

Design Patterns and Organisational Memory in Mobile Application Development

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Abstract. Mobile application development is a challenging task for the software companies due to complicated technological and business environments. Patterns have been recognised to be a valuable tool in software development, for they allow design experiences and solutions to be documented systematically and facilitate the communication of design issues. Patterns can be seen as a part of organisational memory, a means to preserve the design knowledge and enable its reuse in later products and projects. In this paper we study how the design patterns can support organisational memory in mobile application design. We present the utilisation of patterns as a dynamic process and analyse their relationship and suitability to the process of organisational memory. As a result, we present a framework, which can be used for supporting and evaluation of patterns as a means for storing organisational memory in software companies.

1 Introduction

Mobile application development is rather new business area that presents a challenging environment for the software companies. Applications need to be developed rapidly and flexible adaptation to new technologies is required. Plans and design solutions need to be changed frequently. New technologies emerge constantly and they are inherently complex. Adaptation to the changes of technology and to the evolution of business requires innovativeness from the software designers. Since innovation is based on creation of new knowledge, but also on efficient use of existing knowledge [1], the skills of the designers and their experience about past design solutions are highly valuable.

If design expertise is not shared, the work process is both ineffective and inefficient, as the needed knowledge is not available for all and the communication takes a lot of time. Loss of key personnel makes the process also fragile [2]. To enable the knowledge sharing, it is essential to make the knowledge explicit [1]. Explicit knowledge facilitates individual learning, which in turn is a prerequisite of organisational learning [1]. Organisational learning is needed to allow the organisational memory to accumulate, and further, organisational memory is needed to support the retention, maintenance and retrieval of learned knowledge [3].

Design patterns are recognised to be a tool to learn, document and to share experimental design knowledge [4, 5], that is an essential part of software company's organisational knowledge. Although the pattern origins lay in building architecture, they are successfully applied in software development [5]. Patterns enable reuse of good design solutions in an effective manner, facilitate communication and are a tool to document the software code [5]. Patterns are essential development aid particularly in mobile application development, as the business and the technologies evolve rapidly, and this requires the tools to evolve as well.

In our study we develop a framework, where design patterns' use is seen as a dynamic process, which includes design pattern acquisition, retention, maintenance and retrieval. Our research is focused on how this dynamic process fits to the processes of organisational memory in the context of mobile application design. We analyse pattern features and attributes and the support they provide to pattern users in different processes of organisational memory. As a result we form a framework, which brings the theories of organisational memory and design patterns closer to each other, thus enabling the organisational memory research to be applied in later pattern studies.

Our focus lies in mobile application development, where the need of rapid development, together with high quality requirements, is combined. However, the idea of using organisational memory theories in applying design patterns can be applied in other software development as well, when the need of agile tools and high quality are both emphasized.

This paper is organised as follows. We start by describing the environment where the design patterns are needed, namely the mobile application development. Next, the concept of organisational memory is defined and the four processes of it are presented in more detail. The fourth section concentrates on describing the contents of design knowledge in the context of mobile application development. After that, design patterns are presented as a way to communicate the design information. Fifth section concentrates on analysing and comparing the dynamics of design patterns' use to the processes of organisational memory. As a result we present the developed framework. Sixth section draws conclusions of the paper.

2 Mobile Application Development Environment

Mobile application development takes place in development projects, where experts of different domains form an effective team. The fields of expertise may vary even greatly inside one team and communication problems may occur [6]. Typically, one project may last from few months to several years. The team members may change from one project to another, and even during a project.

The application development is affected by the constantly changing mobile business environment, which is formed by a number of players, who together form a value network [7]. Players' effective cooperation requires that the companies have a common view to the mobile business, even though they all have their own business strategies and visions to follow [8]. Typical in this environment is multi-site development, where one product feature is added to several products. The products can be developed in different projects and by different partners, which are situated in different locations. [9]