Mobile Web Usability Standards Compliance Service

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Abstract. Developing a mobile Web site represents an opportunity to reach a large part of the Web audience for an organization. It is also a challenge as Web engineers have to follow specific guidelines to make the mobile Web site usable. Nowadays, most mobile Web sites are not usable to varying degrees. Supporting Web engineers in their quest for mobile Web usability requires a Mobile Web Usability Standards Compliance Service (MWUCS), which incorporates the mobile Web usability standards into the mobile Web site development lifecycle. Our research aims at developing a MWUCS and a tool to put it into practice.

1 Introduction and Background

Following the explosive growth of mobile handheld devices such as cell phones and personal digital assistants (PDAs), the number of mobile device users accessing mobile Internet sites in the United States has been rising. Nearly 1 in 3 mobile device users are accessing Internet sites on their phones [1, 2]. The mobile Web is seen as a new way to communicate and reach an increasing part of the Web audience [3, 4]. A research conducted in 2007 found evidence that major brands are investing in mobile marketing campaigns to reach the mobile Web users [5].

Therefore, Web engineers have to create mobile Web sites. However, they are faced with a new set of issues while developing mobile Web sites [6, 7]. Most of the currently existing Web sites are not usable by mobile device users to varying degrees. Hargrove [8] qualifies the overall mobile usability as “poor.” Inspired by several researchers [9][10][11], we define informally mobile Web usability as
the ease of use and acceptability of a mobile Web site by users which carry out specific tasks in the mobile Web environment; where ‘ease of use’ affects user performance and satisfaction, and ‘acceptability’ affects whether or not the mobile Web site is used.

Mobile Web users are unable to utilize a significant part of the information on the Web [12]. If a Web site lacks usability, users may become confused or frustrated and "take their business" to competing sites resulting in loss of revenue for retailers [13][14]. The lack of mobile Web usability is then costly for companies.

2 Mobile Web Usability and W3C Initiative

Mobile Web usability has some specific and unique characteristics due to the nature of the mobile device and its use. Therefore, mobile Web usability issues require a unique initiative.

As a first step towards mobile Web usability, the World Wide Web (W3C) published the Mobile Web Best Practices (MWBP) as part of the Mobile Web Initiative[1]. The MWBP are composed of 60 guidelines which aim at improving mobile Web usability. They have become the most comprehensive and accepted guidelines to test mobile Web usability due to their device-independent nature.

3 Mobile Web Usability Issues

An exploratory survey was administered to 62 Web engineers aimed at identifying the mobile Web usability issues. The survey reveals that most mobile Web sites do not comply with the MWBP. The lack of compliance is the result of the following three issues:

- *Lack of time:* Web engineers lack time to create usable mobile Web sites. They work under short deadlines and complying with the 60 MWBP is time-consuming. If mobile Web usability is evaluated, it is usually evaluated in the latter phases of the development process, when the Web site implementation is almost complete. Thus, correcting the detected usability errors implies a complete redesign of the application, which cannot usually be afforded.

- *Impracticability of the MWBP*: The MWBP are complex and difficult to understand. Web engineers perceived them as impractical.

- *Absence of a methodology for the incorporation of MWBP into the mobile Web site development lifecycle:* A methodology for the incorporation of the MWBP into the mobile Web site development is not available. It should include a method to test the MWBP during the mobile Web site development.

4 Research Objective, Questions and Approach

Our research objective is to:
"Formulate an approach for the incorporation of an agile mobile Web usability standards compliance service (MWUCS) into the mobile Web application development lifecycle."

[1] The Mobile Web Best Practices 1.0 are available at http://www.w3.org/TR/mobile-bp/

To help us in the development of our research approach, we formulate our main research question as:
How can we formulate an agile MWUCS so that Web engineers are capable of incorporating usability into mobile Web sites during the mobile Web application development lifecycle?

This research question can be decomposed into two sub-questions:

What is the design principle that incorporates a mobile Web usability standards compliance service as a subset of building blocks of the mobile Web application development lifecycle?

In the construction industry, the construction standards are progressively incorporated at different stages of the building construction. Several inspections are performed throughout the building construction allowing contractors to correct code deviations before the building is completed. The approach used in the construction industry to incorporate the construction standards into the building development process is an inspiration for the first sub-question. The purpose of the first sub-question is to explore the conceptual foundation of the MWUCS. The MWUCS can be defined as a series of activities of intangible nature, which assist Web engineers with the incorporation of MWBP into the mobile Web site development process. It should be agile in nature to satisfy the attempt to offer faster and nimbler mobile Web development processes. Instruments such as two case studies and development methodology literature have deepened our understanding of the mobile Web usability issues and contribute to the answer of the sub-question 1.

Is it possible to engineer an automated support service for mobile Web usability incorporation and evaluation during the mobile Web application development lifecycle, which will provide Web engineers with the ability needed to test the compliance to mobile Web standards?

The purpose of the second question is to evaluate our theory by exploring its feasibility and applicability. Based on the theory derived from sub-question 1, a prototype to support the agile MWUCS will be constructed for this evaluation. The two case studies and some of the original survey respondents will participate to the evaluation of the theory.

Due to the intrinsic nature of our research question and sub-questions, our research is mainly influenced by the Design Science philosophy. Our research strategy is based on the processes of build and evaluate as well as the IT artifacts of constructs, models, methods, and instantiations as presented by March and Smith [15].

5 Analytical Framework

The analytical framework defined by Sol [16] is used to structure the MWUCS methodology.

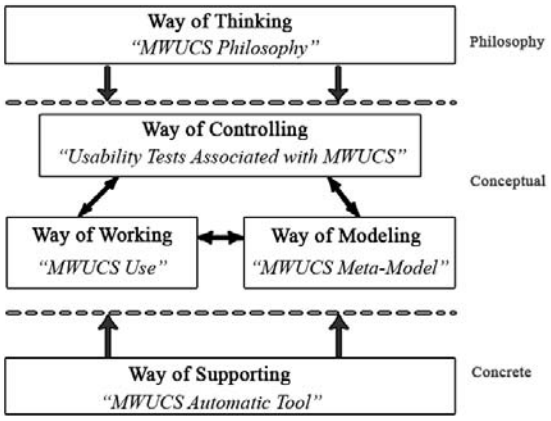

Fig.1: Sol's Framework for Understanding [16]

- *Way of Thinking:* It delineates the underlying philosophy of our MWUCS design theory and defines the assumptions in the process of MWUCS theory formulation.

- *Way of Modeling:* The adoption of the four-layer meta-modeling architecture, also known as MOF [17], becomes the basis of the formal specification of our MWUCS conceptual foundation based on the way of thinking. The elaboration of a metamodel, corresponding to the M-2 layer of the MOF, defines the domain independent, generic concepts and relationships of the MWUCS conceptual foundation.

- *Way of Controlling:* It presents the usability tests associated with the MWUCS.

- *Way of Working:* It explains how to use the MWUCS to incorporate the usability standards into the mobile Web site development process.

The ways of modeling, controlling, and working formalize the conceptual foundation of our MWUCS design principle and lead to the way of supporting.

- *Way of Supporting:* The MWUCS conceptual foundation entices the building of a prototype which comprises a checker to test the compliance of mobile Web sites with the MWBP. The prototype offers the option to perform two types of tests: extensive test or partial tests. The extensive test checks the compliance of a mobile Web site with the complete set of MWBP. It is initiated once at the end of the mobile Web site development and corresponds to the final test. The partial tests check the compliance of a mobile Web site with some subsets of the MWBP. They are implemented at different stages during the mobile Web site development process. The checker generates a report presenting the test results and suggesting solutions to improve the site's mobile Web usability.

6 Conclusion

We have presented our research work and an overview of our research methodology. The MWUCS will assist the Web engineers in their quest of mobile Web usability by incorporating the MWBP into the mobile Web site development lifecycle. At this point, we have completed the literature review and the research proposal. We are in the process of identifying the conceptual underpinning which defines the methodology that supports the MWUCS during the mobile Web site development lifecycle. We have also developed a discovery prototype MWUCS is using to fine tune our conceptual model of MWUCS.

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