Web Usability

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INTRODUCTION

The study of computing technology and user interfaces was initiated during the 1970s when industrial research laboratories began to focus on human-computer interaction (HCI) (Badre, 2002). In the 1980s, the personal computer was introduced, thus expanding the need for designing effective user interfaces. HCI became a discipline during this time, and the Association for Computing Machinery (ACM) established the Special Interest Group in Computer Human Interaction. One of the first textbooks on HCI, *Designing the User Interface: Strategies for Effective Human-Computer Interaction* (Schneiderman, 19891), was published. Shortly thereafter, HCI became part of the ACM curriculum promoting the development of effective user interfaces. Software tools were developed in order to assist in designing usable interfaces while employing usability engineering methods. Many of these methods focused on usability from the perspective of ease of use, ease of learning, user satisfaction, and zero defects (Nielsen, 1993).

The World Wide Web (Web) became an integral part of HCI research in the 1990s, as organizations rushed to deploy a corporate Web site. Many of these Web sites took advantage of cutting-edge technology, including graphics and animation, with little regard for the impact on the user. As a result, users became disgruntled by lengthy download times, complex navigation schemes, nonintuitive search mechanisms, and disorganized content.

While others were predicting a "Y2K meltdown," Jakob Nielsen (1999a) correctly predicted a "Web meltdown" due to the number of poorly designed Web sites that cluttered the Internet. Numerous studies showed that users were frustrated with glitzy Web sites that had too many usability barriers. A Forrester report estimated a 50% loss of potential online sales due to users not finding a product or service on the Web site (Manning, McCarthy & Souza, 1998). As importantly, 40% of users did not return to a site when their initial visit was a negative one.

Shortly after 2000, electronic commerce sites (dot coms) began to fail at an increasing rate. A Deloitte and Touche report found that many retailers had developed online sites to "test the waters" for consumer demand with no clearly articulated strategy for success (Speigel, 2000). The demise of many dot coms has been attributed to unfriendly user interfaces that negatively impacted the online experience.

BACKGROUND

Many researchers and practitioners alike have studied usability in order to develop Web sites that are navigable, consistent, appealing, clear, simple, and forgiving of user mistakes (Murray & Costanza, 1999). Existing user interface design recommendations were extended to include user interfaces for the Web (Lynch & Horton, 1999; Schneiderman, 1998). Those experienced in designing user interfaces provided heuristics and guidelines for designing Web pages, often by identifying design layout, navigation, and performance issues associated with particular Web sites (Flanders & Willis, 1998; Hurst, 1999; Spool, Scanlon, Schroeder, Snyder & DeAngelo, 1999). Jakob Nielsen, a well-known usability expert, provided much needed guidance on Web usability through featured online articles (www.useit.com/alertbox) and published guidelines (Nielsen, 1999b; Nielsen & Tahir, 2002).

Web usability has been defined as the measure of the quality of the user's online experience. There are several factors that are commonly used as a means of measuring this experience. These factors include (www.usability.gov):

- Learnability – A measure of the user's learning time for accomplishing basic tasks given that the user interface has not previously been used (or used infrequently).
- Efficiency – A measure of the user's time and error rate for task completion.
- Effectiveness – A measure of user productivity in performing a task.
- Satisfaction – A measure of the attitude, perceptions, and feelings about the site.
- Memorability – A measure of user recall such that a previously visited site can be used effectively with no new learning curve.

It is commonly accepted that the usability of a Web site is impacted by the user's online goal, the user's profile, and his or her computing environment. A user, for example, would have some tolerance for lengthy download times when searching for medical information with graphic illustrations. This tolerance level is greatly reduced when searching for information on the cost of an airline ticket. The user profile, including age, gender, income, education, computer skills, and other factors, influences the online experience. Web

content written at a high reading grade level, for example, may be difficult to comprehend for users with low English proficiency. The use of color to convey meaning on a Web site may impede its use by those who have color-deficient sight. Small font size, patterned background images, and pastel colors may become Web barriers to older adults experiencing vision degradation due to aging (Morrell, 2002). The user's computing environment also has an impact on Web usability. Environmental factors, such as hardware, software, browsers, connectivity, and bandwidth, impede the use of a Web site when it is cluttered with graphics, animation, and other objects adding little value to the online experience.

Since 1998, much has been accomplished in promoting Web usability for persons with disabilities. Section 508 of the 1973 Rehabilitation Act was enacted to eliminate information technology barriers in order to provide those with disabilities equal access. The law applies to all federal agencies when they develop, procure, maintain, or use electronic and information technology (http://www.Section508.gov). As a result of this initiative, significant strides have been made to electronic government access by enforcing the Web content guidelines put forth by the World Wide Web Consortium. Though not mandated by law, many commercial and nonprofit Web sites have implemented Section 508 in order to provide access to a broad user base.

WEB USABILITY ASSESSMENT METHODS

There are several popular methods that have been employed to effectively study Web usability. The inquiry approach makes use of field observation, interviews, self-reporting logs and online sessions. The inspection approach utilizes heuristic evaluations, walkthroughs, and checklists. Usability testing may also be used in conjunction with the other approaches to gather feedback during and after Web site design (Hom, 1998).

- Field Observation – The user is observed while surfing a Web site in order to gather usability data in a real-world setting.
- Interviews, Surveys, and Questionnaires – The objective of these methods is typically to gather feedback about the user's perspective of usability. In terms of data gathering, the interview is a formal, structured process, whereas the survey is an informal, interactive process. Interviews and surveys may involve one or more users in a focus group setting. The questionnaire provides the means to obtain written responses regarding a user's online experience.
- Session and Self-Reporting Logs – The user records his or her actions and makes observations during an online session. Software is often used during a session to automatically record data about the user's online experience. The self-reporting log requires the user to manually record data while surfing the Web.
- Heuristic Evaluation – A usability expert (or group of experts) assesses a user interface to determine whether the Web design follows established usability practices (heuristics).
- Walkthrough – A usability expert (or group of experts) evaluates online experiences by constructing scenarios of Web use and then role-playing the targeted user.
- Usability Inspection – A usability expert (or group of experts) conducts usability inspections of a user interface in order to uncover usability problems in the design.
- Checklists – A usability expert (or group of experts) uses a checklist often in conjunction with an inspec-

Table 1. Web usability online resources

Resource	Description
http://www.usability.gov	National Cancer Institute summarizes research activities on Web usability. It also provides links to usability resources.
http://www.itl.nist.gov/iad/vvrg/index.html	National Institute of Standards and Technology provides resources and tools for usability testing.
http://www.useit.com	Jakob Nielsen and colleagues provide alert box articles, summaries of usability studies, and other usability resources.
http://www.acm.org/sigchi/	ACM Special Interest Group on Computer-Human Interaction provides a bibliography of usability research.
http://www.w3.org/WAI/	The World Wide Web consortium (W3C) Web initiative provides resources on making sites accessible to those with disabilities.
http://www.usabilitynews.org	The *Software Usability Research Laboratory (SURL)* specializes in software and Web site user interface design research, human-computer interaction research, and usability testing and research.

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