Constantine Stephanidis
Michael Pieper (Eds.)

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Universal Access in Ambient Intelligence Environments

9th ERCIM Workshop on User Interfaces for All
Königswinter, Germany, September 2006
Revised Papers

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Foreword

Since its establishment in 1995, the ERCIM Working Group "User Interfaces for All"[1] (WG UI4ALL) has systematically promoted the proactive realization of the design for all principles in HCI. Its activities have included the organization of a series of very successful workshops[2] that have contributed to consolidate recent work and stimulate further discussion on the state of the art in user interfaces for all and its increasing range of applications in the upcoming Information Society. Such workshops have brought together, in a new scientific community, researchers and teams working not only in the different ERCIM organizations, but also in organizations beyond ERCIM and the European boundaries, who share common interests and aspirations and contribute to the endeavors towards making the Information Society equally accessible to all citizens. This volume contains the proceedings of the last ERCIM "User Interfaces for All" Workshop.

The work of the ERCIM WG UI4ALL led in 2001 to the establishment of the International Conference on Universal Access in Human–Computer Interaction (UAHCI)[3], which takes place in the context of the HCI International Conference series[4]. UAHCI has established an international forum for the dissemination and exchange of scientific information on theoretical, methodological and empirical research that addresses all issues related to the attainment of universal access in the development of interactive software, attracting participants from a broad range of disciplines and fields of expertise.

The work of the ERCIM WG UI4ALL has also contributed to the establishment of the international, interdisciplinary refereed journal *Universal Access in the Information*

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[1] http://www.ui4all.gr/

[2]
- 1st ERCIM Workshop "User Interfaces for All", Heraklion, Crete, Greece, October 30–31,1995.
- 2nd ERCIM Workshop "User Interfaces for All", Prague, Czech Republic, November 7–8, 1996.
- 3rd ERCIM Workshop "User Interfaces for All", Obernai, France, November 3–4,1997.
- 4th ERCIM Workshop "User Interfaces for All", Stockholm, Sweden, October 19–21,1998.
- 5th ERCIM Workshop "User Interfaces for All", Dagstuhl, Germany, November 28– December 1 1999.
- 6th ERCIM Workshop "User Interfaces for All", Florence, Italy, October 25–26, 2000.
- 7th ERCIM Workshop "User Interfaces for All", Paris (Chantilly), France, October 23–25, 2002.
- 8th ERCIM Workshop "User Interfaces For All", Vienna, Austria, June 28–29, 2004.

[3]
- 1st International Conference on Universal Access in Human-Computer Interaction 2001, in the context of HCI International 2001, August 5–10, 2001, New Orleans, LA, USA.
- 2nd International Conference on Universal Access in Human-Computer Interaction 2003, in the context of HCI International 2003, June 22–27, 2003, Crete, Greece.
- 3rd International Conference on Universal Access in Human-Computer Interaction, in the context of HCI International 2005, July 22–27, 2005, Las Vegas, Nevada, USA.

[4] http://www.hci-international.org/

Society (UAIS), published by Springer[5]. UAIS provides an archival publication channel for the discussion and advancement of theoretical and practical aspects of universal access in the Information Society, facilitating the rapid and wide diffusion of scientific and technological results that promote universal access in the Information Society; and stimulating cross-fertilization between the different contributing disciplines.

Many members of the ERCIM WG UI4ALL have also contributed to the edited book "User Interfaces for All – Concepts, Methods and Tools," the first book dedicated to the issues of universal design and universal access in HCI, published by Lawrence Erlbaum Associates in 2001[6]. The book is a collection of 30 chapters written by leading international authorities, affiliated with academic, research and industrial organizations and non-market institutions, providing a comprehensive overview of the state of the art in the field, and including contributions from a variety of theoretical and applied disciplines and research themes.

Furthermore, the work of the ERCIM WG UI4ALL has contributed to the establishment of the International Scientific Forum "Towards an Information Society for All" ISF-IS4ALL (1997–2000)[7], an international ad hoc group of experts which was the first one to recognize the need for a global approach towards an Information Society accessible, usable and acceptable by all citizens. Two White Papers have been published in the *International Journal of Human-Computer Interaction* and were also submitted to the European Commission, reporting on an evolving international R&D agenda in the field of HCI. Since then, the vision of an Information Society for all and the necessity for universal access to Information Society technologies have acquired widespread acceptance and importance not only at a scientific and technological but also at a European policy level, as demonstrated by the Europe "Information Society for All" initiative of the European Commission. The activities initiated by the ISF-IS4ALL have been continued in the framework of the Thematic Network (Working Group) "Information Society for All" (IST-1999-14101 - IS4ALL), which has consolidated knowledge on universal access in the context of Information Society technologies into a comprehensive validated code of design practice, leading to the publication by Springer, in 2005, of the edited book *Universal Access in Health Telematics - A Design Code of Practic*"[8], and has developed an on-line training course in design for all[9].

As a result of the 12 years of activities of the ERCIM WG "User Interfaces for All," the field of "universal access and design for all" has made significant progress towards consolidating theoretical approaches, methods, tools and technologies, as well as exploring new application domains. The ERCIM WG UI4ALL, which was the recipient of the ERCIM WG Award for the year 2000, can be considered as an example of a dedicated, prolific and successful research and development community, which has highly contributed to the establishment in Europe of a new scientific field, that of "universal access and design for all".

As of the end of 2006, after the successful ninth workshop, the time has come to consider the mission of this WG as fully accomplished. The papers presented during

[5] http://www.springeronline.com/journal/10209/about
[6] http://www.ics.forth.gr/hci/publications/book.html
[7] http://www.ui4all.gr/isf_is4all/
[8] http://www.springeronline.com/3-540-26167-2
[9] http://is4all-tc.ics.forth.gr

the ninth ERCIM "User Interfaces for All" Workshop and included in the present volume demonstrate that Ambient Intelligence is raising new fascinating research challenges, rapidly gaining wide attention by an increasing number of researchers and practitioners in Europe and worldwide. The notions of universal access and user interfaces for all are central to this vision, since Ambient Intelligence aims at providing implicit, unobtrusive interaction paradigms, putting people, their social situations, and the corresponding environments at the center of design considerations. These issues are now addressed by the new (established in 2006) ERCIM WG "Smart Environments and Systems for AMbient Intelligence" (SESAMI[10]). The research community established by the ERCIM WG UI4ALL will therefore continue its collaborative efforts in the context of SESAMI.

September 2006 Constantine Stephanidis

[10] http://www.ics.forth.gr/sesami/

Preface

The Ninth ERCIM Workshop "User Interfaces for All" was held in Königswinter (Bonn), Germany, September 27–28, 2006, building upon the results of the eight previous workshops held in Heraklion, Crete, Greece, October 30–31, 1995; Prague, Czech Republic, November 7–8, 1996; Obernai, France, November 3–4, 1997; Stockholm, Sweden, October 19–21, 1998; Dagstuhl, Germany, November 28–December 1, 1999; Florence, Italy, October 25–26, 2000; Paris (Chantilly), France, October 24–25, 2002; and Vienna, Austria, June 28–29, 2004.

The concept of "user interfaces for all" targets a proactive realization of the "design for all" principle in the field of human–computer interaction (HCI), and involves the development of user interfaces to interactive applications and e-services, which provide universal access and usability to potentially all users. In the tradition of its predecessors, the ninth ERCIM Workshop "User Interfaces for All" aimed to consolidate recent work and to stimulate further discussion on the state of the art in "user interfaces for all" and its increasing range of applications in the Information Society.

The emphasis of the 2006 event was on "Universal Access in Ambient Intelligence Environments." In the years ahead, as a result of the increasing demand for ubiquitous and continuous access to information and services, Information Society technologies are anticipated to evolve towards a new computing paradigm referred to as Ambient Intelligence. Such an environment will be characterized by invisible (i.e., embedded) computational power in everyday appliances and other surrounding physical objects, and populated by intelligent mobile and wearable devices. Ambient Intelligence will have profound consequences on the type, content and functionality of the emerging products and services, as well as on the way people will interact with them, bringing about multiple new requirements for the development of Information Society technologies. Towards this end, the notion of universal access, which, by definition, aims towards the accessibility and usability of Information Society technologies by anyone, anywhere and at anytime, is critically important. In the Ambient Intelligence environment, universal access will face new challenges posed by the pursuit of proactive accessibility and usability in the context of embedded interactivity "hidden" in a variety of interconnected, multifunctional art facts. It is therefore important to understand such new challenges, and to identify how these will affect the continuing efforts towards universal access in the Information Society. Thus, the ninth ERCIM Workshop "User Interfaces for All" focused on the new HCI challenges that Ambient Intelligence brings about under a universal access perspective, with the aim to envisage new scenarios of use of Ambient Intelligence technologies by users with diverse needs and requirements, and to identify some of the critical issues that will have to be addressed throughout all phases and aspects of the development life-cycle of interactive applications and services. The workshop offered two keynote speeches, "From Human–Computer Interaction to Human–Environment Interaction: Ambient Intelligence and the Disappearing Computer" by Norbert Streitz (Fraunhofer IPSI, Germany) and "Human Computer Confluence" by Alois Ferscha (Institut für

Pervasive Computing, Johannes Kepler Universität Linz, Austria). In all, 27 long papers and 9 posters on topics related to Ambient Intelligence and universal access were presented during the workshop, which attracted participation from all over the world.

These proceedings contain the long papers and the invited papers presented at the workshop. The volume is organized into four sections:

I. "Interaction Platforms and Techniques for Ambient Intelligence." This section includes the two invited papers of the workshop, which introduce the vision of Ambient Intelligence and present the current state of the art, with particular emphasis on interaction and on the central role of humans in the new technological environment. Other papers in this section discuss interaction in a continuously evolving technological environment, addressing issues such as gesture recognition for motor-impaired users, haptic interaction in virtual reality environments, digital TV, mirror-based interaction, avatars in ambient intelligence environments and spoken dialog with home appliances.

II. "User and Context Awareness." This section contains papers discussing the types of knowledge required for addressing user and context diversity, as well as the necessary mechanisms for exploiting such knowledge. Topics include the generation of audio interfaces, scenarios for accessible and personalized multimedia messaging services, the design of context aware eTourism systems, intelligent and adaptive tutors, user profiles for adapting speech support for disabled users, and transgenerational design of small screen device applications.

III. "Inclusive Design and Evaluation." This section presents recent advances in designing for user diversity. Topics include methodological accessibility issues, design techniques, accessibility evaluation, case studies, including defining levels of accessibility, participatory evaluation methods, and empirical experiments.

IV. "Access to Information, Education and Entertainment." This last section contains papers presenting applications and services in the domains of access to information, education and entertainment. Topics include accessible browsing, transportation assistance services, mobile messaging services, accessibility of content management systems, ambient-based learning systems, universally accessible, ambient and emotional games.

We would like to thank all the contributors and participants who made the ninth ERCIM "User Interfaces for All" Workshop a successful international event. We also wish to thank the members of the Programme Committee and all the reviewers for their dedicated efforts to maintain the high scientific quality of the event, as well as the invited speakers Norbert Streitz and Alois Ferscha for their enlightening presentations.

September 2006 Constantine Stephanidis and Michael Pieper

Ninth ERCIM Workshop "User Interfaces for All"

Königswinter (Bonn), Germany, September 27–28, 2006

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