Chapter 16

Pervasive Computing and Ambient Intelligence Development:
An Educational Perspective

Vladimír Bureš
University of Hradec Kralove, Czech Republic

Pavel Čech
University of Hradec Kralove, Czech Republic

ABSTRACT

Ambient Intelligence (AmI) as an environment, where pervasive computing methods, tools, or products are taking place, is a concept envisioning information society in the future. AmI can be investigated from several points of view, whereas a technological perspective is the one most frequently presented. However, as the fragments of AmI vision are becoming reality, the educational perspective is of growing importance. Managerial workplace may be considered as a typical environment where pervasive, or ubiquitous, computing and AmI are being currently introduced. Hence, the proper education of future managers or IT specialists should aim at students' ability to define requirements for the structure and behaviour of AmI from different viewpoints and from final users' perspective namely. The problem is that AmI is a system with high level of complexity due to the need to unite many related aspects from different problem domains. Therefore, relevant tools and methods should be taught so that students can comprehend such a complexity. A brief description of the situation in the selected Czech university and results based on particular tools and methodological approaches are depicted in the following chapter.

INTRODUCTION

Information and communication technologies (ICT) represent the key facilitator of many changes in contemporary business environment. Information and communication technologies enable for communication cost reduction or ensure information to be at the right place in the right time for precise decision-making process. Information and communication technologies make possible to have the best of both worlds – the economic and scale efficiencies of large organizations, and the human benefits of

small ones: freedom, motivation, creativity, and flexibility (Malone, 2004). The development in the area of ICT has been significantly supported by the progress that was achieved in the field of pervasive computing. The pervasive computing is a trend towards increasingly ubiquitous connected computing devices in the environment. Therefore, another name for this movement is ubiquitous computing (Singh, 2008).

Several companies are implementing the ubiquitous computing to support their needs in various forms such as short-range wireless systems for vehicle monitoring, sensor networks for complex systems management, and context aware devices for ad hoc networking (Braley, 2005). In this sense, Ambient Intelligence (AmI) can be perceived as an environment where pervasive computing methods, approaches, tools, or products are taking place. According to van Houten (2006), AmI refers to future digital environments that are sensitive and responsive to people. Apparently, managerial workplace is a typical environment, where pervasive computing is being more or less successfully introduced.

The vision is that intelligent devices will surround us while travelling, working or doing leisure time activities. These devices and their local networks will provide us with different services that will support our particular operations. For designing and creating appropriate architecture of this intelligent environment, which will match the given requirements, it is necessary to acquire a qualitative description of future stakeholders' needs. As stated above, the everyday workplace of managers is one of the significant application areas of AmI. Faculty of Informatics and Management University of Hradec Kralove (FIM UHK) in the Czech Republic educates either future managers or IT specialists. Its students represent prospective managers or employees providing essential technological support to an organizational management. Therefore, they should be able to impose requirements for the structure and behaviour of AmI from the point of view of final users.

Moreover, they should be able to participate in the development of solutions that form AmI.

The *problem* is that although the concept of AmI has a strong technological orientation, there are also social, psychological, ethical or political dimensions that have to be taken into account. These are briefly described in the following paragraphs. The successful application of AmI requires entwining technological, managerial and other aspects into a complex system (i.e. to consider AmI as a "soft" system in the systems approach terminology). One needs appropriate tools or techniques to be able to comprehend such complexity and people in general, and managers in particular, usually do not possess the needed skills or tools. The main objectives of this chapter is to briefly describe AmI perspectives, and outline the research at FIM UHK that was conducted while investigating the educational perspective of AmI. This chapter is based on research results presented in (Bureš, 2006) and (Bureš, 2007).

UBIQUITOUS COMPUTING AND AMBIENT INTELLIGENCE BACKGROUND

The concept of the ubiquitous computing was firstly introduced by Weiser (1991) who states: "The most profound technologies are those that disappear. They weave themselves into the fabric of everyday life until they are indistinguishable from it". As stated by van 't Hooft (2007), Weiser envisioned computers embedded in artefacts that surround us – walls, chairs, clothing, or light switches; in anything and everything – and are connected to each other and the world through different types of connections. Usually, the ubiquitous computing is compared to two examples from the past which have become ubiquitous – printing and electricity (or more specifically related networked "devices", i.e. electric devices of daily usage or book and newspapers). According to Weiser (1993), the ubiquitous computing

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