Chapter XIII
Usability–Oriented Quality Model Based on Ergonomic Criteria

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ABSTRACT

World Wide Web software development is a challenge. The need to provide appealing and attractive user interfaces is combined with the fact that the World Wide Web is not merely an information transfer tool anymore. The capacity to offer additional services plays an important role. The World Wide Web makes these services available to a greater number of individuals who have different characteristics, knowledge and profiles. The World Wide Web demands quick development with high quality level. This chapter makes an important contribution in the field of software product characterization for the World Wide Web, proposing a quality model that focuses on quality in use or usability. Said quality model, which has been partially tested on real users through several experiments, is based on international standards and ergonomic criteria. The model has proved useful for organizing and applying the experience available in the development of user interfaces for Web applications and has improved noticeably its final quality in use.
INTRODUCTION

Information systems quality, from the point of view of the HCI community is centred on what users may personally experience when using a software product as a result of an interaction session with the system through its interface, whether it is a software interface or a hardware one.

Although the HCI community has traditionally used the international standards related with software quality definitions, its main goal is interaction, and interaction is always performed by means of a User Interface (UI) (Montero et al., 2003a). In this sense, we will start remembering the definition of the term “User Interface” just as we are going to use it in this chapter and then we will identify the elements that characterize the UI and how they can affect the interaction and how this interaction affect to the final quality of the product.

According to Bennett (1983) in a UI two models and two languages concur. The models have to do with the user, in the sense that the user has goals to achieve and tasks to perform and he conceives them in a certain way depending on his cognitive level and with the very system which is designed to support some functional requirements. The languages have to do with the way in which the designer allows the users to interact with the system—action language—and with the way in which the system presents the information to the user—presentation language.

All these elements have to be taken into account when considering the quality of the user interface. Reviewing some of the quality models that we can find in the literature (Boehm et al., 1978; McCall, Richards, & Walters, 1977; ISO 9126, etc.) and according to the definitions given for the different factors included in them, we can conclude that most of the elements involved in the UI can be agglutinated in one of these factors: Usability. Before the emergence of some of the standards, other authors had defined the concept of Usability by identifying some of these same characteristics that have been finally collected in the standards. For instance, many (Shackel, 1991; Schneiderman, 1992, Nielsen, 1992; Preece, 1994; Constantine & Lockwood, 1999) have characterized usability using different attributes as depicted in Table 1.

Nevertheless, usability refers not only to the User Interface, as the evolution that the term has suffered during its characterization reflects. In the following sections, we will present some tips to show that evolution.

The rest of the chapter is organized as follows: Next section gathers a deep analysis of the term quality in use or Usability and studies the way in which it can be considered within the software development process, defining some approaches to the Usability Engineering. We will also review some quality models proposed in the literature highlighting its main features and applications. Section 3 presents a proposal for quality assess-

Table 1. Comparison of definitions related with usability

<table>
<thead>
<tr>
<th>Shackel</th>
<th>Shneiderman</th>
<th>Preece</th>
<th>Nielsen</th>
<th>Constantine &amp; Lockwood</th>
</tr>
</thead>
<tbody>
<tr>
<td>Effectiveness—speed</td>
<td>Performance speed</td>
<td>Productivity</td>
<td>Use Efficiency</td>
<td>Use Efficiency</td>
</tr>
<tr>
<td>learning—time</td>
<td>Time to learn</td>
<td>Learnability</td>
<td>Ease to be learned</td>
<td>Ease to be learned</td>
</tr>
<tr>
<td>Learning—attention</td>
<td>Remembering</td>
<td>-</td>
<td>Retainability</td>
<td>Ease to be remembered</td>
</tr>
<tr>
<td></td>
<td>Duration</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Effectiveness—errors</td>
<td>Error rate</td>
<td>Productivity</td>
<td>Security / Errors</td>
<td>Use Reliability</td>
</tr>
<tr>
<td>Attitude</td>
<td>Satisfaction</td>
<td>Actitude</td>
<td>Satisfaction</td>
<td></td>
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</tbody>
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