Chapter VI

Architectural Metrics for E-Commerce: A Balance between Rigor and Relevance

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Abstract

Metrics for the architectural quality of Internet businesses are essential in measuring the success and failure of e-commerce. This chapter proposes six dimensions of architectural metrics for Internet businesses: internal stability, external security, information gathering, order processing, system interface, and communication interface. For each of the six metrics, we have constructed questionnaires to measure the perceived level of architectural quality and identified feature lists that might be closely related to the perceived quality level. Large-scale empirical studies were conducted both to validate the proposed metrics and to explore their relevance across four Internet business domains. The results indicate that metrics have high validities and reliabilities in three different domains. The relevance of the metrics was also proved by the meaningful relations between design features and customer loyalty. This chapter ends with the implications and limitations of the study results.

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Introduction

As the Internet has rapidly spread throughout our society, so has electronic commerce, which is defined as any commercial activity made over the Internet (Kalakota & Whinston, 1996). Similarly, a sharp increase has been observed in the number of Internet businesses involved in electronic commerce (The Yankee Group, 2001). Internet businesses, such as E*trade and Amazon, are defined as individual entities that perform commercial activities on the Internet (Adam, Awerbuch, Slonim, Wegner, & Yesha, 1997; Margherio, Henry, Cooke, & Montes, 1998; Kim, 1999). As the number of Internet businesses has increased, so has the variety of individual businesses. At the beginning of the digital economy era, most Internet businesses were created to announce on the Web the existence of traditional companies (Sullivan, 1999). Nowadays Internet businesses include those that trade physical and digital goods (Chircu & Kauffman, 2000; Chau, Au, & Tam, 2000), cyber communities (Wilde & Swatman, 1997; Kodama, 1999), and even online network games (Mulligan, 1998).

As the variety of Internet businesses increases, we need diverse kinds of metrics to measure the current state of individual businesses comprehensively. For example, financial metrics such as total sales and revenue are important to measure the financial performance of individual businesses selling products and services (Bell & Tang, 1998). Similarly, behavioral metrics such as total number of visitors or average time per visit are important measuring the behavioral performance of portal businesses trying to entice as many people as possible in order to generate revenue from business partners and advertising (Day, 1997; Kodama, 1999). Even though these financial and behavioral metrics inform us of the final outcomes of individual businesses, they are hard pressed to explain why the businesses are successful or failing. In order to answer this question, we need additional metrics that can evaluate the architectural quality of Internet businesses.

This chapter proposes that metrics for architectural quality can be used to evaluate the quality of individual Internet businesses. Architecture is related to the understanding and conveying of the big picture of an Internet business (Rosenfeld & Morville, 1998; Bauer & Scharl, 2000; Park & Kim, 2000). It consists of individual features that include not only various system characteristics such as link structures and screen layout (Kim & Yoo, 2000), but also important managerial characteristics such as the amount of provided information and security policies (Huizingh, 2000). Metrics for architectural quality are especially important because one of the ultimate goal of an Internet business is to provide the optimal experience to its customers (Hoffman & Novak, 1996; Kim & Moon, 1998; Nel, Niekerk, Berthon, & Davies, 1999). Financial or behavioral metrics do not consider the visitor’s experience and, therefore, cannot provide concrete guidelines to achieve a business’s goals. In other words, they only measure the results of the provided level of experience, but do not suggest how to enhance customer experience. Architectural metrics, on the other hand, can provide direct recommendations on how to enhance the quality of the customer experience because they are closely related to Web site development. This is because most Internet businesses are eventually implemented through Web sites.1
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