

# Usability and Its Assessment & Evaluation

## - Introductory Note

*Usability rules the Web. Simply stated, if the customer can't find a product, then he or she will not buy it. The Web is the ultimate customer-empowering environment. He or she who clicks the mouse gets to decide everything. It is so easy to go elsewhere; all the competitors in the world are but a mouse click away. - JAKOB NIELSEN (2000A)*

### 1.1 Introduction

Web Applications as we know is very business critical and is characterized by the following factors:

- Immediacy of the customer
- Implied promise of rapid delivery at competitive prices
- Increasing accessibility of the web

However the following facts prove that the success of an Web Applications depends on the performance of the website and the perceptions that it creates in the minds of the users. Finally, it is the user who decides the quality of the site. According to a study, it is noted that around 28% of all online purchases fail. Of the above, 28% of the online shoppers never shop online again. 23% of the above never visit the site again. 6% of the above would not visit the brick and mortar outlet of the company again!

The users have abandoned a site or a purchase because of the following reasons:

- Difficult to use
- The web pages broke
- Slow to respond
- Did not trust it to be secure
- Content is confusing
- Improper processing of orders

As the final judgment regarding the site and its performance is made by the users, it is imperative for the organization developing a website, to understand, how usable the website is for its target audience.

Know your users, know their goals, and know the circumstances of system use. The usability of a product is affected not only by the features of the product itself, but also by the characteristics of the users, the tasks they are carrying out, and the technical, organizational and physical environment in which the product is used. In this guide, we use the term 'context' to include all factors, which affect the usability of the product, excluding the features of the product itself. We use the term 'product' to represent any interactive system or device designed to support the performance of users' tasks.

### 1.2 Definition of Usability

The discipline of applying scientific observation, measurement, and design principles to create web sites that have the greatest ease of use and the least amount of discomfort.

In plain language, usability is the user's perception of:

- Friendliness
- Ease of use
- Usefulness

- Ease of learning
- Ease of relearning

Usability is the practice of designing products so that users can perform required use, operation, service, and supportive tasks with a minimum of stress and a maximum of efficiency.” (Woodson, 1981)

It is also the effectiveness, efficiency, and satisfaction with which specified users can achieve specified goals in particular environments.

### 1.3 A Framework for Usability Assessment

Assessment is an essential step in any development activity in order that the managers of the process can:

- Predict whether usability targets will be met;
- Obtain feedback which can be used to improve design;
- Assess whether the targets have been met.

Early in design the emphasis will be on obtaining feedback (typically consisting of a list of usability defects) which can be used to guide re-design, while later when a realistic prototype is available it will be possible to measure whether user and organizational objectives have been achieved.

In the early stages of the development and design process, changes are relatively inexpensive. The longer the process has progressed and the more fully the system is defined, the more expensive the introduction of changes will be. It is therefore important to start assessment as early as possible. Assessment cannot take place, however, in a vacuum.

It must take place considering who the end users are or will be and the situations the end users will find themselves in. The analysis of Context of Use (see below) is therefore an essential first step in all assessment activities. The more integrated these activities are within the overall design process, of course, the more effective they will be.

The process of user-based assessment yields information that will enable design decisions to be made by:

- Eliciting feedback and further or revised requirements from the users;
- Selecting the design option which best fits the functional and usability criteria.

When assessment is set against specific usability targets or objectives, it is referred to as evaluation. Particular evaluation goals will reflect some of the objectives suggested below:

- To diagnose potential usability problems and identify needs for improvements in the interface, the supporting material, the workstation environment or the training proposals;
- To determine whether usability targets have been met.

Assessment techniques will vary in their degree of formality, rigour and user involvement depending on the environment in which the evaluation is conducted. The choice will be determined by financial and time constraints, the stage of the development lifecycle and the nature of the system under development.

The four main approaches to usability assessment are:

**Heuristic (sometimes known as ‘rule-based’) evaluation**, usually carried out by human factors specialists, and is possibly supported by task experts. It can be fast and economical and is good for identifying major problems but is not sufficient to guarantee a successful interactive system. Experts are not considered to be able to predict all the problems that end users will experience.

**User-based evaluation** can be used to provide feedback at any stage of design. In the early stages, users may be involved in the evaluation of scenarios, simple paper mock-ups or partial/rapid prototypes. As design solutions become more developed, evaluations involving users will be based on progressively more complete and concrete versions of the system.

**Evaluation against design criteria** is an established technique, which can contribute to usability. These criteria are contained in design guides, collections of ergonomic guidelines and standards.

**Model-based assessment** takes place against a theoretical model of human abilities, and the specification of how the human-computer interface is going to operate. The nature of the models used is usually quite generic and does not guarantee that the end users will react in the same way to the product. Model-based evaluation is only gradually being introduced to industry.

## 1.4 The focus of the usability assessment

Depending on the state of the process reached, and the goals of the evaluation, usability assessment may focus on different aspects of quality of use. Here are some scenarios most commonly encountered in usability assessment:

### 1.4.1 Informational content of the application

The usability assessment of the informational content is performed to evaluate the correctness of the information provided by the system as well as the adequateness of the media selected for the presentation of information by the system. Evaluation at this level focuses on ‘deep’ aspects of the design of the application; it refers to the appropriateness of the system’s functionalities and information to support the user’s task.

### 1.4.2 Functionality of the user interface

This looks at features and properties of the dialogue and presentation components between the user and the user-interface of the application. The purpose of such features is to give the user access to the functions of the software provided for browsing and navigating through the information content, for searching, selecting, retrieving and storing of information and other more application-specific functions.

### 1.4.3 User performance

This looks at the ability of the end user to carry out the tasks for which the system is designed, in the context in which the system will be used. We may distinguish between two aspects of user performance: does the user get the correct information or generate the right outputs (effectiveness); and how long does it take the user achieve this output (efficiency).

#### 1.4.4 Load imposed on the end user

This looks at the properties of the task, which the user intends to perform. This may be the result of properties of the information content or the functionality of the application, or the nature of decisions the user performs on the basis of this information. Stress in terms of cognitive load and subjectively experienced discomfort is a function of the load on the individual user, and factors such as individual differences, learning state, and fatigue.

#### 1.4.5 Satisfaction of the end user

A software system may be highly efficient, and lead to effective outputs. However, the way the user reacts to the system is equally important. Subjective reactions include efficiency (does the user feel that they are working well with the system), perceived helpfulness, degree of control experienced by the user, the learnability of the software, and a general emotional reaction to the software system. These are all determinants of whether the system will be accepted in use, or if deployment of the system will be mandatory, the extent to which end user staff will experience job satisfaction.

#### 1.4.6 Cost/benefit analysis

This kind of assessment focuses on what has to be done to the system in order that it should achieve a certain level of quality of use, and then considers the probable cost of carrying out the work needed balanced against the degree of criticality of the work. Alternatively it may consider the probable cost of the validation activities balanced against the criticality of the information to be obtained from such a procedure.

### 1.5 Usability Assessment Process

Usability is an iterative process that focuses on a product's use rather than on its features and functions. It involves knowing the actual users and the work they do. Usability engineering and assessment involves a variety of techniques that can provide important information about how customers work with your product. These techniques include:

*User and task observations* — observing users at their jobs, identifying their typical work tasks and procedures, analyzing their work processes

*Interviews, focus groups, and questionnaires* — meeting with users, finding out about their preferences, experiences, and needs

*Benchmarking and competitive analysis* — evaluating the usability of similar products in the marketplace

*Participatory design* — participating in design sessions, bringing the user's perspective to the early stages of development

*Paper prototyping* — including users early in the development process through prototypes prepared on paper, before coding begins

*Creation of guidelines* — helping to assure consistency in design through development of standards and guidelines

*Heuristic evaluations* — evaluating software against accepted usability principles and making recommendations to enhance usability

*Usability testing* — observing actual users performing real tasks with the application, recording what they do, analyzing the results, and recommending appropriate changes.

## 1.6 Usability Evaluation Methods

There are generally three types of usability evaluation methods: **Testing**, **Inspection**, and **Inquiry**.

### 1.6.1 Testing

In Usability Testing approach, representative users work on typical tasks using the system (or the prototype) and the evaluators use the results to see how the user interface supports the users to do their tasks. Testing methods include the following:

- Coaching Method
- Co-discovery Learning
- Performance Measurement
- Question-asking Protocol
- Remote Testing
- Retrospective Testing
- Shadowing Method
- Teaching Method
- Thinking Aloud Protocol

### 1.6.2 Inspection

In Usability Inspection approach, usability specialists -- and sometimes software developers, users and other professionals -- examine usability-related aspects of a user interface. Commonly used Inspection methods are:

- Cognitive Walkthroughs
- Feature Inspection
- Heuristic Evaluation
- Pluralistic Walkthrough
- Perspective-based Inspection

### 1.6.3 Inquiry

Here, usability evaluators obtain information about users' likes, dislikes, needs, and understanding of the system by talking to them, observing them using the system in real work (not for the purpose of usability testing), or letting them answer questions verbally or in written form. Inquiry methods include:

- Field Observation
- Focus Groups
- Interviews
- Logging Actual Use
- Proactive Field Study
- Questionnaires

### 1.6.4 Usability Evaluation Methods & Cost

In the list below, to determine the cost of conducting a usability evaluation method, the following were considered:

- Personnel required: number of users, usability experts, and software developers

- Time required for data collection and analysis
- Need for coordination - that is, whether the method requires the participants to be present together

## 1.7 What are some of the benefits?

Some of the key benefits for conducting usability assessments and benchmarking are as follows:

- Discover new markets and develop competitive barriers
- Understand the strengths and weaknesses of your web site
- Understand how your customers really use your web site
- Discover how to improve the navigation on your site
- Help your web development team understand your customers
- Improve customer satisfaction, loyalty and retention
- Validate your design ideas and know how to allocate resources
- Choose the right online strategy and target your customers
- Develop the best navigation and content grouping for your web site
- Choose the best prototype for your next web site redesign
- Discover the problems with your site that drive customers away
- Find out how customers really use your web site
- Port existing applications to the online environment
- Develop new online applications
- Review and improve existing applications, through expert evaluation and user testing programs
- Create initiatives that focus on meeting customer requirements
- Provide usability benchmarking and competitive analysis

Remember, Usability is key to understanding of the following elements:

- The competition
- The audience
- User needs
- User goals
- Behavior patterns
- User expectations
- Market position
- Business objectives
- Attributes of differentiation

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