Chapter XIII
Web–Based Systems Development:
An Empirically–Grounded Conceptual Framework

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ABSTRACT

This chapter encapsulates the main findings of an in-depth study of Web development practices in Ireland. The essential research objective was to build a richer understanding of the modern context of Web development and of how that context influences design practices. At the outset, a conceptual framework was derived through a synthesis of issues in the literature and an analysis of existing models of IS development. Data was then gathered through a dual-mode (Web and postal) quantitative survey which yielded 165 usable responses, and later through a series of 14 semi-structured qualitative interviews in a follow-up field study. Following an interpretive approach, elementary statistics and grounded theory were used to iteratively analyze the data until a reasonably comprehensive and stable explanation emerged. This is presented in the form of an elaborated conceptual framework of Web-based systems development as "situated action."

INTRODUCTION

The latter years of the 1990s saw a frenetic surge in activity on the World Wide Web, driven by improvements in networking and communications technologies, enhanced browser capabilities, more advanced server-side and client-side functionality, increased sophistication of visual user interfaces, and the rise of electronic commerce. This sudden and spectacular growth caused quite a degree of apprehension amongst the academic research community because the apparently "out of control" Internet technological upheaval was progressing at such a chaotic pace that the state-of-theory was left lagging some distance behind the state-of-practice (Cusumano & Yoffie, 1999).

Whereas the Web a few short years previously was predominantly a publishing medium, it was metamorphosing so quickly into an applications development environment that serious doubts hung over the readiness of the incumbent generation of Web designers, many of whom were self-trained and from backgrounds other than "proper" software engineering.

On such a premise, Murugesan & Deshpande (1999) called for a "new concept and discipline of Web Engineering" and affirmed that there was a "pressing need for new methods and tools" (Murugesan, Deshpande, Hansen, & Ginige, 1999). In similar vein, Oinas-Kukkonen et al (2001) claimed that "systematic analysis and design methodologies for developing Web information systems are necessary and urgently needed among practitioners". Speculation was rife of an imminent "Web crisis" on foot of a prevalent view that industry development practices in general were unsystematic and unreliable. Whether these remarks were well-founded or mere "exception reporting" (Glass, 1998) is arguable, for the software industry has supposedly been chronically afflicted by a "crisis" as long as it has existed (Gibbs, 1994; Naur & Randell, 1969).

This research project was initiated at a point (c. 2001) when there was much sensational talk in the academic literature of an imminent "Web crisis". Quite a number of empiricial studies of Web development, mostly of the nature of descriptive surveys or narrow experience reports, were published about that time. Though useful and interesting, those studies are now a little dated. Setting aside general HCI research on the effectiveness/usability of Web sites and the mainly experimental contributions of the Web Engineering community, remarkably few studies of actual industry *practice* have since appeared. Following the post-Y2K implosion of the "dot.com" bubble, the Web design industry went through an upheaval whereby firms engaging in haphazard practices were forced to either reform (if they were capable of so doing) or perish (as very many of them did). Development technologies have advanced remarkably in recent years, and many Web development firms originally established in the mid- to late-1990s have at this stage settled down and attained process maturity. The objective of this research project was therefore to contribute towards a richer and updated understanding of the "real-world" context of Web-based systems development, and of how that context influences design practices.

Specifically, the research questions were as follows:

R 1. What is the profile of a typical Web-based systems development project?
R 2. What are the main challenges being experienced by Web-based systems designers in practice?
R 3. What development practices are being engaged to address these challenges?
R 4. What situational factors influence the enactment of development practices?
R 5. Where formalised design guidance is in place, what is its nature and from where is it derived?

RESEARCH APPROACH

A three-phase research approach was taken, as shown in Figure 1. At the outset, a number of informal meetings were held with a few experienced Web developers to help solidify the research objectives, assess the salience and relevance of certain aspects raised by the literature, and uncover any major topical issues of which the researcher was unaware.

The second phase consisted of a dual-mode (postal and Web-based) survey of 438 organisations. The sampling frame included organisations engaged in bespoke software application development; those specialising in Web or interactive multimedia systems design; companies from traditional media that had branched into "new

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