

Integrating Usability Engineering for Designing the Web Experience: Methodologies and Principles

*A book edited by Tasos Spiliotopoulos, Panagiota Papadopoulou, Drakoulis Martakos and Georgios Kouroupetroglou
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Editorial Preface

Introduction

System usability is defined as the extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use. Usability is regarded as one of the aspects of software quality, and as such it can be described alternatively as “quality in use”. Since usability is only defined within a certain context of use, we can deduce that it cannot be considered as an inherent attribute of a product, but it has to be studied by studying the users themselves.

Ease of use has long been a major concern within software development and the industry has realized that in order to achieve such a quality, a user-centered approach is needed. However, User-Centered Design (UCD) constitutes a considerable paradigm shift in the development process and this has hindered the adoption of UCD methods. Thus, it is fairly recently that more systematic approaches have been considered and efforts have been made to integrate such methods in the software development process. Moreover, the proliferation of the World Wide Web has increased the need for developing usable systems, since the designers have to cater for a much more diversified user base. In addition, the Internet has led to an increase in the number of people that develop software and has shrunk the amount of time from the inception of an idea to its development as an application and its deployment to the market. Advances in ICT have complicated modern applications and their interfaces, making them harder to use. As a consequence of all the above, a considerable lack of usability can be observed in the Web today, despite the fact that the importance of the concept has been widely acknowledged.

Since usability, and Human-Computer Interaction (HCI) in general, has to study the users of computer systems, researchers and practitioners have traditionally drawn upon principles from a wide range of scientific fields in order to devise effective UCD methods. Apart from computer science, such fields include cognitive psychology, social psychology, ergonomics, linguistics, philosophy, anthropology, industrial design etc. In addition, several theoretical approaches are being adapted from these disciplines to computer science in order to give insights on the design of the interaction between computers and their users.

Usability methods for the web, that is methods that enable or facilitate the development of usable systems for the web, can be classified as inquiry, prototyping, inspection and testing methods.

- Inquiry methods investigate the usability attributes of a system by noting down the user's opinions of it. It should be taken into account, however, that the users' opinions are always subjective and therefore not of as much value as one would expect. These methods include user questionnaires, interviews, focus groups, personas, card sorting, field observations etc.
- Prototyping methods aim at modeling the final system, thus making it possible to study and test it, even if its development has not finished yet. It is possible to have high or low fidelity prototypes and horizontal or vertical prototypes. Moreover, prototypes can be classified as reusable or evolutionary and modular or incremental. Some usability methods in this category are paper prototyping, storyboards, video prototyping, rapid prototyping and parallel design.
- Inspection methods refer to the inspection of a system or a prototype of the system by one or more usability experts. The inspection can be either a simple review by the expert or it can be based on certain scenarios that constitute a walkthrough of the system. Such methods include heuristic, expert, guideline and cognitive reviews and walkthroughs.
- Testing methods involve the participation of actual users in testing the system. Their interaction with the system is recorded and analyzed later, in order to obtain useful conclusions. Some methods for usability testing are thinking aloud protocol, constructive interaction, retrospective testing, coaching method, wizard of Oz and logging actual use of the system.

Other characteristics of such usability methods include:

- The stages of the development process that the method can be used in, i.e. requirements analysis, design, implementation, formative or summative evaluation. Of course, a usability method can be applied in more than one stage in the web development process.
- The type of results obtained from the method, i.e. qualitative or quantitative.
- Bias of the method, i.e. objective or subjective results.
- The resources necessary, such as equipment, implementation of a prototype, number of users or usability experts needed and trips.
- Level of the information obtained, i.e. high or low level.
- Location, i.e. laboratory or real work environment.
- Immediacy of response, i.e. how quickly the feedback is available.
- Intrusiveness of the method.

Since usability methods can provide complementary results, it is important to examine the ways that these methods can be combined and integrated in the development process, in order to achieve increased efficiency. This book aims at providing an holistic approach to web usability methods, allowing the readers to obtain a better understanding of usability in the context of the development process for the web.

Organization of the book

Section 1 of the book focuses on the integration of usability methods in the web development process. This part of the book examines the reasons that advances in usability research do not find their way easily into the web industry and attempts to provide valuable insights to all the stakeholders in the development of a web system. Section 2 examines universal usability for the web and explores ways of

enabling all citizens to succeed using communication and information technology in the web. In doing so, this section studies designs that gracefully accommodate a diversity of user needs and circumstances. Section 3 focuses on the theoretical aspects of usability for the web. This part of the book acknowledges the inherent interdisciplinarity of usability in order to provide a deeper understanding of the scientific principles in the field and to investigate their application in web design. Finally, the last section of the book examines and appraises particular examples of usability methods and techniques in more detail.

Section 1: Integrating Usability Methods in the Web Development Process

Chapter 1, *Supporting Web Developers in Evaluating Usability and Identifying Usability Problems* is written by Mikael B. Skov and Jan Stage. In this chapter, the authors propose to facilitate the integration of usability in the web development process by enabling website developers without formal training in human-computer interaction to conduct their own usability evaluations. The authors' own experiences and results from such usability evaluations are presented, where they employed a simple tool that has been developed to support identification of usability problems.

Chapter 2, *A Structured Methodology for Developing 3D Web Applications* is written by Juan Manuel González-Calleros, Jean Vanderdonckt and Jaime Muñoz-Arteaga. This chapter tackles the issue of designing usable 3D web applications. In order to achieve this aim, the authors develop a user-centred methodology as an alternative to content-centric methodologies for developing 3D user interfaces, which considers a step-wise development life cycle where usability guidelines could be considered implicitly or explicitly at each development step.

Chapter 3, *A Case Study of Usability Engineering in the Defence Industry* is written by Steve Hogg, Patrik O'Brian Holt and Jim Aitchison. This chapter discusses a case study of how a company used modern system design and development approaches, agile software development and usability engineering to produce and deploy a solution to a problem that is critical to the organization. The authors describe in detail this endeavor, explaining the usability issues encountered, and conclude with a discussion providing useful guidance for future work, based on the lessons learned.

Chapter 4, *The Evaluation Cycle Management Method Applied to the Evaluation of Learning Management Systems* is written by Matija Pipan, Tanja Arh and Borca Jerman Blažič. This chapter introduces ECM, a support methodology based on multi-attribute decision making and usability testing, which is aimed at the evaluation of options that occur in the decision-making process. This method is subsequently employed for evaluating the suitability of Learning Management Systems for a defined target group.

Chapter 5, *Usability techniques for Interactive Software and their Application in E-commerce* is written by Shawren Singh. This chapter attempts an overview of usability and usability techniques, focusing on the development of e-commerce systems. It examines usability evaluation techniques and techniques for designing with usability in mind before presenting and discussing several e-commerce studies from a developing economy perspective.

Chapter 6, *Development and Evaluation of a Methodology for Developing Marketing Websites* is

written by Tomayess Issa, Martin West and Andrew Turk. In their work, they select the strongest aspects of various development methodologies from several disciplines and combine them into a new, participative methodology for the development of marketing websites, with a focus on usability.

Section 2: Universal Usability

Chapter 7, *Integrating Accessibility Evaluation into Web Engineering Processes* is written by Christopher Power, André Pimenta Freire and Helen Petrie. This chapter presents the relationship between usability and accessibility and argues for the importance of accessibility evaluation in web engineering. The authors present the major types of accessibility evaluation that are available to web engineers and explain how to integrate these evaluations into existing development processes.

Chapter 8, *Usability Methodologies for Spoken Dialogue Web Interfaces* is written by Dimitris Spiliotopoulos and Georgios Kouroupetroglou. This chapter investigates usability issues for spoken dialogue web interfaces. The authors describe the background of such systems, before discussing hands-on approaches for applying usability methodologies in a spoken dialogue web application environment.

Chapter 9, *Website Accessibility and the Role of Accessibility Statements*, written by Catherine Parkinson and Wendy Olphert, defines accessibility in the broader context of usability and describes the key drivers for website accessibility. It then goes on to focus on accessibility statements and explain their importance for website accessibility. The main goal of the chapter is to present an overview of the current practice and usage of accessibility statements and to provide guidance for their development.

Chapter 10, *Considering the Perceptual Implications of Auditory Rich Content on the Web* is written by Fláithrí Neff, Aidan Kehoe and Ian Pitt. This chapter explores design strategies for non-speech sound content for the web. In order to help web designers to consider issues of accessibility and usability without detracting from the overall user experience, the authors present an auditory user interface model aimed at conceptualizing the perceptual issues involved when presenting a rich soundscape to the web user.

Chapter 11, *A Usability Guide to Intelligent Web Tools for the Literacy of Deaf People* is written by Tania di Mascio and Rosella Gennari. This chapter reviews several literacy e-tools for deaf people and assesses whether the tools conform to the User Centred Design Methodology. Based on these assessments, the authors stress the need for the introduction of guidelines for developing tools that are usable by deaf people and propose a set of such guidelines.

Section 3: Theoretical Approaches

Chapter 12, *Social Research Methods Used in Moving the Traditional Usability Approach Towards a User-Centered Design Approach* is written by Horia D. Pitariu, Daniela M. Andrei and Adriana M. Guran. This chapter provides a social scientist's perspective on usability, portraying web usability as deriving from the quality of interactions between humans, their work and the web design product. The authors discuss the design models that can support usability and argue on the importance of using social research tools for a better understanding of the people and their needs starting with the very first

stage of design. They describe user needs analysis methods and provide guidelines in preparing and using these methods. Finally they demonstrate the use of these methods in user needs analysis through two empirical studies.

Chapter 13, *A Theoretical Framework Measuring the Usability of Retail Sites* is written by Konstantina Vassilopoulou, Kathy K. Keeling and Linda A. Macaulay. This chapter attempts to determine the extent to which usability succeeds in addressing the needs of the user as a consumer, and subsequently develops a theoretical framework that suggests future use intention as a new type of measurement of usability of retail sites and identifies appropriate usability attributes for retail sites.

Chapter 14, *The Influence of E-commerce Website Colors on Usability* is written by Jean-Eric Pelet. This chapter explores the effect of the colors used on e-commerce websites on consumer retention of information and buying intention, in order to better understand website usability. After an extensive laboratory experiment, the author concludes that the graphic composition of a website can indeed affect the representation that the consumer retains when shopping, providing some useful insights for web designers.

Section 4: Usability Methods and Techniques

Chapter 15, *Whose questionnaire is it, anyway?* is written by Andrew Saxon, Shane Walker and David Prytherch, who provide a much needed social scientist's view on evaluative methodologies for web software. The authors examine two different example methodologies for addressing the psychological needs of the users, the Motivation Systems Theory and the Repertory Grid Technique.

Chapter 16, *DEPTH: A Method and a Web-Based Tool for Designing and Executing Scenario-Based Usability Inspections of e-Systems* is written by Petros Georgiakakis and Symeon Retalis. In this chapter, the authors provide an overview of DEPTH, an innovative method and the corresponding tool for performing scenario-based expert heuristic usability evaluation for web based systems. The distinguishing characteristic of this method is the fact that it uses the added value of design patterns in a very systematic way within the usability evaluation process.

Chapter 17, *Applying the WDP Technique to Usability Inspections in Web development organizations* is written by Tayana Conte, Verônica T. Vaz, Jobson Massolar, Andrew Bott, Emilia Mendes and Guilherme H. Travassos. This chapter presents a usability inspection technique for Web applications, the process to execute an inspection using this technique and the results of the execution of a usability inspection in a software development project. This technique combines web design perspectives and heuristic evaluation, while the results of its application indicate the feasibility of performing usability inspections with the participation of a software project's stakeholders, even when stakeholders are not usability experts.

Chapter 18, *Multiple-User Simultaneous Testing: Experience with Two Methods* is written by Borchuluun Yadamsuren, Anindita Paul, Sanda Erdelez and Joi L. Moore. This chapter examines two different approaches for multi-user simultaneous usability testing; self-paced and moderated. The authors describe the two methods in detail and their comparative experiences, while concluding with recommendations for practitioners on how to design and conduct similar studies.

About the Editors

Tasos Spiliotopoulos is a researcher at the Department of Informatics and Telecommunications, National and Kapodistrian University of Athens, Greece. As a member of the Information Systems Laboratory Research Group since 2000 he has participated in numerous EU and national research projects. His current research focuses on human-computer interaction, computer systems usability, the social web and online security and privacy.

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