1 The Need for Web Engineering: An Introduction

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Abstract: The objective of this chapter is three-fold. First, it provides an overview of differences between Web and software development with respect to their development processes, technologies, quality factors, and measures. Second, it provides definitions for terms used throughout the book. Third, it discusses the need for empirical investigations in Web engineering and presents the three main types of empirical investigations – surveys, case studies, and formal experiments.

Keywords: Web engineering, Empirical Investigation, Case studies, Surveys, Formal experiment, Scientific principles, Engineering.

1.1 Introduction

The World Wide Web (Web) was originally conceived in 1989 as an environment to allow for the sharing of information (e.g. research reports, databases, user manuals) amongst geographically dispersed individuals. The information itself was stored on different servers and was retrieved by means of a single user interface (Web browser). The information consisted primarily of text documents inter-linked using a hypertext metaphor.

Since its original inception the Web has changed into an environment employed for the delivery of many different types of applications. Such applications range from small-scale information-dissemination-like applications, typically developed by writers and artists, to large-scale commercial, enterprise-planning and scheduling, collaborative-work applications. The latter are developed by multidisciplinary teams of people with diverse skills and backgrounds using cutting-edge, diverse technologies. Numerous current Web applications are fully functional systems that provide business-to-customer and business-to-business e-commerce, and numerous services to numerous users.

1 http://www.zeltser.com/web-history/.

2 The increase in the use of the Web to provide commercial applications has been motivated by several factors, such as the possible increase of an organisation’s competitive position, and the opportunity for small organisations to project their corporate presence in the same way as that of larger organisations [29].
Industries such as travel and hospitality, manufacturing, banking, education, and government utilised Web-based applications to improve and increase their operations [12]. In addition, the Web allows for the development of corporate intranet Web applications, for use within the boundaries of their organisations [15]. The remarkable spread of Web applications into areas of communication and commerce makes it one of the leading and most important branches of the software industry [23].

To date the development of Web applications has been in general ad hoc, resulting in poor-quality applications, which are difficult to maintain [22]. The main reasons for such problems are unsuitable design and development processes, and poor project management practices [11]. A survey on Web-based projects, published by the Cutter Consortium in 2000, revealed a number of problems with outsourced large Web-based projects [11]:

- 84% of surveyed delivered projects did not meet business needs.
- 53% of surveyed delivered projects did not provide the required functionality.
- 79% of surveyed projects presented schedule delays.
- 63% of surveyed projects exceeded their budget.

As the reliance on larger and more complex Web applications increases so does the need for using methodologies/standards/best practice guidelines to develop applications that are delivered on time, within budget, have a high level of quality and are easy to maintain [29,27,20]. To develop such applications Web development teams need to use sound methodologies, systematic techniques, quality assurance, rigorous, disciplined and repeatable processes, better tools, and baselines. Web engineering aims to meet such needs [12].

Web engineering is described as [21]:

“the use of scientific, engineering, and management principles and systematic approaches with the aim of successfully developing, deploying and maintaining high quality Web-based systems and applications”.

This is a similar definition to that used to describe software engineering; however, both disciplines differ in many ways. Such differences are discussed in Sect. 1.2.

Section 1.3 provides an introduction to measurement principles and three widely used methods of investigation – surveys, case studies, and formal experiments [7]. Finally, conclusions are presented in Sect. 1.4.

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3 The term “Web engineering” was first published in 1996 in a conference paper by Gellersen et al. [9]. Since then this term has been cited in numerous publications, and numerous activities devoted to discussing Web engineering have taken place (e.g. workshops, conference tracks, entire conferences).