System Development for E–Business

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INTRODUCTION

This article first introduces both the technical and business environments in which Web information systems are developed and the unique project variables of these systems. Characteristics are identified where e-business projects differ from traditional information systems projects. The next section presents various system development methodologies, provides a categorization framework and analyzes these categories for situations where each is best utilized. The synthesis of applying the environmental and project variables to the system development methodology categories provides the main contribution of the article. Conclusions are drawn that a project is unlikely to align perfectly with any one methodology. The project manager should select the methodology that is the "best fit" from the model presented here. Finally, the project manager should customize the process based on the unique characteristics of the organization, project, and team.

BACKGROUND

The speed demanded of e-business developers and the ever-fluctuating nature of the technical and business environments in which they must function combine to demand new approaches to the system development process. Traditional methodologies were designed for vastly different environments and cannot be easily transplanted into this new Web setting. In the practitioner press, Yourdon has called for a new "light" version of traditional methodologies (2000) for use in e-business development. Avison and Fitzgerald (2003) have found many Web-based applications being developed in an ad-hoc, trial-and-error manner.

The E-Business Environment

E-business projects are developed in a unique environment that is characterized by "perpetual ambiguity and rapid change" (Nadherny and Stuart, 2000). A Web Information System (WIS) is usually tightly integrated with other non-WISs, such as databases and transaction processing systems (Isakowitz and Bieber, 1998) to support the work of the organization. "Internet time," the perception that product development and consumer acceptance now occur in a fraction of the time that they traditionally took (Odlyzko, 2001), has increased time-to-market pressure in WIS projects. These distinctive characteristics set e-business projects apart from other types of information systems (IS) projects.

(1) Web Technical Environment

The technical environment for a Web Information System is vastly expanded compared to traditional IS projects. In most traditional projects, an organization builds their information systems in a closed setting, limiting external organizations' access based upon the controlling organization's technology choices. Web Information Systems are different in that both external and internal users often access WISs using a variety of different hardware, software, and networking technologies. To further complicate matters, compatibility issues arise when new WISs must interface with existing legacy systems.

(2) Competitive Marketplace

The competitive marketplace plays a far greater role in Web Information Systems than it does in most traditional projects. WIS marketplace impact can be direct and immediate. This situation offers the promise that an organization could quickly gain competitive advantage through its Web Information Systems. However, according to Porter (2001), the five underlying forces of competition: the intensity of rivalry among existing competitors, the threat of substitute products or services, the barriers to entry for new competitors, the bargaining power of suppliers, and the bargaining power of buyers, have been negatively affected by the shift away from quality, features, and service toward price. This has resulted in a dampening of overall profitability, and has reduced the ability of any company to establish an operational advantage that can

be sustained. Thus the e-business competitive environment is characterized by the ability of any competitor to rapidly change marketplace dynamics, coupled with the likelihood that any such change will be quickly be supplanted by another competitor's actions.

(3) Organization's Culture

Each organization brings to every project its own culture. An organization's culture is comprised of values, behaviors, and attitudes (Hatch and Schulz, 2001). It provides continuity, structure, common meaning, and order, giving rise to stable patterns of interaction within the organization. However, that stability can be upset by the creative, more liberal culture characteristics of many Web development efforts. Developers who challenge the advisability of traditional project phases and approvals also challenge the established culture and order.

(4) Organizational Strategy

An organization's Web strategy should be viewed as a continuous cycle that builds on the current strategy of the organization while creating new business models (Venkatraman, 2000). Yet, for some organizations, e-business brings with it a change in strategic emphasis from internal operations to customers. In the world of Web Information Systems, branding has become increasingly important. A brand is the relationship between a company and its customers that is based on vision, culture, and image (Hatch and Schultz, 2001). Personalization of the Web interface and creation of online communities can extend the traditional brand relationship and increase customer loyalty and profitability. The customer, viewing their experience with the organization, should see only a seamless integration of the organization's overall strategy and their Web initiatives.

(5) Organization's Technical Environment

Web Information Systems complicate the organization's technical environment. In the 1970s mainframe era, most organizations had single-site implementations, where all hardware and software came from one manufacturer, and there were designed to work together. The introduction of client/server technologies in the early 1990s replaced this single source with the challenge of integrating hardware and software from multiple vendors. Web Information Systems operate in a distributed world with a multitude of different manufacturers' components, many of which were not engineered to work together. Organizations have the option of retaining this technology in-house or outsourcing, or a combination of both.

(6) Project Characteristics

Web Information Systems concentrate more heavily on Information Architecture than the average traditional IS

Table 1. E-business development methodology variables (Knight et al., 2003)

Organization		
Culture:	Conservative	⟶ Innovative
Strategy:	Committed	⟶ Evolving
Technology:	Stable	⟶ Experimental
	Non-integrated	⟶ Integrated
Project		
Objectives:	Clear	⟶ Unclear
Requirements:	Stable	⟶ Changing
Users:	Known	⟶ Unknown
Implementation:	Long	⟶ Rapid
Team		
Skills:	Technical	⟶ Creative
Composition:	Stable	⟶ Changing
Member Experience:	Less Experience	⟶ Highly Experienced
Leadership:	Less Experience	⟶ Highly Experienced

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