

Keynote: Mobile software development - the business opportunity of today

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Abstract. Mobile phones have been closed environments until recent years. The change brought by open platform technologies such as Symbian operating system and Java-technologies have opened up a significant business opportunity for anyone to develop application software such as games for the mobile terminals. The keynote approaches the topic from both the business and the development perspectives and outlines the current status and future prospects. It is suggested that agile innovations offer a solution for mobile application and service developers who are in need of high quality development processes.

Keywords: Mobile software development, agile software development

1. Business Motivation

Following Lindholm et al. [1], within this work, mobile terminal is used to refer a device that has roughly the size of a mobile phone and contains an information system. All mobile devices have a common nominator: The software plays a crucial role in all of them. Mobile devices come in many sizes and shapes setting limitations to its input and output devices. The developers have to think of ways to implement applications that use these limited characteristics as efficiently as possible.

The mobile telecommunications industry has shown to be comprised of a highly competitive, uncertain and dynamic environment [2]. While, so far, mobile commerce applications have not been very successful, telecommunications companies believe a change in short term due to the adoption of 3G technologies. This should lead to a widespread adoption of mobile services in combination with mobile commerce applications [3]. Examples of such commercialized applications may include user-and location-specific mobile advertising, location-based services, and mobile financial services. The potential number of different mobile commerce applications is virtually unlimited [4].

Few years ago, three future trends for mobile phones were predicted to be global packet-switched high-bandwidth wireless communication, financial instrumentation of mobile phones, and advanced multimedia and entertainment applications [5]. Due to the rapidly increasing number of mobile phones and advancing technology, the potential in entertainment application market is enormous. Yet, as of 2005, this is still in its early stages outside Asia. While mobile phone terminals have been closed environments until recent years and software for them was developed and maintained by the mobile terminal manufacturers themselves, the change brought by open platform technologies such as Symbian operating system and java-technologies have completely changed the situation. Now, basically anyone with the needed skills can develop applications for mobile terminals offering the business opportunity of today.

2. Problem Statement

Despite of the identified business opportunity, very few scientific publications can be found, which address the specific characteristics that the development organizations are facing when

developing software for mobile devices. Buellingen and Woerter [6] address the business perspective by exploring the driving forces of m-commerce. Barnes [7] adds to this by analyzing the key players and technologies that form the m-commerce value chain. Paternò [8] is concerned with the human–computer interaction research perspective in relation to interaction with mobile devices. Goldstein et al. [9] approach the usability perspective of a multipurpose mobile hand-set and propose guidelines on objectively evaluating the usability of a mobile application. Gerstheimer and Lupp [10] take the end-user perspective and propose a broad need-driven “system design” approach for developing applications enhancing the mobile communication perspective.

One of the aims of the keynote is to shed light on to what, in fact, makes the mobile application development so challenging and how these special characteristics and limitations affect mobile software development process.

Currently, entertainment applications such as games are the most well known and widely spread types of mobile applications. Game development is a genre of its own in the field of software development with its specific characteristics (e.g., joyfulness, fun) that are not necessarily shared in other types of application areas, e.g., business applications [11]. Yet, we maintain that by studying the game development companies, which have the most experience in mobile software development, we are able to identify generic characteristics that can be generalized to other mobile development domains. Thus, while our research has had its origins in mobile game development, we maintain that the findings largely apply to the broader context of the mobile application development.

It will be shown that there are certain specific factors – internal and external - that characterize the mobile game development business. External factors are those that cannot be affected by the development organization but rather they must adapt to them. These external factors are the primary stakeholders: mobile terminal manufacturers and terminals, network operators and the end-users. Other external factors include the technology itself, which is not standardized despite of recent efforts, and the distribution channels. Internal factors, on the other hand, are those that the organization can readily influence them and improve their performance. These factors include diversity of skills needed, inadequacy of testing, mobile software architecture and different types of games.

3. Agile as a Potential Solution

Agile movement seeks to provide an alternate view on software development through a set of values and principles (for details see www.agilemanifesto.org). Agile approach proponents suggest that agile developers are happier and more productive. They produce systems that are easier to maintain, the code better tested and the resulting system is more robust. Even cost of change is lower than in traditional systems development. These claims, however, remain largely without convincing empirical justification.

While many agile methods have been introduced [for an overview, see e.g., 12]) none of them are specifically targeted for the development of mobile software. Boehm and Turner [12] speculate that there are five dominant factors that are likely to influence agility in broad sense. These are operating culture, size of the development team, criticality of the software, competence of the developers and stability of the requirements. Boehm [13] proposed that there is something called a home ground for agile development. This home ground is achieved when the organizational culture accepts high levels of uncertainty, majority of the development team is competent, size of the development team is less than 10, the risk of

software failures causes loss of comfort and the requirements for the system change more than 50% each month. Boehm and Turner use Cockburn's [14, 15] argumentation and rationale to support their claims. Tooling is not often considered to influence agility in systems and software development. In fact, agilists claim that agile development and thinking is a people oriented solution [e.g., 16]. Yet, complex tasks of refactoring [17] and test-driven development [18] require extensive tooling support. Otherwise, such development tasks are bound to become not feasible.

Table 1 maps the agile home ground characteristics, provides the rationale its inclusion and presents the respective view of mobile software development.

Table 1. Mapping agile home ground themes with mobile software development

Ideal agile characteristic	Rationale	Mobile software
High environment volatility	Due to high change of requirements, less need for up-front design & planning, need for incremental and iterative development approach.	High uncertainty, dynamic environment: Hundreds of new mobile phones published each year
Small development teams	Small teams are able to react more rapidly, share information, less is documentation needed, etc.	Majority of mobile software is developed in micro or SME companies, or development teams.
Identifiable customer	To avoid business misunderstanding	Potentially unlimited number of end-users. Business customer easier to identify, e.g. distributor.
Object-oriented development environment	Most tools that support agile mode of development exist for object oriented development platforms	E.g., Java and C++ used. Some problems in proper tooling e.g. for refactoring and test-first approach
Non-safety critical software	Failures do not cause loss of lives. More agility can be pursued.	Majority of existing mobile software is for entertainment purposes. Mobile terminals are not reliable.
Application level software	Large embedded systems require extensive communication & verification mechanisms	While mobile systems are complex and highly dependent, mobile applications can be stand-alone applications
Small systems	Less upfront design needed	Size of mobile applications vary, but generally they are less than 10000 lines of code.
Short development cycles	For the purposes of rapid feedback	Development cycles vary. Generally mobile applications and services can be developed within 1-6 month time frame

Of all the characteristics presented only one, i.e. identifiable customer, deviates from the agile home ground viewpoint. There is unlimited amount of potential application end-users. Mobile software (e.g. game industry) companies have distribution channels through which the applications are distributed. Yet, while they are able to identify their closest business customer, the relationship between the development organization and the customer may not be necessarily very close. Korkala and Abrahamsson [19] recently proposed an off-site customer process model where a customer proxy is organized to represent the business customer to the development organization. The problem is far from trivial and further

imposes turbulence to the actual development process, requiring even more ability to respond to changing needs. Moreover, certain types of applications (again, mobile games) pertain qualities that are very difficult to test a priori (or even automate). Such a quality is the “fun” aspect of the product. If the consumer does not find a particular game attractive and fun, chances of its wider success becomes limited and the game is taken out of the top-10 lists. Yet, in a case of extending an existing PC-based information system to include mobile capabilities resembles more the traditional developer-customer relationship.

Our work in the area aims at designing an agile method that meets the needs of the volatile mobile development environment. A method proposal has been made. See [20] for details.

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