

# Chapter I

## Using Patterns for Engineering High-Quality E-Commerce Applications

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### ABSTRACT

*In this chapter, we view the development and maintenance of high-quality electronic commerce (e-commerce) applications from a Web engineering perspective. A methodology for deploying patterns as means for improving the quality of e-commerce applications is presented. To that regard, relevant quality attributes and corresponding stakeholder types for the e-commerce applications are identified. The role of development process, the challenges in making optimal use of patterns, and feasibility issues involved in doing so, are analyzed. The activities of a systematic selection and application of patterns are explored. Examples illustrating the use of patterns during macro- and micro-architecture design of business-to-consumer (B2C) e-commerce applications are given. The implications of the use of patterns in a Semantic Web context are briefly highlighted.*

### INTRODUCTION

Over the past decade, electronic commerce (e-commerce) (Kalakota & Whinston, 1996) has opened new vistas for many sectors of society including businesses and has revolutionized the way business is conducted. In particular, e-com-

merce applications have revolutionized the way business is conducted today, and reduced the gap between small-and-medium size enterprises (SMEs) and large corporations.

Although e-commerce applications have offered rich prospects, they have also brought various concerns to the providers (Kamthan, 1999).

Indeed, the successes have come with their share of failures (Nguyen, Johnson, & Hackett, 2003), many of which have been attributed to issues of quality (Pertet & Narasimhan, 2005).

A commitment to “high-quality” is both an imperative and a challenge to the providers of e-commerce applications. Indeed, empirical studies have shown (Sharkey, Scott, & Acton, 2006) that the quality of an e-commerce application is directly related to its “dimensions” of success. At the same time, it is crucial that efforts towards assuring the quality of these applications remain predictable and feasible in the long-term.

In this chapter, our interest is in a *systematic* approach of engineering large-scale and quality-centric e-commerce applications based on the knowledge garnered from past experience and expertise (Kamthan, 2008). For that, we rely on the notion of the problem-solving approach of patterns (Appleton, 1997; Buschmann, Henney, & Schmidt, 2007). As discussed later, the use of patterns has several advantages over other approaches in terms of quality improvement, including that the approach is preventative rather than curative (Dromey, 2003), is supported by developmental processes, and provides practical solutions along with their reasoning for problems that have been tackled in the past.

The rest of the chapter is organized as follows. We first outline the background necessary for the discussion that follows, and state our position in that regard. This is followed by the presentation of a *pattern-oriented electronic commerce applications methodology (POECAM)* for systematically addressing the quality of e-commerce applications. POECAM includes a model consisting of quality attributes at different tiers and the role of patterns as means for addressing them. Next, challenges and directions for future research are outlined. Finally, concluding remarks are given.

## BACKGROUND

In this section, we present the motivation for a systematic approach to address the quality in e-commerce applications and a synopsis of patterns.

### Challenges to Development of E-Commerce Applications

There are certain defining characteristics that make e-commerce applications unique compared to other software applications, and lead to special considerations towards their quality management.

The market may often dictate the direction of the development and the evolution of an e-commerce application. Typically, e-commerce applications have relatively short time-to-market. This additional constraint on scheduling can adversely impact the activities related to quality assurance and evaluation that the provider of an e-commerce application needs to contend with. For example, a provider may have to compromise the time allocated to verification (say, via inspections or testing). Furthermore, the information in e-commerce applications may also have to be frequently modified to reflect the state-of-the-art and/or to maintain competitive advantage.

The consumers of an e-commerce application need not be colocated; indeed, they may be in different jurisdictions in the same country or in different countries. The laws that govern the provider and the consumers of an e-commerce application may be different. For example, let A and B be two different jurisdictions and let P be a product available for purchase in jurisdiction A. Then, although browsing information on P may be legal in B, purchasing it may not be.

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