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Preface

This volume contains the proceedings of the Second European Ambient Intelligence (AmI) Conference. The conference took place in Erlangen and Nürnberg, November 19–22, 2008. The concept of ambient intelligence (AmI) was introduced in the late 1990s as a novel paradigm for electronic environments for the years 2010-2020. It builds on the early visions of Weiser describing a novel mobile computing infrastructure integrated into the networked environment of people. According to early definitions, AmI refers to smart electronic surroundings that are sensitive and responsive to the presence of people. The added value for the multi-dimensional society we are living in lies in the fact that the large-scale integration of microelectronics into the environment enables people and objects to interact with this environment in a seamless, trustworthy, and natural manner.

Obviously, AmI solutions deliver a new quality of communication and information exchange, they help people to fulfill their professional tasks with increasing efficiency, enable the older generation to stay much longer in the privacy of their own homes and the younger one to lead a healthy and responsible life. Smart mobile devices navigate in private apartments as well as in complex public or industrial environments in order to support people with a broad variety of services. In logistics employees, smart objects and intelligent surroundings will be able to cooperate and use their communication and negotiation capabilities in order to avoid critical situations or to optimize processes. Today it is obvious that during the last few years Weiser's vision has grown mature in two complementary senses. On the one hand, the technological base is becoming more and more sophisticated. Today AmI solutions are based on electrical engineering, computer science, industrial design, user interfaces, and cognitive sciences. On the other hand, the spectrum of application domains has been extended a lot during the last two years. AmI solutions for private homes, hospitals, for the logistics services industry, for natural environments etc. are addressed in research and development projects financed by the European Union and national governments all over Europe.

AmI 2008 was the third joint conference that perpetuated two events focusing on ambient intelligence. The first event was the Conference on Smart Objects (sOc), which had been organized by France Telecom and by the French National Center for Scientific Research (CNRS) in Grenoble, France in 2001 and 2003. The second event was the European Symposium on Ambient Intelligence (EUSAI), which had been organized by Philips and the University of Eindhoven in Eindhoven, The Netherlands in 2003 and 2004. In 2005 the first joined conference of sOc and EUSAI was organized in Grenoble, France under the name sOc-EUSAI 2005. AmI 2007 in Darmstadt expanded the scope of the series by including three different types of contributions: research contributions, case studies as well as lessons-learned contributions and industry and socio-economic contributions.

During last year's discussion it became quite clear that the overwhelming economic potential of AmI can be realized only provided that technologies and applications

perfectly meet people's needs. Solutions have to be embedded into services that deliver real value to the customer. Following that line of thinking, "Services for People" was the key theme of AmI 2008. The call for papers addressed researchers from academia and industry working on hardware and software, on applications and services, as well as on security aspects and ethical issues in order to create integrated and secure AmI solutions based on strong business cases. "Wellbeing and Care" and "Mobility and Logistics" were the two main fields of applications building the setting for technical research contributions, for case studies, for lessons-learned and socio-economic papers. The spectrum of "Wellbeing and Care" spanned from the exciting shopping event in the retail outlets of tomorrow to a service-oriented comfortable private home. "Mobility" addressed the freedom and flexibility of traveling as well as the efficient bridging of distances. In contrast, "Logistics" was connected to the autonomous and self-organized movement of vehicles, goods, and materials in intelligent environments, supply chains, and networks. The two different application or service domains were used to structure the current LNCS volume. Like AmI 2007, this year's conference provided the AmI research community with a venue to discuss in a less formal setting preliminary results and upcoming ideas through a number of workshops. Again we felt that we should not hold back the results obtained in these workshops as they are in many cases quite intriguing and therefore might be stimulating in the development of novel ideas. Therefore, we decided to publish these results in a separate Springer volume under the title *Constructing AmI—AmI 2008 Workshop Proceedings.*

The present volume shows quite clearly that the next steps toward the first implementations of AmI solutions in real life have been taken. The concept is obviously gaining ground. The fact that the "localization and positioning issues" presented in last year's proceedings have been converted into "navigation issues" in the current volume can be taken as a symptom for fundamental change. It seems that today AmI researchers focus much more on problems and services (like navigation) than on technological functions (like position sensing). Thus, research questions concerning social acceptance and security aspects in particular become more and more important and the fact that some of the papers in the current volume address these issues is quite promising. As indicated last year there is a growing awareness of the fact that the success of the AmI paradigm depends on the social acceptance of the newly proposed AmI technology.

The AmI 2008 proceedings can be considered as another important milestone on the scientific roadmap for developing the AmI paradigm. We are confident that they provide a significant contribution to the dissemination of the AmI vision. We would like to thank all those who have contributed – the authors of the research papers as well as the members of the Program Committee. Without their commitment and their enthusiasm neither the conference nor the proceedings would exist. We hope that you as a reader will have many inspiring and fruitful reading hours.

September 2008

Emile Aarts
Heinz Gerhäuser

Message from the Program Chairs
"Wellbeing and Care"

At AmI 2008 the spectrum of "wellbeing and care" spanned from the service-oriented comfortable private home to an exciting shopping event in the retail outlets of tomorrow. This track focused on health care issues and measures of achieving wellbeing, exploring its far reaching impact on lifestyles in the ambient intelligence community.

Whereas ambient intelligence research has traditionally been focusing on user experiences in more entertainment-oriented scenarios, there is a recent move toward the deployment of ambient intelligence technologies for wellbeing and care-related application scenarios. Wellbeing and care applications cut across the domains of lifestyle (e.g., persuasive fitness applications) and healthcare (e.g., remote patient monitoring systems for chronic care patients). It should be clear that the development of applications related to our wellbeing and care will demand for some important shifts in the ambient intelligence research paradigm. New requirements for the enabling technologies that relate to ethics, new methodologies for empirical research to better understand the context in which these applications will be positioned, and a shift from system intelligence to social intelligence are just some examples of challenges that call for a paradigm shift in ambient intelligence research.

While technology is miniaturizing and becoming pervasive, ambient intelligence solutions can become actors in wellbeing applications. Rather than being limited to passive monitoring, the ambient intelligence solutions will influence and persuade end users to change their behavior or even modify their lifestyle. The care-focused application scenarios are clearly driven by demographic trends that are signaling the overwhelming need for ICT-based consumer care applications. One of the high potential growth areas is the elderly care domain: according to the World Health Organization, worldwide the proportion of people age 60 and over is growing faster than any other age group. Hence, there will also be a reduction in the number of people that can provide care to seniors. This clearly points to an opportunity for ambient intelligence solutions to support independent living for seniors. Ambient-assisted living refers to electronic environments that are sensitive and responsive to the presence of people and that provide assistive propositions for maintaining an independent lifestyle. The development of these solutions requires a continuous user involvement to ensure a seamless fit with user needs and preferences and to promote care provider endorsement.

The Wellbeing and Care track of AmI 2008 presented some important contributions in the following thematic sessions:

- Service-oriented smart and comfortable homes for better recreation and leisure time

- Intelligent and cooperative domestic devices for smart home and shopping environments
- Context-oriented health monitoring and alerting systems for a carefree life

Boris de Ruyter
Reiner Wichert

Message from the Program Chairs
“Mobility and Logistics”

The real power of ambient intelligence will become increasingly evident as ordinary objects, augmented with computing, communications, sensing and interaction, are increasingly integrated into everyday activities and environments. Thus we organized sessions 4 and 5 around the concept of mobility and interaction within ordinary environments and ordinary tasks.

Session 4 explores the use of mobile ambient intelligence for managing logistics and information. In the paper "Collect&Drop: A Technique for Multi-Tag Interaction with Real World Objects and Information," the authors investigate mobile interaction with multiple mobile objects, using tags to associate information with objects. This paper introduces the technique of collect and drop as a generic technique for multi-tag interaction that supports the collection, storage and management of information from the real world as well as its usage with different services.

In the paper "Tracking Outdoor Sports – User Experience Perspective," the authors examine the potential role for ambient intelligence in tracking outdoor sports. In a user study, the authors provided a mobile tracking tool and related Web services to a group of 28 participants. The system collected and stored workout data such as the route, speed and time, and compiled a training diary that can be viewed during exercise as well as afterwards. The user study illustrates the potential benefits of using mobile telephone technology to provide information both during and after outdoor sports.

The authors of "Rich Tactile Output on Mobile Devices" assess the potential of rich tactile interaction using mobile phones. The results of experiments with up to six actuators within a mobile phone prototype are presented. These experiments explore the user experience that can be created with multi-vibration output in a handheld device. The experiments suggest where vibration motors should optimally be placed and demonstrate that information can be reliably communicated by producing different patterns of vibration output using a small number of actuators.

The paper "Ambient Agent Model Exploiting Workflow-Based Reasoning to Recognize Task Progress" describes the use of a workflow model to allow an ambient agent to discretely recognize and model human activity without interaction.

The last paper of session 4, "An Architecture to Automate Ambient Business System Development," introduces a software architecture that allows the integration of real-world objects into business processes. This architecture decouples architectural concepts from technological solutions. Case studies are explored to illustrate the benefits of such an architecture.

Session 5 addresses the use of ambient intelligence for navigation and guidance in unknown environments and unusual situations. In the first paper, "C-NGINE: A Contextual Navigation Guide for Indoor Environments," the authors present a context-aware navigation guide that draws information from a user profile. The paper focuses on indoor environments and uses an ontology model expressed in OWL to capture and

formally model user profiles and context information to provide personalized context-aware navigation services.

In "Creating Design Guidelines for a Navigational Aid for Mild Demented Pedestrians," the authors examine the design options for a GPS-based navigation aid for elderly with early-stage dementia. Lessons learned from a target group were used to design a Wizard-of-Oz experiment to study the effectiveness of landmark based vs left–right navigation instructions. This study shows that landmark-based instructions resulted in fewer errors and less hesitation.

Indoor navigation has the potential to become a popular application for mobile ambient intelligence. In the paper "Context-Aware Indoor Navigation,"the authors focus on path selection. Rather than simply present the shortest path, their system uses contextual information to suggest the most natural path for users. Experiments are described in which the system uses an efficient spatial representation to guide users.

James Crowley
Alexander Pflaum

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