

Usability Engineering of User-Centered Web Sites

Theresa A. O'Connell

National Institute of Standards and Technology, USA

Elizabeth D. Murphy

U.S. Census Bureau, USA

INTRODUCTION

For Web sites to succeed, they must be user-centered. A user-centered focus throughout Web site development life cycles promotes Web site usability. This is accomplished through usability engineering carried out within the context of software engineering.

BACKGROUND

Starting with an understanding of users, and proceeding in concert with software engineering, usability engineering promotes user success and satisfaction. In this section, we introduce principal concepts of Web site usability engineering.

Users

In the context of this chapter, users are people who interact with Web sites. The term *user* is restricted to the intended users of a Web site. It excludes usability engineers (UEs), the site's providers, and others who have any stake in the Web site. Users of Web sites differ across many dimensions, for example, age, gender, technology experience, intellectual or aesthetic preferences, interaction styles, and abilities.

Usability

A definition of usability, from the International Organization for Standardization (ISO), underlies UEs' focus on users' needs and their goal of meeting users' needs through usability engineering. ISO defines usability in specific contexts of use: efficiency, effectiveness, and user satisfaction (ISO, 1998). Efficiency and effectiveness are components of user success. Satisfaction is an equal factor for usability: Usability = user success + user satisfaction.

The ISO definition implies that usable software must be accessible to users with special needs. Accessibility is a

subdomain of usability in which users have physical and/or cognitive disabilities. Accessibility enables people with disabilities to experience success and satisfaction with software to a degree comparable to that enjoyed by people without disabilities (W3C, 2005).

User Participation in Web Site Development

Usability engineering relies on close interaction with users at strategic points where their input is crucial. Techniques span the software development life cycle. Examples include focus groups, interviews, surveys, design discussions, and observing as users interact with prototype Web sites. Collection of human performance data is key to evaluating users' success. Typical measures of human performance include accuracy and speed of task completion. These measures of user success complement, and often contrast with, self-reported ratings of user satisfaction.

Mental Models

From experiencing computers and Web sites, users build mental models, that is, psychological representations of the ways in which computers and Web sites work (Carroll, 1990; Johnson-Laird, 1983). Highly experienced users have mental models of different categories of Web sites, for example, entertainment and informational sites. Novice users, however, may not have differentiated their mental model of Web sites into unique categories. UEs help designers make user-interface design consistent with frequent users' expectations from prior experience with other Web sites. This consistency helps novices develop expectations as a basis for forming mental models that will apply across other Web sites. This is not to imply, however, that all user groups will have congruent mental models. Realistically, the mental models of different users and user groups will have some commonalities, yet, at the same, time exhibit many individual differences.

USER INTERFACE

A user interface (UI) is software that people use to interact with technology. The UI encompasses more than what users see or hear. In the broadest sense, the UI is the virtual place where the user's mental model meets the designers' system model (Bolt, 1984.) Aligning these models is a goal of usability engineering (Norman & Draper, 1986).

Usability Engineering

Usability engineering is a set of defined, user-centered processes grounded in research-based principles. Its purpose is

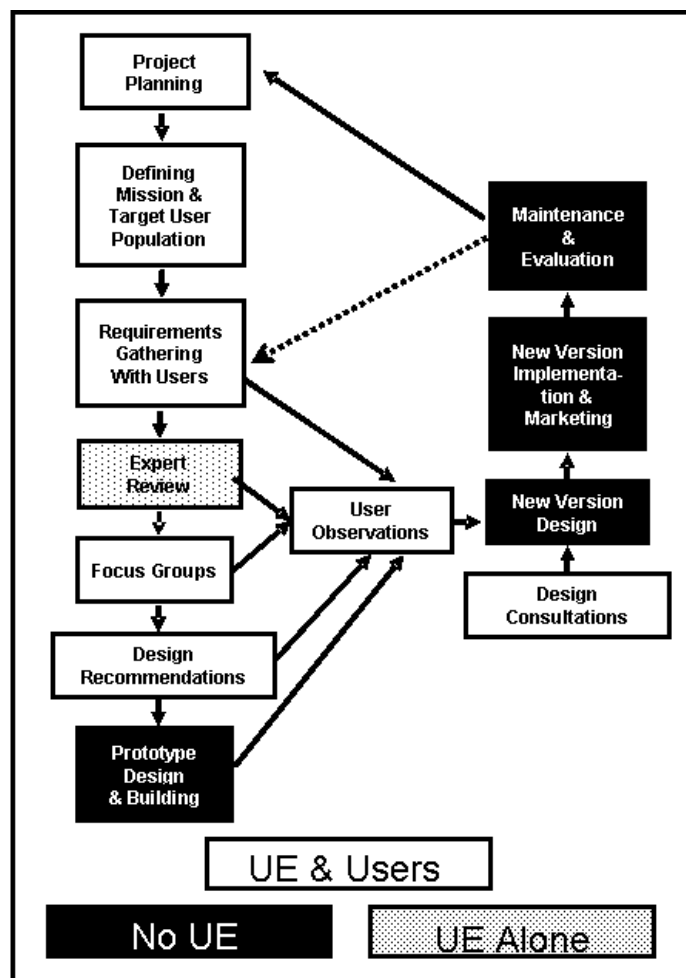
to raise the potential for user success and satisfaction and, thereby, to support Web site providers' goals. UEs must understand a complex set of user variables to promote user success and satisfaction.

UEs' work is user-oriented, but usability engineering goes beyond user advocacy. UEs must also understand organizational and project goals. They must work within the structure of software development life cycles.

Usability Principles

With roots in human factors, usability engineering also draws on disciplines such as software engineering, linguistics,

Figure 1. A software development life cycle showing UEs interacting with users. Cited resources demonstrate how some usability engineering processes can be integrated into a software development life cycle (Addelston & O'Connell, 2005, Hix & O'Connell, 2005, Mayhew, 1992, O'Connell & Murphy, 2007). Next, we focus on usability engineering activities in four life-cycle critical iterative process areas: project planning, requirements definition, design, and evaluation/testing.



5 more pages are available in the full version of this document, which may be purchased using the "Add to Cart" button on the publisher's webpage: www.igi-global.com/chapter/usability-engineering-user-centered-web/14157

Related Content

E-Governance

Srinivas Bhogle (2009). *Selected Readings on Information Technology Management: Contemporary Issues* (pp. 40-62).

www.irma-international.org/chapter/governance/28660

Demonstrating Value-Added Utilization of Existing Databases for Organizational Decision-Support

Nurit L. Friedman and Nava Pliskin (2002). *Information Resources Management Journal* (pp. 1-15).

www.irma-international.org/article/demonstrating-value-added-utilization-existing/1227

Conclusion and Future Work in E-Reading Context

Azza A. Abubaker and Joan Lu (2017). *Examining Information Retrieval and Image Processing Paradigms in Multidisciplinary Contexts* (pp. 262-267).

www.irma-international.org/chapter/conclusion-and-future-work-in-e-reading-context/177707

A Framework for Improving Effectiveness of MIS Steering Committees

Harish C. Bahland and Mohammad Dadashzadeh (1992). *Information Resources Management Journal* (pp. 33-44).

www.irma-international.org/article/framework-improving-effectiveness-mis-steering/50965

Developing the Schedule and Cost Plan

Daniel M. Brandon (2006). *Project Management for Modern Information Systems* (pp. 120-156).

www.irma-international.org/chapter/developing-schedule-cost-plan/28181