EDUCATIONAL POSSIBILITIES IN THE DEVELOPMENT OF THE AMBIENT INTELLIGENCE CONCEPT

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Abstract

In 2001, IST Advisory Group, as an advisory body of the European Commission in the field of information and communication technology, introduced four scenarios of the future development in information society forming an Ambient Intelligence (Ami) environment. This vision is a relatively new concept that is being developed at both theoretical and practical level. The problem is that although the concept of AmI has a strong technological orientation, there are also social, psychological, ethical or legislative dimensions that have to be taken in to consideration. Successful application of AmI requires entwining technological, managerial and other aspects to a complex soft system. In order to design and create appropriate architecture of this intelligent environment, which will match given requirements, it is necessary to acquire qualitative description of future stakeholders' needs. One needs appropriate tools or techniques to be able to comprehend such complexity and people in general usually do not possess needed skills or tools. Therefore, the role of education is of a crucial importance here. The paper describes the AmI concept and outlines its relation with educational issues. Experience obtained while implementing of so-called learner-directed educational approach together with achieved findings and lessons learned are introduced.
Keywords: *Ambient intelligence, decision-support systems, learner-directed learning, object modelling, systems thinking.*

Introduction

Practical applications of pervasive/ubiquitous computing efforts led to idea of Ambient Intelligence (AmI) concept that promotes pervasive, distributed technology, not intrusive, but always present (Remagnino, 2005). This vision of the future digital environment is full of intelligent devices surrounding us while travelling, working or doing leisure time activities. Four major aspects of AmI are of crucial importance - user friendliness, effectiveness, distributed support and interactivity. AmI is primarily based on integration of information and communication technologies (ICT) to the environment so that from the point of view of the user it is absolutely non-essential with what technologies he/she is interacting; with how many applications he/she is in contact; how the applications are related and how the applications cooperate. In fact the user might not be even aware that he/she is interacting with technology or applications at all (Mikulecký, 2007). That is why AmI supports the shift of computing from desktop computers to various intelligent devices integrated in everyday life of users.

According to van Houten (2006), the AmI vision can be applied to very diverse application environments, varying from homes, offices, or cars to homes for the elderly and hospitals. It refers to a wide range of human emotional and intellectual needs, from comfort, pleasure, and entertainment to safety, security, and health. AmI scenarios provide examples of such environments. They are included in the ISTAG report (Ducatel, 2001) that introduced four scenarios of the future development in information society.

The everyday workplace of managers is one of significant application areas of AmI. Faculty of Informatics and Management at the University of Hradec Kralove (FIM UHK) in

the Czech Republic is educating on the interdisciplinary basis both future managers with strong technological background and IT specialists who are aware of managerial issues related to ICT. In this way, 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 also be able to participate on the development of solutions that form AmI. To be able to achieve these goals, students have to acquire and practice several tools, methods or skills. These are experimentally applied in relevant subjects and represent the main focus of this paper.

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Conclusions

AmI is a complex system which can be developed only with the help of appropriate tools, techniques or methods. Research and education at FIM UHK show that different types of thinking can be used for this purpose. In general, these thinking types can be either exercised in a specialised curriculum, or tied to particular subjects, whose content is focused primarily on a specific area. The latter approach was chosen at FIM UHK, where skills teaching and exercising was split in several subjects with contents relevant to AmI. The sequence of their introduction to students was set as follows: 10.000 Meter Thinking, "System as Cause" Thinking, and Dynamic Thinking, Operational Thinking, Closed-Loop Thinking, Continuum Thinking, and Scientific Thinking. Selected subjects in which these skills are taught are Theory of Systems (TESY), Introduction to Object Modelling (IOMO), and Management Support Systems (MSS) subjects. Subjects' organisation is based on learner-directed learning approach. It is represented by the project management in which students solve problems in the form of narrow or individual tasks, or complex and team projects. This approach is related to the shift in educational processes. Experience shows that the biggest barrier is not represented by teachers, who are able to change their approach quite quickly. Surprisingly, students' habits and attitudes to their education constitute an obstacle that needs a relatively long time to be overcome.

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References:

Bureš, V. (2006). Systems Thinking as a Basis for Ambient Intelligence. *ACM SIGCSE Bulletin* 38(3), pp.318.

Bureš, V. & Čech, P. (2007). Complexity of Ambient Intelligence in Managerial Work. *ACM SIGCSE Bulletin* 39(3), pp.325.

Ducatel, K. et al. (2001). *Scenarios for Ambient Intelligence in 2010: Final report*. Seville, Spain: Information Society Technologies Advisory Group. Retrieved February 2, 2009, from ftp://ftp.cordis.lu/pub/ist/docs/istagscenarios2010.pdf.

Mikulecký, P., Olševičová, K., & Ponce, D. (2007). Ambient Intelligence - Monitoring and Supervision of New Type. In P. Kleve, R. V. de Mulder, & C. van Noortwijk (Eds), *First international seminar of the Legal Framework for the Information Society (LEFIS) on Monitoring, Supervision and IT* (pp. 115-134). Zaragoza, Spain, Zaragoza University Press.

Remagnino, P., Foresti, G.L., & Ellis, T. (Eds.). (2005). *Ambient Intelligence: a Novel Paradigm*. New York, Springer.

Richmond, B., Peterson, S., & Vescuso, P. (1987). *An Academic User's Guide to STELLA*. Lebanon, NH, High Performance Systems.

Richmond, B. (1993). Systems thinking: critical thinking skills for the 1990s and beyond. *System Dynamics Review* 9(2), 113-133.

Richmond, B. (2004). *An Introduction to Systems Thinking*. Lebanon, NH, ISEE Systems.

Roberts, N. et al. (1983). *Introduction to Computer Simulation: A System Dynamics Modeling Approach*. Reading, Mass., Addison-Wesley.

van Houten, H. (2006). The Physical Basis of Ambient Intelligence. In S. Mukhejree et al. (Eds.). *AmIware: Hardware Technology Drivers of Ambient Intelligence*. Dordrecht, Springer.