

Chapter 9

Co-Design and Co-Deployment Methodologies for Innovative m-Learning Systems

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ABSTRACT

Building innovative m-learning systems can be challenging, because innovative technology is tied to innovative practice, and thus the design process needs to consider the social and professional context in which a technology is to be deployed. In this chapter the authors describe a methodology for co-design in m-learning, which includes stakeholders from the domain in the technology design team. Through a case study of a project to support nurses on placement, they show that co-design should be accompanied by co-deployment in order to manage the reception and eventual acceptance of new technology in a particular environment. They present both our co-design and co-deployment methodologies, and describe the techniques that are applicable at each stage.

INTRODUCTION

In the last decade we have seen many types of mobile (m-) learning tools, from simple systems that allow access to existing content and functionality on-the-move (Flynn *et al.*, 2000, Collins, 2005) to

more targeted applications, that take advantage of the mobility or locality of the applications users, for example, to provide location-based information (Abowd *et al.*, 1997, de Crom, 2005), or to support fieldtrips (Kravcik *et al.*, 2004, Weal *et al.*, 2006). However, these tools often replicate existing learning activities, rather than changing the nature of the activity itself.

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This is understandable as changing practise also requires a change in philosophy or of culture, and is far more difficult to achieve even in small problem areas. It requires an appreciation of the problem space that is usually beyond the technology experts, and an understanding of the technology that is usually beyond the domain experts. This creates a tension in the design process as no single expert has the necessary knowledge or skills.

Design methodologies are therefore required to drive the creation of novel tools, ensuring that they are both useful and sustainable in practice. Many methodologies and models for the design of information and e-learning systems take a layered approach, separating design issues to allow independence (Wills *et al.*, 2003): mapping the domain (in terms of its structure, content, work flow, *etc*), analysing the associations and relations in that domain, and presenting the information to appropriate users.

Our co-design approach has the objective of ensuring that an m-learning system is both feasible and useful by explicitly including the expertise of the people in the intended domain, and as such it is similar to the socio-cognitive engineering approach proposed by Sharples *et al.* (2002), which seeks to develop a theory-based framework of the user's underlying cognitive and social processes. Our co-design methodology is more lightweight, and does not attempt to build a theoretical model of users' practice, but instead works closely with users as part of the design team in an agile way—something that is essential for tools that innovate practice. Our methodology involves domain experts as 'first-class' members of the design team, using a number of techniques that brings the design team together and helps it to converge on a joint understanding of the conceptual space, and focusing on tools to tackle real problems in the domain. We have done this by integrating techniques found in HCI (personas, scenarios, and storyboarding) with agile software development techniques (iterative and incremental delivery)

and lightweight software engineering (use case, activity, and iteration diagrams).

We have also discovered that the engagement with the eventual user group must continue into the deployment phase of prototyping, using co-deployment methodologies that emphasise a continuing conversation between a range of stakeholders in the user community and the design team.

In the rest of this chapter we present our co-design and co-deployment methodologies, using a case study to demonstrate how some of the techniques work, and showing the consequences of underestimating the importance of the deployment phase. Our hope is that these methodologies will help other m-learning developers to design new technology and applications that create genuine innovations in the domains in which they are deployed.

BACKGROUND: DESIGN METHODOLOGIES

Our work on co-design and co-deployment builds on traditional software engineering practices for m-learning, and especially on participatory design and agile development. Co-design and co-deployment are focused on enabling innovation in a domain through the use of technology, and as such can also benefit from the experiences of management methods for institutional change.

Traditional Software Engineering

Mobile learning development has often followed traditional software engineering methodologies where teams of developers envision, implement, and deploy systems. In so doing, mobile learning systems are not immune from the software engineering paradox described by Lehman (1980) satisfaction declines unless steps are taken to constantly improve systems. This effect can be detected even before a system has been completed,

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