made by a group of expert evaluators, who apply the set of criteria established by the heuristic rules. A number between three and five evaluators is enough, although it may be increased in the case that usability was a key factor for the success of the Web site. Nevertheless, in order to know the optimal number of evaluators, a cost-benefit analysis must be made in each case (Nielsen, 1994).

Nielsen describes ten usability heuristics (Nielsen and Mack, 1994) that can be applied to the user's interface of any type of computing system. Although these heuristics might be potentially enough to fulfil the evaluation of a Web site, its application is difficult due to the generic character of both criteria.

On the other hand, the standards of usability published by public organizations (ISO 9241, Parts 10-17; ISO 13407, 1999; ANSI/HFES, Parts 1-4) specify a great number of rules to be followed, showing the same generic character as in the case of the heuristics developed by Nielsen. This amount of criteria makes its application difficult both from the Web site developer and its usability evaluator's point of view.

This paper presents a set of heuristics, specifically positioned to the evaluation of the degree of usability of XML based Web sites.

2 HEURISTIC EVALUATION PROCEDURE

Heuristic evaluation is performed by having each individual evaluator inspect the interface alone. Only after all evaluations have been completed are the evaluators allowed to communicate and have their findings aggregated, with the aim of guaranteeing the independence and impartiality during the process of evaluation.

During the evaluation session, the evaluator examines the elements that form the Web page, comparing them to the list of usability principles (the heuristics). Each individual session should never last more than two hours (Nielsen, 1994). Once finished this session, the evaluator makes a report specifying the list of usability problems found in the interface, showing the principles that have been violated and listing in detail both where and how have been produced .

The next step consists of the classification of errors found, according to their importance (measure that comes from the combination of three factors: (1) the frequency with which the problem occurs, (2) the impact of the problem if it occurs, and (3) the persistence of the problem), so that the most important usability problems can be found and, thus, we may decide whether the product will be published or not before its solution (Nielsen, 1995).

As each evaluator will find a small number of usability problems, it is advisable to link all the mistakes found by each of them, so that they make a

later evaluation of each of the problems (using a rising scale from one to ten to classify their importance). The classification of usability problems found will be useful as the basis for the decisions taking on which parts must be redesigned and their order of application.

3 HEURISTIC MODEL IN LAYERS

Nowadays, most of the content published on the Web uses the Hypertext Markup Language (HTML) where content, presentation and structure are inseparably linked.

Following the Web accessibility guidelines (W3C, 1999a), the presentation and structure of a document should be separated. The content (the information on the site) should be separated from presentation (the look and feel of the site), so that future redesigns can easily be developed. Furthermore, the same content and structure can be present in different ways to different users, devices (PC, mobile, ...) and platforms (e.g. through use of style sheets).

Web sites developed by using XML technologies are characterized by the structured description of the content of its documents, completely independent of the definition of that information presentation format (W3C, 2000).

The presentation of XML documents can be specified using technologies such as Cascading Style Sheets, level 1 (W3C, 1999b), Cascading Style Sheets, level 2 (W3C, 1998) or eXtensible Stylesheet Language (W3C, 2001).

Starting from this structure, this paper provides a

model of heuristic evaluation structured in four layers (Figure 1), with the aim of making the usability study of these Web sites easier (as shown in the reports of usability problems found).

The two basic layers of the heuristic evaluation model (content heuristics and content organization heuristics) are related with the level of information content of the Web site (XML document). Thus, content heuristics evaluate the information of each individual page of the Web site, whereas the content organization heuristics evaluate the structure and homogeneity of all the information in all the pages of the Web site.

The heuristics' consistency in presentation layer is associated with the level of translation of the XML document to its presentation in the browser, using CSS or XSL technologies, which is applied to the study of style and navigation correction of such documents, as well as the coherence in the presentation of the set of all the pages that form the evaluated Web site.

The last presentation layer (heuristics of presentation in the browser) specifies the evaluation of usability of the Web site documents view in the user's browser, as well as the user's interaction with the Web application.

4 HEURISTICS

Heuristics of usability are shown grouped in four levels corresponding to the four layers of the described heuristic model.

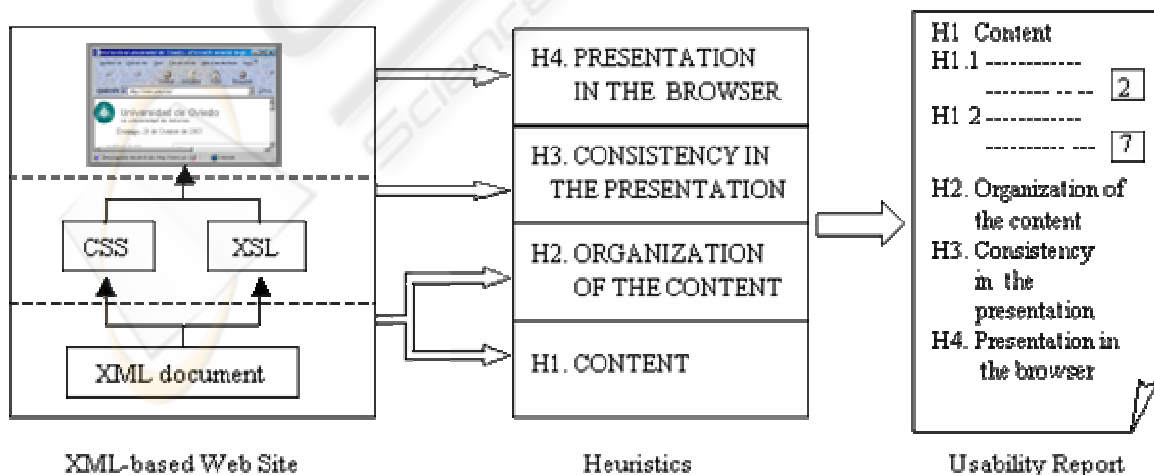


Figure 1: Four-layer heuristic model.

H1: Content.

- H1.1 All content is clear and intelligible to the target audience, do not present repetitious or irrelevant information and do not have misleading links.
- H1.2 The most important information is at the top of the document.
- H1.3 The information is grouped in sets that facilitate the user its location, interpretation and understanding in the easiest way.
 - H1.3.1 Groups are visually distinguished in a clear way (in position, spacing and codification).
 - H1.3.2 Groups of objects logically related are internally marked within the document so that they are identified by other ways different from the visual (for users who use screen readers or voice browsers).
- H1.4 The name of each page is identified without repetitions (to facilitate the organization in the bookmarks).
- H1.5 The elements (fields in forms, icons and graphics) are distinguished and easily discriminated and they can also be easily understood. At all events, those whose meaning is not obvious are clearly labeled in order to facilitate their understanding.
- H1.6 A clear and complete description of any specific functionality of the document is included (facilitating the use to the user).
- H1.7 Relevant and equivalent alternatives to auditory and visual contents are provided.

H2: Organization of the content.

- H2.1 The content of the Web site follows a hierarchic organization with more general information appearing before more specific detail (facilitating the user to reach the wished detail level).
- H2.2 Documents contain exactly one topic avoiding the user to access multiple documents for a same subject.
- H2.3 The repeated elements maintain their consistency throughout the Web site, always using the same identifier (name or symbol).
- H2.4 All the necessary aids and guides, giving the user additional information to the normal dialogue with the interface in order to facilitate to the utmost its interaction with the system, are provided.

H3: Consistency in the presentation.

- H3.1 A presentation style common to all Web site pages are kept (fonts -using two different, one for the title and another for detail- and backgrounds that don't affect the legibility of the document) and homogeneous location of all elements (buttons, sections, links and navigation menu options).
- H3.2 The typefaces' size has an enough dimension and their foreground colour keep an adequate luminance contrast difference as for the background colour, in such a way that the document can be easily read. Moreover, there is not any discriminatory use of the colours that causes an overprint effect of the presentation.
- H3.3 Navigation menus with links to the different sections of the Web site are designed in such a way that they facilitate the user the control of the navigation process.
 - H3.3.1 All the pages make an exclusive and common use of top and left zones for the navigation sections.
 - H3.3.2 The navigation menu provides the links that lead, in an organized manner, to all the main sections of the Web site.
 - H3.3.3 Navigation menus are grouped in a level structure so that no menu has a great amount of options (from eight onwards) for its presentation in a unique toolbar.
 - H3.3.4 The menu options are visually ordered in categories, obvious for the user, or if not possible, they appear in a coherent way (alphabetically or by frequency of use).
 - H3.3.5 The access to the menu options is made both by the mouse and by shortcuts (clearly identified for the user).
 - H3.3.6 The menu options are identified and distinguished by brief and not ambiguous names, familiar to the user's language
- H3.4 The user knows where is in the Web site structure, where he can go next and how return to home.

H4: Presentation in the browser.

- H4.1 In the final presentation standard languages (HTML, XHTML), published by the World Wide Web Consortium, are used (W3C, 1999c; W3C, 2002).

H4.2 The Web site is compatible with any browser, in different platforms, screen resolutions and bandwidth.

H4.3 All the system answers to user's petitions include the own petition reminding him the same one.

H4.4 The configuration of presentation of each user is respected, avoiding impose him suitable preferences for the Web site.

H4.5 Links are clearly marked and their target should not be a new window (allowing the forward-backward navigation).

H4.6 The pages are not upgraded automatically in a periodic way.

H4.7 Technologies that the user cannot control are not used (animated graphics, blinking text or default background sound).

H4.8 All the multimedia elements are totally controlled by the user (play, stop, ...).

H4.9 The pages are efficient since they avoid unnecessary communications with the server (checking all the form fields in the client, using client-side image maps).

H4.10 The download is efficient avoiding excessive page sizes, allowing optional download for any heavy file.

H4.11 All the data entries are designed to facilitate its use by the end user.

H4.11.1 Forms are designed in a way that the user easily determines its general structure and can insert data in a natural way.

H4.11.2 All the fields are labeled in a clear and not ambiguous manner, indicating the purpose and the type of entries that are linked.

H4.11.3 Information about the acceptable values and the obligatory or optional character of the entries is given.

H4.11.4 Errors management clearly identifies the wrong fields and give detail of the cause of the mistake and permits its correction with no need to introduce all the data again.

H4.11.5 The System provides the user a confirmation of the sending of the data and the updating of the Data Base (when necessary).

5 CONCLUSIONS

The degree of usability of a Web site developed in XML can be validated through an heuristic evaluation organized in a layer model (associated with the levels of internal structure of the XML technology) by a small group of experts who check the degree of fulfilment of the list of the usability heuristics.

The heuristic evaluation is far better than the rest of techniques and methods of usability evaluation in cost, as it only needs a small number of evaluators. Another additional advantage is that it does not need an external interpretation of the user's actions, as the evaluators make the tests and elaborate the detailed reports of the problems found. Moreover, in the heuristic evaluation, there is the possibility of interacting and helping the evaluators in order to optimize the process of errors detection, in contrast to the user's tests, in which these must interact with the Web site with no additional information, so that it may be possible that any serious problem at the beginning of the tests impedes them to continue with the evaluation, making impossible to detect the rest of the mistakes.

For all these advantages, it is advisory to make a heuristic evaluation of any developed Web site, so that most of the problems are found and solved with a reduced cost, previous to any type of user's test planned on this Web site.

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