Preface

Web information systems are rapidly growing, and the increasing demand of that software has made the quality a discriminator factor becoming a key factor for their success.

Advances in technology and the use of Internet have favored the appearance of a great variety of Web software applications. As a result, over the past decade the number of organizations which make use of Web applications has grown dramatically. These Web applications are used by different companies with the aim of giving several services to their clients. From the user's point of view, Web applications are used to make deals. In both cases, the quality is relevant. In the first case, it is fundamental the quality of Web applications in order to give a good service and assure the loyalty of users. In the second case, the quality is important in order that users can achieve their objectives in a proper way.

Therefore, it is essential not only to develop new Web information systems, but also to take into account their quality. With regard to this, new methodologies and models are being developed to improve and assess the quality of Web information systems. In such an ever-evolving environment, Web engineers, software quality managers, software engineers, software architects, MSc. Students, and university-level professors of the discipline need access to the most current information about the models, measures, and methodologies in this emerging field.

The Web age has modified our society, and new business models have appeared, while others have been modified. In addition, the relationships between the different actors have changed.

It may be worth emphasizing that Web Technologies have become very important in information systems. Web Technologies are essential for organizations. Currently, it is indispensable that the developed Web products, such as Web pages, Web applications, Web portals, and so forth, achieve a minimum level of quality.

According to Offutt 2002[1], several factors inherent to Web development affect to the quality:

1. Developers build Web-based software systems by integrating numerous diverse components from disparate sources, including custom built special-purpose applications, customized off-the-shelf software components, and third-party products.
2. Much of the new complexity found with Web-based applications also results from how the different software components are integrated. Not only is the source unavailable for most of the components, the executables might be hosted on computers at remote, even competing organizations. To ensure high quality for Web systems composed of very loosely coupled components, we need novel techniques to achieve and evaluate these components' connections.
3. Finally, Web-based software offers the significant advantage of allowing data to be transferred among completely different types of software components that reside and execute on different computers. However, using multiple programming languages and building complex business applications complicates the flow of data through the various Web software pieces.

The ***Handbook of Research on Web information systems Quality*** provides comprehensive coverage of the most important issues, such as: effort and quality assessment, accessibility, usability, metadata, MDE, metamodels, ontologies search engine, and information. All of them focus on Web information systems.

The handbook is divided into four sections that cover the main tendencies on the Web information systems research and gives a clear vision of the main actual lines of work and also the topics where more effort is being developed.

The first section is on quality assessment, where different approaches, whose central point is quality, are presented. The second is on accessibility and usability, perhaps two of the most important factors related to Web information systems and where more research and development efforts are deployed from the beginning of this discipline. The third section approaches the technological point of view with chapters about metadata, MDE, metamodels, and ontologies. Finally, the last section works on Web engines and information on the Web.

As we have already mentioned, the first section is related to effort and quality assessment and is composed of eight chapters. The first chapter presents a survey literature of size measures (attributes) that have been proposed for Web effort estimation. These measures are classified according to a proposed taxonomy. In addition, the authors discuss ways in which Web companies can devise their own size measures. The objective of the second chapter is to introduce the concepts related to Web effort estimation and effort estimation techniques. It also details and compares, by means of a case study, three effort estimation techniques.

Chapter III emphasizes the significance of approaching Web information systems (WIS) from an engineering viewpoint. A methodology for deploying patterns as means for improving the quality of WIS as perceived by their stakeholders is presented. The fourth chapter discusses and analyses the effectiveness of SME business to business Web sites from a user perspective under the premise that an effective method of evaluating a Web site can contribute to the development of more quality Web sites and greater realization of benefits. In Chapter V, the problem of Web application quality assessment is assessed from two perspectives.

Chapter VI presents the most prominent systems and prototypes implemented for the automatic quality assessment for Internet pages and analyzes the knowledge sources exploited for these approaches. In Chapter VII several portal quality models are presented and compared. Authors have adapted one of the best portal quality model proposed in the literature to the e-banking context.

Finally, the section ends with a chapter that proposes a model for data quality in Web portals (PDQM) built upon the foundation of three key aspects: (1) a set of Web data quality attributes identified in the literature in this area, (2) data quality expectations of data consumers on the Internet, and (3) the functionalities that a Web portal may offer its users.

The second section of the book is divided into two main topics and is composed of seven chapters. The first works on both topics. The three next chapters deal with accessibility, one of them from a general point of view, another one comparing approaches to Web accessibility assessment, and the last one about maximizing Web accessibility. The other three chapters are about usability from the point of view of ergonomic criteria as part of the development of Web applications or as an important aspect for the construction of business process driven Web applications.

Concretely, Chapter IX is presented in the structure of an index, which allows the development team to create the specification of the context of use document for the development of Web applications, bearing in mind characteristics of usability and accessibility.

Chapter X studies the Web accessibility issue from the perspective of Web information systems Quality. In addition, the closed relationship between accessibility and standard Web technologies is

explained. In the eleventh chapter, the importance of Web accessibility assessment is discussed and 15 different approaches found in literature are compared.

The user interface is the place where users can interact with the information by using their minds. Users with special needs can acquire information by using a human centred user interface. Chapter XII highlights the need to investigate the relationship between cognition and user interface.

Chapter XIII proposes a quality model that focuses on quality in use or usability for the product characterization of the World Wide Web, and Chapter XIV surveys the most emergent usability evaluation models to be adopted during the whole lifecycle of Web information systems, for promoting usability.

In the last chapter of this section, the authors gather a set of guidelines provided by experts in Web usability and present the solution designed in a particular Web engineering method that follows a model driven development approach.

The third section is related to metadata, MDE, metamodels, and ontologies. The first four chapters focus on metadata issues. In the next three chapters, different metamodels oriented to Web requirements, development of Web applications, and Web exploration are shown. Finally, an ontology for WSRP standard is presented and a philosophy of architecture design in Web information systems.

The section starts with Chapter XVI, focused on "portletizing" existing Web applications, that is, wrapping them as portlets, without requiring any modification. After providing some background on portlet technology, they discuss two kinds of approaches to portletization: automatic and annotation-based. In Chapter XVII, the authors survey techniques for ontology evolution. The authors detail the various existing languages and techniques devoted to Web data evolution, with particular attention to Semantic Web concepts, and how these languages and techniques can be adapted to evolving data in order to improve the quality of Web information systems applications.

In Chapter XVIII, the importance of using ontologies to represent database schemas is highlighted. The representation of the fuzzy data in fuzzy databases management systems (FDBMS) has certain special requirements, and these characteristics must be explicitly defined to enable this kind of information to be accessed. Chapter XIX addresses those issues by proposing a Web metadata-based model to evaluate and recommend Web pages based on their information quality, as predicted by their metadata.

Chapter XX presents one WIS development methodology (MIDAS) that has been completed with the definition of a strategy for the formal specification of its models with V&V objectives, and chapter XXI presents NDT (navigational development techniques), a Web methodological approach to deal with requirements, based on model-driven engineering. The proposal is composed of a set of procedures, techniques and models to assure the quality of results in the Web requirements treatment.

Chapter XXII introduces the necessity to consider quality management activities as part of the Web engineering (WE) process to improve the final quality of Web applications with respect to creative practices.

The problem of automatically organizing heterogeneous collections of Web documents for generation of thematically focused expert search engines and portals is the focus of Chapter XXIII. As a possible application scenario for the presented techniques, the authors show a Web crawler that aims to populate topics of interest by automatically categorizing newly fetched documents.

An ontology for WSRP standard is presented in Chapter XXIV. The aim of this standard is to provide a common interface in order to allow the communication between portal and portlets. Bearing this in mind, in this work the authors propose an ontology for the WSRP standard that offers an understandable summary of the standard.

Closing this section, Chapter XXV provides a comprehensive set of guiding principles—philosophy of architecture design (PAD)—as a means of coping with the architecture design complexity and managing the architectural assets of Web information systems in a service-oriented paradigm.

The last section of the book focuses on two main topics: search engine and information. Among the chapters classified in this section, four of them are related to the first topic, whereas the last two are related to the second one.

The section starts with Chapter XXVI, where the authors propose the improvement of the quality of Web search by combining meta-search and self-organizing maps. This can help users both in locating interesting documents more easily and in getting an overview of the retrieved document set.

In Chapter XXVII, some past research in Web search and current trends focusing on how to improve the search quality in different perspectives of "what," "how," "where," "when," and "why" are discussed.

The objectives of Chapter XXVIII are to review the theories and technologies pertaining to Web search, helping in the understanding of how Web search engines work, and how to use the search engines more effectively and efficiently.

The purpose of the Chapter XXIX is to describe methods and criteria used for evaluating search engines. The chapter also proposes a model for evaluating the searching effectiveness of Web retrieval systems in non English queries.

Finally, the last chapter of the book proposes that visitor information centres are analogous to a general information system and that centre user experience can partially be explained by their perception of the information resource quality.

Due to the variety of topics and the different aspects related to the research on quality for Web information systems, this handbook can be used by software engineering researchers and practitioners (professors, PhD, and postgraduate students, industrial R&D departments, etc.) for helping in the understanding of the topic, knowing about the main current tendencies of research and the future lines of research on Web information systems quality.

ENDNOTE

[1] Offutt, A. J. (2002). Quality attributes of Web software applications. *IEEE Software, 19*(2), 25-32.