Chapter XIV
The Usability Dimension in the Development of Web Applications

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ABSTRACT

Given the emergent need for usability, during last year’s traditional development processes have been extended for enabling the fulfillment of usability requirements. Usability Evaluation Methods (UEMs) have been therefore proposed at any stage of the development process, to verify the usability of incremental design artifacts, as well as of the final product. This chapter surveys the most emergent UEMs, to be adopted during the whole lifecycle of Web information systems for promoting usability. For each evaluation method, the main features, as well as the emerging advantages and drawbacks are illustrated. Some future trends, related to the need of evaluating the usability of UEMs are also discussed.

INTRODUCTION

Usability is generally acknowledged as a factor of system quality representing the answer to many frustrating interactions with technology. It describes the quality of products and systems from the point of view of humans who use them. Different definitions of usability have been so far proposed, which vary according to the models they are based on. Part 11 of the international standard ISO 9241 (Ergonomic Requirements for Office Work with Visual Display Terminals) provides guidance on usability, introducing requirements and recommendations to be used
during application design and evaluation (ISO, 1997). The standard defines usability as “the extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use.” In this definition, *effectiveness* means “the accuracy and completeness with which users achieve specified goals,” *efficiency* refers to “the resources expended in relation to the accuracy and completeness with which users achieve goals,” and *satisfaction* is described as “the comfort and acceptability of use.” Usability problems therefore refer to aspects that make the application ineffective, inefficient, and difficult to learn and to use.

Although the ISO 9241-11 recommendations have become the standard for the usability specialists’ community, the usability definition most widely adopted is the one introduced by Nielsen (Nielsen, 1993). It provides a detailed model in terms of usability constituents that are suitable to be objectively and empirically verified through different evaluation methods. According to the Nielsen’s definition, usability refers to a number of dimensions:

- **Learnability**: the ease of learning the functionality and the behavior of the system.
- **Efficiency**: the level of attainable productivity, once the user has learned the system.
- **Memorability**: the ease of remembering and recognizing the system functionality, so that the casual user can return to the system after a period of nonuse, without needing to pay attention again on how to use it.
- **Few errors**: the capability of the system to feature a low error rate, to support users making few errors during the use of the system, and in case they make errors, to help them to easy recover.
- **User’s satisfaction**: the measure in which the user finds the system pleasant to use.

The previous principles can be further specialized and decomposed into finer-grained criteria that can be verified through different evaluation methods. The resulting advantage is that more precise and measurable criteria contributes toward setting an engineering discipline, where usability is not just argued, but is systematically approached, evaluated and improved (Nielsen, 1993).

When applying usability to Web applications, some refinements need to be operated over the general definitions, to capture the specificity of this application class. Main tasks for the Web include: finding desired information and services by direct searches or discovering new ones by browsing; understanding the information presented; invoking and executing services specific to certain Web applications, such as the ordering and downloading of products. Paraphrasing the ISO definition, Web usability can be therefore considered as the ability of Web applications to support the previous tasks with effectiveness, efficiency and satisfaction. Also, the above mentioned Nielsen’s usability principles can be interpreted as follows (Nielsen, 2000):

- **Learnability** must be interpreted as the ease for Web users to identify in the Home Page the contents and services made available through the application, and how to look for specific information using the available links for hypertext browsing. Learnability also means that each page in the hypertext front-end should be composed in a way so as contents are easy to understand and navigational mechanisms are easy to identify.
- **Efficiency** means that users who want to find some contents can reach them quickly through the available links. Also, when users get to a page, they must be able to orient themselves and understand the meaning of the page with respect to their navigation starting point.