

# **Mobile-D for Mobile Software: How to Use Agile Approaches for the Efficient Development of Mobile Applications**

Pekka Abrahamsson, Tuomas Ihme, Kari Kolehmainen,  
Pekka Kyllönen and Outi Salo

VTT Technical Research Centre of Finland,  
P.O.Box 1100, FIN-90571 Oulu  
firstname.lastname@vtt.fi

## **Abstract**

Mobile phone terminals 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. Agile development solutions can be seen to provide a good fit for mobile application development environment. This tutorial seeks to provide an overview on the special characteristics of mobile software development and introduce a development approach called MobileD, which combines several agile approaches to meet the needs of volatile mobile application development. The approach has been validated in five empirical cases (two java applications, two native Symbian applications and one naked-objects application) each of which managed to deliver a market version in just 8-10 weeks of calendar time. To assist the developers and managers in using the proposed approach, concrete empirical data on the development process will be shown.

## **Tutorial introduction**

The mobile telecommunications industry has shown to be comprised of a highly competitive, uncertain and dynamic environment [Lal, 2001]. 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 [Blazevic, 2003]. 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 [Varshney, 2002].

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. This requires, however, a good knowledge on the specific characteristics that the development organizations will face when developing software for mobile devices. Agile software development solutions can be seen to provide a good fit for the development of mobile applications [Abrahamsson et al., 2003].

The objective of this tutorial is twofold. First it will 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. Second, it introduces a software development approach drawn from the field of agile software engineering, which is designed to meet the specific demands of extremely volatile mobile environment.

The proposed approach is called the MobileD and it has been empirically tested in five application development cases. Two of the cases produced a java based application, two used native Symbian C++ to produce the applications. One of the projects was a naked-objects based implementation of the application. The principal technical differences in java-based and native Symbian are displayed as well. All of the products have been targeted to operate on a multiple mobile phone terminals and were delivered to marketing within 8-10 weeks of calendar time. The MobileD is organized into a framework that conjoins the main processes (plan, design, implement, test, release) with the support processes (project management, software configuration management, software process improvement). The use of the framework in other companies and settings is facilitated by providing data on the following managerial aspects: development and rework costs, estimation accuracies, and defect densities.

The tutorial will also introduce a new architecture concept called Architecture Line. It aims producing an application framework, which guides the development of future mobile applications. It is shown that application frameworks have an important role in the radical acceleration of product development and in the management of fast cyclic technical products such as games for mobile phone terminals.

## References

Abrahamsson, P., J. Warsta, et al. (2003). New directions on agile methods: A comparative analysis. International Conference on Software Engineering (ICSE25), Portland, Oregon.

Blazevic, V., A. Lievens, et al. (2003). "Antecents of project learning and time-to-market during new mobile service development." International Journal of Service Industry Management 14(1): 120-147.

Lal, D., D. C. Pitt, et al. (2001). "Restructuring in European telecommunications: Modeling the evolving market." European Business Review 13(3): 152-156.

Varshney, U. and R. Vetter (2002). "Mobile commerce: framework, applications and networking support." Mobile Networks and Applications 7(3): 185-198.

## Tutor CVs

*Dr. Pekka Abrahamsson* is a senior research scientist at VTT Technical Research Centre of Finland. He received his Ph.D. on "The role of commitment in software process improvement" from University of Oulu in 2002. His research interests are currently centred on agile software production of embedded systems and mobile application development. He has coached several agile software development projects in industry and authored 45+ scientific publications focusing on software process and quality improvement, commitment issues and agile software development. His professional experience involves 5 years in industry as a software engineer and a quality manager.

*Lic. of Tech. Tuomas Ihme* is a senior research scientist at VTT Technical Research Centre of Finland. He obtained a Master of Science in 1976 and Licentiate of technology in 1991 from University of Oulu, Finland. His professional experience involves several years in industry as a software engineer and a project manager, more than 20 years experience in development and research of embedded software, and management of industrial development projects as well as national joint research projects. His areas of expertise are software architectures in embedded and wireless systems, architecture design methods and tools, architecting component software, product line architectures, and architectural patterns. His research interests are currently centred on agile software architectures in embedded systems. He has authored more than thirty scientific publications focusing on methods, tools, reusability, quality, and architecture of embedded software.

*Mr. Kari Kolehmainen* is a research trainee at VTT Technical Research Centre of Finland. He has participated to several agile project as a developer and is currently preparing his Master's Thesis on "Refactoring in mobile software development".

*Mr. Pekka Kyllönen* is a software engineer and a research trainee at VTT Technical Research Centre of Finland. He's preparing his Master's Thesis on "A framework for managing agile projects" in the Department of Information Processing Science at the University of Oulu. His research interests are centred on agile software development methods and project management. He has been project manager for four experimented agile software projects and a few other software development and maintenance projects. His professional experience involves 5 years in industry as software engineer developing desktop, web-based and mobile systems with numerous different languages (like Visual Basic, Borland Delphi, Java and C++).

*M.Sc. Outi Salo* is a research scientist at VTT Technical Research Centre of Finland. She is currently preparing her PhD on "Agile software process improvement" and has coached several agile projects both in academic and industrial settings. She has published scientific work on agile software process improvement, process development and agile research methods.

Tutorial length: Full day.

Industry partners who have participated to VTT's agile research on mobile systems development will also participate to the tutorial as presentors.

Tutorial has been held prior to Profes at EuroSPI 2004 and REK-SW 2005 at Island.

More information: Pekka Abrahamsson, [pekka.abrahamsson@vti.fi](mailto:pekka.abrahamsson@vti.fi)