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Towards a General Guidance and Support Tool for Usability Optimization

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ABSTRACT

This paper reports on the work that has been done by the team above within the EvalWeb project. The work presented here describes how web usability guidelines should be refined in order to be suitable for the ergonomic design and evaluation of web sites and to be embedded in a software tool.

1 INTRODUCTION

The problem of designing usable interactive applications' user interfaces has been addressed in details for more than a decade. Today, the problem of usability of Web sites is becoming more and more critical as the number of Web users is still increasing in an exponential way. Besides, it seems that usability problems found in WIMP interfaces are still replicated in Web sites.

Web interfaces evaluation versus Wimp User Interfaces evaluation

Numerous evaluation methods exist for Web site evaluation. These methods may be grouped into three categories:

- Classical methods for WIMP user interface that are re-used for Web site without modification (example: end-user testing),
- Methods for WIMP user interface that have been adapted for Web interface (example: the WAMMI (1) questionnaire),
- New methods defined for the particular context of Web interface evaluation. This category brings together all remote evaluation methods (example: Tele-conference (2) supporting evaluation).

These numerous evaluation methods help make Web sites more usable. However, the use of these methods is sometimes considered a hard task due to many factors:

- Project budget and time for Web site development are (most of the time) more limited than for WIMP user interfaces,
- Designers of Web sites are not necessary designers of WIMP user interface. Their skills to conducts usability evaluation and their usability awareness are (usually) poor
- Due to the high frequency of Web site modification, the evaluation methods must be re-applied several times,
- User population of Web sites is expanding in age, in expectations, in information needs, in task types and in user abilities. In this context, most of user centered evaluation methods are difficult to apply.

What kind of methods should be defined?

The reasons presented above justify a evaluation method, that should be cheaper, easier to use for non-expert in usability, easier to integrate in an iterative design and of course more efficient than the current ones.

However, the evaluation is a complex task that requires knowledge and expertise. For usability experts, most of the evaluation methods are "simple". For non-experts, however, evaluation methods are considered "complex" mostly because they appeal to usability knowledge and expertise for their effective application throughout the evaluation process. Usability guidelines may be one way to alleviate this lack of expertise. Research has shown that careful application of guidelines had positive impact on usability (3).

For these reasons, our work is focusing on Web usability guidelines. In order to make these guidelines "easy to use" for non-experts, we propose a tool that integrates usability guidelines and which provides general guidance for non-expert designers during Web sites evaluation and design processes.

The paper is structured as follows: section 2 reports on the usability knowledge contained in Web usability guidelines. Section 3 proposes a summary of different tools for working with guidelines. And finally, in section 4, we present the guidelines organization and the incorporation of guidelines into a new development life cycle dedicated to the construction of Web sites.

2 WEB USABILITY GUIDELINES

Many Web usability guidelines are available in the scientific literature and on Web sites. In (4), a description of these different sources of guidelines is proposed.

However, contrary to the WIMP usability guidelines, the process employed to develop Web guidelines is more informal (5). Web usability guidelines are often produced by common sense or observation of good practices. Moreover, Web usability guidelines mainly concern interface look and feel (5) and more specific aspects such as navigation, graphic use, hypertext links, etc.

At the organization level, Web design guidelines are structured along concepts such as usability (6), along design stages (7) or even along specific aspects of the Web (8).

3 EXISTING TOOLS FOR WORKING WITH GUIDELINES

Two categories of tools exist to provide assistance to designers:

- 1 *Passive tools*: this category only provides designers with powerful access to guidelines, but these guidelines are in no way executable in any sense. Facilities can be offered to gather guidelines, to select them, to build a report for evaluation purposes, or for documentation, illustration or teaching.
- 2 *Active tools*: this category provides designers with tools capable of some form of processing guidelines, either at design time or at evaluation time. Representative tools belonging to this category are reported in (9). In particular for the Web, there are validation checkers concentrating on the HTML Code (10), such as WebLint (11), HTML Validator (12), but these verifications, although useful, are not related to usability. To our knowledge, only three tools are devoted to some form of automated testing of Web usability guidelines:
 - **Bobby** (13), from CAST, automatically checks a Web page or a series of Web pages against accessibility guidelines promoted by the Web Accessibility Initiative (WAI) (14). Clicking on any Bobby hat appearing on the resulting page leads to a reference where the problem is detected and some comment on the guideline. WAI guidelines have been considered for implementation and evaluation through Bobby with three different levels of support: fully automated, partially automated, and manual.
 - **WebSAT** (15), from the WebMetrics Suite (16) automatically test a single or a series of Web pages against a predefined set of guidelines that are not necessarily focusing on accessibility. As Bobby, a static analysis of the HTML code is performed and submitted to usability testing by a formal approach. Results are then summarized into six categories: accessibility (e.g., "All images not used as links should contain ALT tags"), form use (e.g., "The form should include a functionality for returning the completed form"), performance, maintainability, navigation, and readability (e.g., "Try to limit the density of the Web page"). Similarly, explanation for each usability defect can be provided, as well as a checklist of them.

- **Design Advisor** (17) automatically critiques a Web page while the designer is modifying its content. The critique is based on a visual hierarchy of perceptual guidelines assuming that page elements are searched according to a priority order: motion, size, images, color, text style, and position. From these guidelines, the tool automatically superimposes a scanning path on the Web page, thus highlighting usability problems. Although this tool is primarily based on these specific guidelines, it is interesting to note here that they have been implemented as Prolog clauses and the attributes of Web elements as facts. Having such an inference engine would be very practical for us, as adding, deleting, or modifying any guideline in the knowledge base would have no effect on their execution. But so far, we are unsure that all guidelines can be restricted to Prolog clauses. A deeper understanding of these possible restrictions, where any, is required. It is not certain that all guidelines can be implemented this way.

Our main goal is to produce a tool for automated testing of usability guidelines as far as they can be implemented. For this purpose, a specific tool for working with guidelines is needed. The next section explains how this goal can be reached.

4 OUR APPROACH: THE EVALWEB PROJECT

4.1 Integration of guidelines in the design process

Guidelines incorporated into a development cycle are usually used manually or automatically at the evaluation stage. Our approach is both to embody guidelines in a software tool and to integrate it in each design phase.

In order to reach this goal, it is necessary to associate guidelines with different phases during the development cycle in order to present them where relevant.

For this purpose, each guideline is formalized in a systematic way. Guidelines can be decomposed in a "premise" and a "conclusion". For example: "Each personal homepage should contain the company logo at the top of the page". This rule can be redefined like this: "IF the current page is a personal homepage THEN the page should contain the company logo AND the logo should be at the top of the page". The "premise" of guidelines defines the context of validity and the "conclusion" defined actions that should be verified.

Our work consists in determining in which design phases "premises" and "conclusions" should be considered. For this purpose, the following general development life cycle has been proposed.

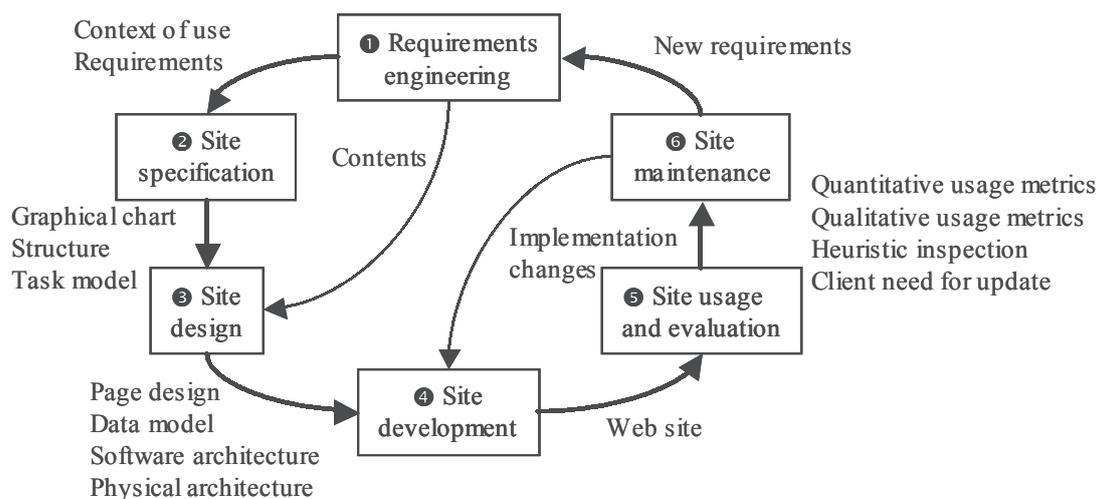


Figure 1: general development life cycle for a Web site

In the previous example:

- During the "requirement engineering" phase, the designer must indicate if pages correspond to personal pages in a company Web site.
- During the "specification" phase, the homepage should contain the logo company and this logo should be at the top of the page.

4.2 Guidelines organization

To improve the organizational structure of guidelines, we have also classified guidelines according to ergonomic criteria (defined as usability dimensions by (18) and by index keys.

- The classification by *ergonomic criteria* provides designers with a general draft that embeds ergonomic rules into the design process describing how they interfere with usability. This classification also allows attributing a level of importance to each guideline. For example, a guideline related to "task compatibility" is more important than a guideline related to "grouping items by format".
- The classification by *index keys* allows flexible access to guidelines, but is more adequate while envisioning a solution:
 - For the automatic selection of guidelines for a particular element of Web site;
 - For the selection of relevant guidelines when only few particular elements of Web site have been modified.

5 PRESENT AND FUTURE WORK

In this study, three sources containing guidelines have been selected ((19),(20),(21)). These sources do not deal only with Web interfaces. Therefore, we also have integrated a recent compilation of ergonomic guidelines specific to the Web (22).

Due to the large number of guidelines, a selection has been done. We have extracted 466 non-redundant and relevant guidelines in the context of Web site design. Afterwards, each selected guideline has been classified according to the structuring presented in §4.

Future work will concern tool support for the integration of guidelines in the design process of Web site. This paper presented some of the potential benefits and some shortcomings of automated testing of usability guidelines. A prototype is currently implemented; but, based on these preliminary results, it appears that a more complete and functional version of the tool would be a promising contribution to automated testing of usability guideline.

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