Editorial Message: Special Track on Ubiquitous Computing

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ABSTRACT

Ubiquitous technologies, infrastructures, applications and services that operate across physical environments (e.g. neighbourhood, home, car etc) will soon be spanning all the different spheres of everyday life. Ubiquitous computing places humans in the center of environments saturated with computing and wireless communications capabilities, yet gracefully integrated, so that technology recedes in the background of everyday activities. The ubiquitous computing world is largely defined by applications, which present an altogether new set of requirements. In order to assess the impact of ubiquitous computing and discover caveats as early in the adoption process as possible, we need to study and analyze working prototypes applied in real-life settings and scenarios. The special track on ubiquitous computing applications, now in its third year, provides a forum for the discussion of all types of ubiquitous computing applications and related specialized infrastructures built for the deployment of targeted applications. Individual papers place applications within their use context and introduce novel and appropriate interaction paradigms while at the same time addressing related technical and business aspects and consequently identify novel opportunities or constraints.

1. INTRODUCTION AND RATIONALE

In the past years significant research effort has been dedicated to realizing the technologies that would achieve Weiser's vision of "calm computing" [1] or ISTAG's "Ambient Intelligence (AmI)" [2]. Ambient Intelligence is a vision that places human beings at the centre of future development of the knowledge-based society and ICTs. An AmI space consists of a set of ubiquitous technologies, infrastructures, applications and services operating seamlessly across physical environments (e.g. neighbourhood, home, car); thus spanning all the different spheres of everyday life. Ubiquitous computing places humans in the center of environments saturated with computing and wireless communications capabilities, yet gracefully integrated, so that technology recedes in the background of everyday activities.

The AmI world is largely defined by applications. As computers and other technologies "weave themselves into the fabric of everyday life until they are indistinguishable from it" [1], what people come across is a set of everyday activities they want to realize and the associated tasks to implement, all using ubiquitous computing applications and information devices [3]. But such applications present an altogether new set of requirements: they are developed at the many layers of the physical world, that is they may be global, environmental, spatial, personal, handheld, wearable or embedded; they may be personal or social or adapting their status depending on context; they may be made up of any of a number of components coordinated centrally or built as a distributed and decentralised architecture, autonomous or un-affiliated; they may vary on their degree of physical integration as well as their integration with existing information infrastructures; they may show spontaneous behaviour and they may learn to adapt it; they may create an ambient intelligence landscape; and last but not least they may be embedded, pervasive or mobile. Thus, from a computer science perspective many see ubiquitous computing as primarily a systems engineering problem.

On the other hand, ubiquitous computing is a new technological paradigm, which will increasingly pervade all aspects of people's life. Living in AmI space requires a proper balance between a complex diversity of interests and values related to freedom of speech, access to information, protection of the individual sphere, trust, security, protection against discrimination, protection of identity, and protection against intrusions by public and private actors. In order to assess the impact of ubiquitous computing and discover caveats as early in the adoption process as possible, we need to study and analyze working prototypes applied in real-life settings and scenarios. It is not a surprise that ubiquitous computing successes to date have come into the spotlight primarily through implementations of applications: Stanford's iRoom, HP Labs' Cooltown, University of Washington's Labscape, EU funded applications such as MyGrocer, eGadgets, Roomware, Georgia Tech's Aware House, Philips' HomeLab are some of the applications that have paved the way for ubiquitous computing. Hence, we assert that research through prototype implementation constitutes an important alternative to ubiquitous computing development following a systems engineering approach.

Following this discussion, it appears appropriate that this track on ubiquitous computing applications should:

- Showcase the state of the art of ubiquitous computing applications and trace the state of the research landscape.

- Provide a forum for groups and researchers that implement and evaluate ubiquitous computing application prototypes to present their work.
- Offer the opportunity to researchers working on ubiquitous computing application prototypes to forge collaborations, create constituencies and exchange ideas.
- Solidify user need and requirements and accentuate the role of context in ubiquitous computing applications.
- Identify theoretical barriers and technology limitations to support ubiquitous computing infrastructures.
- Explore how applications create new research directions in ubiquitous infrastructure and technology.
- Promote the concept of research through experimentation with ubiquitous computing applications.
- Develop a set of applications that can be used to benchmark the efficiency and the effectiveness of ubiquitous computing infrastructures.
- Identify best cases and design patterns.
- Identify the social implications of the deployment and of the widespread use of ubiquitous computing applications.

Unlike other conferences that take a systems engineering point of view for the development of ubiquitous computing, which often presupposes the development of global infrastructures, in this track we opt for a more experimental, explorative approach. Indeed, application-driven research has been the foundation of excellent research contributions from the computer science community. We believe that this research philosophy is essential for the ubiquitous computing community. Moreover, ubiquitous computing is fundamentally interdisciplinary and has to negotiate a balance between different research communities. We believe that especially at this point in the development of the ubiquitous computing research agenda, applications offer the potential to provide key breakthroughs and identify requirements. The success or failure of ubiquitous computing as the next generation of viable technology depends primarily on the design and implementation of appropriate applications. We hope that with this track ACM SAC can act as a catalyst in highlighting the prominent role of applications in ubiquitous computing.

2. UC TRACK OVERVIEW

The special track on ubiquitous computing attracted 10 paper submissions, 4 of which where accepted for inclusion to the program, an acceptance rate of 40 per cent. Submissions varied in terms of applications areas and approaches, ranging from software architecture proposals to user studies. Kranz, Holleis and Schmidt analyze how current instant messaging can be generalized to serve presence and awareness management systems. They present the prototype of a Tangible User Interface and its user evaluation. Pellegrino, Bonino and Corno present the architecture of a Domotic House Gateway, which supports co-operation of heterogeneous domotic devices and uses a rule-based subsystem capable of learning from user actions. Bodhuin, Canfora, Preziosi and Tortorella give an alternative approach to the problem, which is based on a common abstract model of entities that appear both in real and virtual worlds. Finally, Lam, Leong and Chen describe a hierarchical group-based querying scheme as a consolidation mechanism for queries issued from mobile ubiquitous hosts to a server.

3. REVIEWERS AND ACKNOWLEDGMENTS

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4. REFERENCES

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