

Association for Information Systems AIS Electronic Library (AISeL)

AMCIS 1999 Proceedings

Americas Conference on Information Systems
(AMCIS)

December 1999

Methods for Evaluating the Usability of Web-Based Systems

Raquel Benbunan-Fich
Seton Hall University

Follow this and additional works at: <http://aisel.aisnet.org/amcis1999>

Recommended Citation

Benbunan-Fich, Raquel, "Methods for Evaluating the Usability of Web-Based Systems" (1999). *AMCIS 1999 Proceedings*. 304.
<http://aisel.aisnet.org/amcis1999/304>

This material is brought to you by the Americas Conference on Information Systems (AMCIS) at AIS Electronic Library (AISeL). It has been accepted for inclusion in AMCIS 1999 Proceedings by an authorized administrator of AIS Electronic Library (AISeL). For more information, please contact elibrary@aisnet.org.

Methods for Evaluating the Usability of Web-Based Systems

Raquel Benbunan-Fich, Seton Hall University, Benbunra@shu.edu

Abstract

Due to the widespread use of the World Wide Web, many organizations are creating web sites and developing web interfaces for their existing information systems. Surprisingly however, there appears to be little evidence that organizations systematically evaluate the usability of their web-based systems. The usability of a web site defines how well and how easily a visitor, without formal training, can use the site. Clearly, better usability will result in more efficient interaction between the user and the site and could have important implications for the acceptance of web-based systems. This paper reviews different usability testing methods and describes how protocol analysis (or "think aloud") can be used to test web site usability.

Introduction

To date, there are only a few published studies of web site usability and most of them are focused on how users search for information on the web (Levi and Conrad, 1996; Nielsen, 1998; Sullivan, 1996), rather than how consumers order products online.

There are at least two reasons for the lack of usability evaluation. First, electronic commerce is a new undertaking in which organizations have little experience. Second, formal usability tests are difficult to set up and expensive to implement. As a solution to this problem, this paper explains how to apply a relatively inexpensive and systematic qualitative technique, known as *protocol analysis*, to study the usability of commercial web sites.

Protocol analysis is a very rich research method, well-suited to determine how users interact with web sites, how users feel about a site (very important when use is discretionary), and how and when usability problems occur.

Defining Usability

Any information system should provide the necessary functions to the users, so they can accomplish their tasks. However, functionality alone is not enough. Goodwin (1987) states that the determinants of system acceptance are functionality and *usability* or ease of use. Moreover, complete functionality can not be achieved if the system is not usable. Thus, "usability must be elevated to the same priority as functionality" (Adler and Winograd, 1992: 12).

Usability can be defined as the degree of compatibility of the system with the users' cognitive characteristics such as communication, understanding, memory and problem solving (Goodwin, 1987). It refers to what extent the system and the user can "communicate" clearly, in a dialogue that takes place through the interface.

As web-based interfaces become more popular, it is necessary to review available usability testing methods to tailor them to the development of web-based systems.

Usability Testing Methods

While good design guidelines, based on cognitive models of human behavior, dictate how to build usable computer systems, they do not necessarily produce usable information systems. Similarly, when these guidelines are applied to web site design, they do not guarantee a usable site (Levi and Conrad, 1996).

Usability testing allows us to measure ease of use and degree of user satisfaction. There are different ways to test usability: *subjective preference*, *objective performance*, *experimental evaluation* and *direct observation*.

- *Subjective preferences* are determined by asking the users to evaluate the system on one or more rating scales in a questionnaire (Dumas and Redish, 1993). This type of measure can be difficult to obtain if the user population is widespread and diverse as, it generally is for many commercial web sites (Nielsen, 1998). But more importantly, this measure can be misleading because users tend to rate highly a web site even if it is unusable. In a recent study, Spool et al. (1998) found that 58% of the time users were unable to find specific information on several commercial web sites. However, when asked about the "overall ease of use" of these web sites, users tend to give a relatively high rating (4.9 on a 1-7 scale, 7 best). These results indicate that subjective ratings are limited as a way to test web site usability. "People tend to be polite and give relatively high ratings even when the site is unusable" (Nielsen, 1998).
- *Objective performance* is measured by determining how long visitors take to complete a task through the web-based system. As a productivity assessment, however, this measure

is also limited because it is influenced by variables beyond the control of the user (Nielsen and Levy, 1994). In this case, factors such as connection speed and Internet traffic may affect the time that the system takes to completely display a web page or process a request.

- *Experimental evaluation* is implemented by manipulating parameters associated with web interface design and studying their effects on user performance and preferences. The experiment takes place in a controlled environment so that causal relationships can be established. Before testing, the experimenter decides the types of manipulation to be made to both tasks and web site features. This method is particularly useful while the interface is being developed (Preece, 1993).
- *Direct observation* consists of studying a web site by inspecting how a sample of users actually uses the site. It involves observing the users and monitoring their behavior while they are interacting with the system. Any method based on assessing usability by inspection could be as effective as formal experimentation and it is easier and less expensive to conduct (Instone, 1997; Sullivan, 1996).

In general, a usability inspection method does not need to involve many users. Typically, systematic tests with a small group of target users can identify most usability problems with a web-based system. It is important, however, to assure that the sample is representative of the typical user population.

One of such direct inspection methods is called *protocol analysis*. It consists of asking the users to perform a specific task through the web site and "think aloud" as they work. The process of verbalization reveals the assumptions, inferences, misconceptions and problems that the users face when interacting with the web site. Although other methods based on direct observation may be quicker and less expensive, protocol analysis is the most systematic and valid (Ericsson and Simon, 1996).

Verbal Protocols to Analyze Web Site Usability

A verbal protocol is a record of a step-by-step procedure of a user "thinking out loud" while performing a structured task through a web-based system. In a protocol analysis session, the experimenter observes the interaction between a typical user and a web-based system, while the user is completing a specific task. The user is instructed to verbalize his/her thoughts while

completing the task. The session is recorded in order to gather three types of data: (1) exact verbalization of the user and experimenter, (2) user actions or keystrokes, and (3) possible interpretation of causes of errors or problems.

A small sample (6-8) of users representative of the target user population is individually observed and recorded in these experimental sessions. For each user, a complete transcript of the session is produced matching thoughts, steps (keystrokes) and results. The episodes are analyzed to detect major problems or misconceptions encountered by the user.

The *verbal protocol* (exact quotes from users and specific action sequences) illustrates the occurrence of usability problems. By grouping the episodes, problems can be classified and common misconceptions and sources of errors can be found. Episodes are used to detect what separate problems are occurring and what proportion of participants encountered. At the end of the experimental session, users are interviewed to evaluate the web-based system.

The data collected in the protocol analysis along with the results of the interviews illustrates major usability problems. As a qualitative and in-depth technique, protocol analysis provides valuable evidence to evaluate web site usability.

Some drawbacks of this method are lack of realism and inability to obtain performance measures. The presence of the experimenter and the need to verbalize thoughts may affect the realism of the session. Verbalizing (or talking) also affects performance time, so objective measures of task execution can not be obtained for benchmarking purposes. However, protocol analysis can pinpoint important usability problems and why and when they occur.

Conclusions

Systems developers are very concerned with building the right functionality into their systems but usability also matters (Goodwin, 1987). For web-based systems and commercial web-sites offered to the general public, a usable interface could determine how and with what frequency the site is used, and even if the site is used at all.

Protocol analysis is a systematic and relatively inexpensive qualitative technique to evaluate the usability of a web interface. Results of protocol analysis can reveal usability problems that affect user acceptance of a web site. In general, this type of study can provide organizations and researchers with an easy-to-use method to evaluate how usable are their web-based systems.

References

- Adler, P.S. and Winograd, T.A. (1992) *Usability: Turning Technologies into Tools*. New York: Oxford University Press.
- Dumas, J.S. and Redish, J.C. (1993) *A Practical Guide to Usability Testing*. Norwood, NJ: Ablex Publishing Corporation.
- Ericsson, K.A. and Simon, H.A. (1996) *Protocol Analysis: Using Verbal Reports as Data*. Cambridge, MA: MIT Press.
- Goodwin, N. (1987) "Functionality and Usability", *Communications of the ACM*, March, 229-233.
- Instone, K. (1997) "Site Usability Evaluation", <http://webreview.com/wr/pub/97/10/10/usability/index.html>
- Levi, M.D. and Conrad, F.G. (1996) "Usability Testing of World Wide Web Sites", <http://stats.bls.gov/orersrch/st/st960150.html>
- Nielsen, J. (1998) "Cost of User Testing a Web Site", May 1998. <http://www.useit.com>
- Nielsen, J. and Levy, J. (1994) "Measuring Usability: Preference vs. Performance". *Communications of the ACM*, 37(4), 66-75.
- Preece, J. (1993) *A Guide to Usability*. Reading, MA: Addison-Wesley.
- Spool, J. et al. (1998) *Website Usability*. Morgan Kaufman Publishers.
- Sullivan, T. (1996) "User Testing Techniques - Site Reviews", <http://www.pantos.org/atw/35283.html>