Chapter XV
When Ubiquitous Computing Meets Experience Design:
Identifying Challenges for Design and Evaluation

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ABSTRACT

In this chapter we provide an overview of the main implications of emerging ubiquitous computing scenarios with respect to the design and evaluation of the user experience. In doing that, we point out how these implications motivate the evolution of the human-computer interaction discipline towards a more interdisciplinary field of research requiring a holistic approach as well as new adequate research methods. We identify challenges for design and evaluation and consider different classes of methods to cope with these challenges. These challenges are illustrated with examples in which ubiquitous technology is used both for its design and for the study of the users' everyday life. In our discussion we support the idea that ubiquitous technology provides new means for the study of human experiences as well as human deliberate engagement with technology; the latter as an alternative to automation and invisible technology.

INTRODUCTION

The vision of ubiquitous computing foresees novel scenarios of highly interactive environments in which communication takes place between single users and devices, between devices and devices, and between users and users. The novel possibilities enabled by embedded technology have motivated most of the research on context sensitive systems, automation, and invisible technology. Next to that type of scenario, novel and ubiquitous possibilities for capturing, author-

ing, editing, and transferring multimedia content provide new means for people's interaction, performance, communication, and storytelling. This in turn allows for the design of new stimuli from which people can create their own meaningful experiences. These new design possibilities raise potentials as well as challenges, and ask for new methods and forms of interaction between users and environments, and between different groups of users.

Furthermore, an overview of the main implications of emerging ubiquitous computing scenarios with respect to the design and evaluation of the user experience will be provided. In doing that, we point out how these implications motivate the evolution of the Human-Computer Interaction (HCI) discipline towards a more interdisciplinary field of research, which requires a more holistic approach as well as new adequate research methods. In our discussion we support the idea that ubiquitous computing technologies provide new means for the study of human experiences as well as human deliberate engagement with technology, in contrast to automation and invisible technology.

This chapter addresses the point "where ubiquitous computing meets experience design." In other words, the question "how can the design of products and services benefit from the potential of ubiquitous computing?" is central. We identify challenges for design and evaluation and consider different types of methods to cope with them. Then, these challenges are illustrated by examples in which ubiquitous technology is used both for the design of innovative products and services as well as for the study of the users' everyday life experiences.

FEATURES OF UBIQUITOUS COMPUTING

In this section, the features of ubiquitous computing that are most relevant to experience design are described.

A key implication of ubiquitous computing on the design of the user experience is the extension of human-human and human-computer interactions across a broader range of time and location. The individual, situated interaction setting, characteristic for the personal computer (PC) is augmented by a more distributed and casual interaction with computing, or with information in a broader sense. As a consequence, the level of complexity of the humans' activities dealing with technology increases.

Users' interactions with technology become much more continuous and overlapping in time. While it is still possible to distinguish single goal-driven tasks when analyzing users' interactions on a desktop PC, this becomes harder with ubiquitous computing. We can talk on the phone while moving in the street, listen to music while writing an SMS, or purchase a bus ticket with our mobile phone while riding on the train. Our activities become more and more concurrent and our accessibility to social interaction broadened. This implies the chance of more frequent interruptions and the difficulty to clearly identify a beginning and an end of our activities (Abowd, Mynatt, & Rodden, 2002; Fogarty et al., 2004).

Ubiquitous networks have a large impact on how we organize our daily life, how we work, make friends, and look for entertainment. In short, they are changing our behaviors and social patterns. The increasing use of mobile telephones affects our expectations for availability and accessibility. When setting an appointment with someone somewhere, for example, we tolerate and actually expect more flexibility in punctuality, due to the fact that it is possible to inform each other in case of delay. With the reduction of cost and effort in communicating with others through these devices, the likelihood of communication increases. Despite the possibility of communication with "anyone, anytime, anyplace" that these ubiquitous networks allow for, people do not always want to be accessible.

Another attribute of ubiquitous computing is its invisibility. In ubiquitous technology the

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