

# Chapter 13

## Using Patterns for Engineering High-Quality Mobile Applications

**Pankaj Kamthan**  
Concordia University, Canada

### ABSTRACT

*In this chapter, the development and evolution of mobile applications is viewed from an engineering perspective. A methodology for deploying patterns as means for improving the pragmatic quality of mobile applications is proposed. In doing so, relevant quality attributes and corresponding stakeholder types for mobile applications are identified, the role of the development process is emphasized, and the challenges in making optimal use of patterns are presented. The underlying feasibility issues involved at each step are analyzed. The activities of selection and application of patterns are explored. The use of patterns during macro- and micro-architecture design of mobile applications is illustrated. The implications of the use of patterns in a Mobile Social Web context are briefly highlighted.*

### INTRODUCTION

Since the beginning of this century, there have been major advances towards the goal of being able to access the Web via a wireless device. Indeed, many of the predictions about mobility (Feldman, 2000; Varshney & Vetter, 2002) including the cost, volume, and growth of business; number of users and subscribers; affordability and proliferation of wireless devices such as media players, mobile computers such as Personal Digital Assistants (PDAs), and phones;

availability of a variety of applications such as electronic mail, instant messaging, shopping, ubiquity of real-time information, have largely been realized today. In general, mobile access has accommodated many sectors of society (Mennecke & Strader, 2003; Stanoevska-Slabeva, 2003) including academia and industry, and continues to play an increasingly vital role in our daily activities of communication, information, and entertainment.

However, the successes achieved by mobile applications have come with their share of quality-re-

DOI: 10.4018/978-1-60566-731-7.ch013

lated issues (Ghosh & Swaminatha, 2001; Nguyen, Johnson, & Hackett, 2003). There are a new set of challenges as these applications evolve to become ‘social’ entities for interaction, collaboration, and participation (Jaokar, 2006). The quality-related challenges faced by mobile applications need to be suitably addressed in order to help preserve the successes that they have achieved, and to sustain and strengthen user confidence in them.

In this chapter, our interest is in a systematic approach of engineering quality-centric mobile applications based on the knowledge garnered from past experience and expertise. For that, we rely on the notion of the problem-solving approach of patterns (Buschmann, Henney, & Schmidt, 2007b). The use of patterns has several advantages over other approaches in terms of quality improvement, including that the approach is preventative rather than curative, is supported by a number of developmental processes, and provides practical solutions (along with their rationale) for problems that have been tackled successfully 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 Mobile Web Engineering Methodology (POMWEM)* (Kamthan, 2008b) for systematically addressing the quality of mobile applications. POMWEM 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, the motivation for a systematic approach to addressing the quality in mobile applications and a synopsis of patterns is presented.

## **Definitions and Characteristics of Mobile Applications**

In this chapter, we will use the term wireless device instead of the commonly-used term mobile device as it is not the device but the user that is mobile. Furthermore, we will use the term mobile application to mean a software application that can be accessed by a device whose owner is mobile unless otherwise stated. In general, a mobile application could be standalone or networked. Also, a mobile application is always a wireless application although the converse is not necessarily true (Stanoevska-Slabeva, 2003).

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

### **Human/Social Characteristics and Implications**

From a social viewpoint, the demographic of mobile applications continues to get broader as the cost of mobile access becomes increasingly attractive and wireless devices become increasingly affordable. Indeed, the use of wireless devices (and, by reference, the mobile applications installed on them) has become increasingly common among people of all age groups, educational background, and cognitive/physiological ability.

### **Organizational Characteristics and Implications**

From an organizational viewpoint, the engineering and deployment of mobile applications is particularly challenging due to the rise of mobile networks/protocols with varying configurations, (largely vendor-driven) proliferation of wireless devices with broad capabilities, and information description languages and media formats with

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