

Universal Access in the Information Society

A retrospective of recent activities

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ABSTRACT

This paper provides a brief and consolidated review of the author's experiences, over a decade of collaborative R&D efforts, seeking to develop new methods and tools for accessible and high quality Human-Computer Interaction (HCI). The projects mentioned in this position paper are an indicative non-exhaustive list relevant to the research work devoted to the area of accessibility in recent years. They are presented in this position paper in an effort to convey how initial assistive technology concepts evolved and progressed as a result of influences from universal design thinking. It is argued that further efforts are needed to advance the research agenda of the HCI field in the context of achieving universal access in the emerging Information Society.

INTRODUCTION: THE INFORMATION SOCIETY

The term *Information Society*, although difficult to define accurately, is frequently used to refer to the new status quo and the new socio-economic and technological paradigm likely to occur, as a result of an all-embracing process of change that is currently taking place; it is expected to affect the interaction in computer mediated human activities, the individual human behaviour, as well as collective consciousness, and to have major economic and social impact [1,2].

One important issue, in this context, is that the goods likely to proliferate in the emerging information age (i.e., information-based commodities), should be made available to anyone, anywhere and at anytime. This challenge, also referred to as *universal access*, does not only apply to computers and their interfaces, but also to information itself, and how it is created, collected, represented, stored, transferred, and used.

The Information Society has the potential to improve the quality of life of citizens, and increase the efficiency of our social and economic organisation. At the same time, it may lead to a "two-tier" society of "haves" and "have-nots", in which only part of the population has access to the new

technology, or is comfortable using it, and can thus fully enjoy the benefits. It is, in this context, that the principle of *universal design* becomes an important vehicle towards ensuring social *acceptability* of the emerging Information Society.

UNIVERSAL DESIGN

"Universal design" or "design for all" (the two terms are used interchangeably) has long been a topic of discussion and debate. It grew out of demographic, legislative, economic and social changes among older adults and people with disabilities at the turn of the 21st century [8].

But, despite its origin, its focus is not specifically on people with disabilities, but on *all* people. This is clearly evident from the practice of universal design in certain engineering disciplines, such as housing, interior design, architecture, and consumer products, where universal design delivers a code of design that respects and values the requirements of the broadest possible end-user community.

One important misconception regarding universal design relates to the term itself. Critics frequently question whether there is anything that can be universally designed. However, this is not the intended meaning of the term. Rather, the term is used because it makes a clear and intuitive reference to the ultimate goal.

In the present context, the term universal design is used to reflect a new "concept" or "philosophy" for design that recognises, respects, values and attempts to accommodate the broadest possible range of human abilities, requirements and preferences in the design of IST¹-based products and environments. Thus, it advocates a design perspective that eliminates the need for "special features" and fosters individualisation and end-user acceptability. This does not necessarily imply a single design solution suitable for all users. Instead, it should be interpreted as an

¹ IST: Information Society Technologies

effort to design products and services in a way that they are suitable for the broadest possible end-user population.

both a reactive RTD component as well as a focus on proactive strategies and methods. The latter were initially

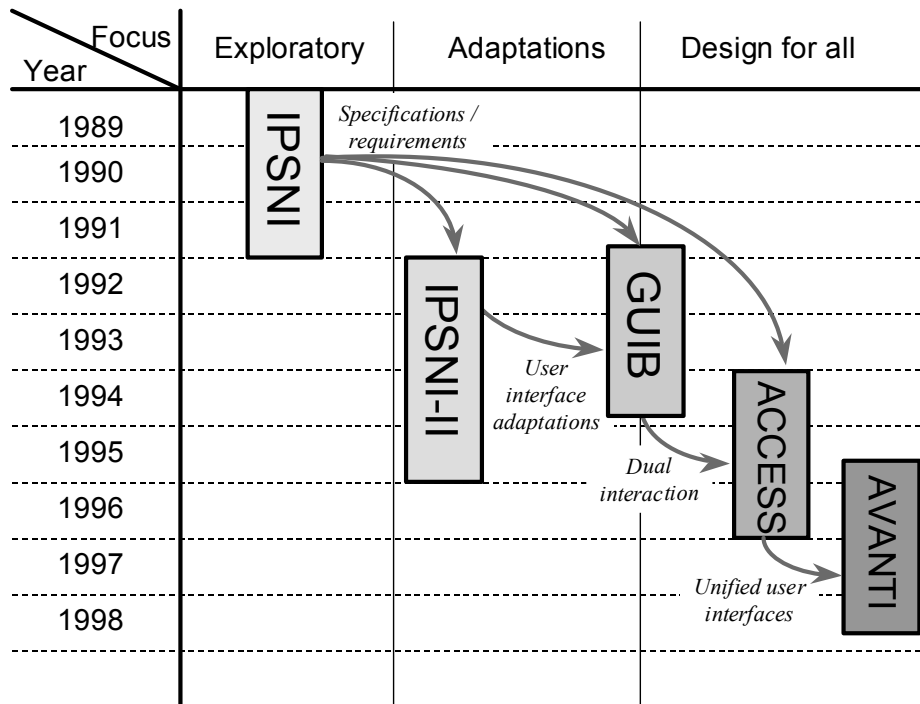


Figure 1. Chronological sequence, focus and some of the key outcomes of the projects reviewed (adapted from [7]).

A RETROSPECTIVE

Having introduced the basic concept, we will now concentrate on some of the landmark projects² funded by the EC and influenced by universal design thinking.

A decade of evolutionary RTD efforts

These projects have pursued an evolutionary path, initially adopting reactive, and subsequently advocating proactive strategies to accessibility. Their main contributions and interconnection are briefly outlined in Figure 1.

What is important to note in relation to these projects is the progressive shift towards more generic solutions to accessibility. In fact with the exception of early exploratory studies (e.g., IPSNI), which did not have an RTD development dimension, all remaining projects embodied

oriented towards the formulation of principles, while later on emphasis was placed on the demonstration of technical feasibility. For a detailed review of these projects and their corresponding outcomes, see [7].

Thus, GUIB-II delivered the HOMER UIMS [3], which provided an implementation platform for dual interaction, and was the first ever, practical demonstration of proactive accessibility strategies. Following this development, the approach was generalized and determined the focus and content of the ACCESS project. ACCESS delivered the unified user interface development methodology [4] and several tools and prototypes to substantiate the viability of a universal design perspective into HCI. Subsequently, the principles of unified user interface development were applied in the context of the AVANTI project [5], which developed web browsers inherently accessible by sighted, non-sighted and speech-motor and language-cognitive impaired users.

The International Scientific Forum

This background led to the establishment of the International Scientific Forum “Towards an Information Society for All” in 1997. The Forum was initially launched as an international ad hoc group of experts sharing common visions and objectives, namely the advancement of the principles of Universal Access in the emerging Information Society. The Forum held three workshops to establish

² The authors had direct involvement in these projects in positions of responsibility. Pier Luigi Emiliani was the Project manager of the projects IPSNI, IPSNI-II, GUIB, GUIB-II, and ACCESS, as well as the technical manager of the project AVANTI. Constantine Stephanidis was the technical manager of ACCESS and the Scientific Responsible for the research and development work reported in this paper, which was carried out at ICS-FORTH, Greece, in the context of these consortia.

interdisciplinary discussion, exchange of knowledge, dissemination, and international co-operation. The 1st workshop took place in San Francisco, USA, August 29, 1997, and was sponsored by IBM. The 2nd took place in Crete, Greece, June 15-16, 1998. The 3rd workshop took place in Munich, Germany, August 22-23, 1999. The latter two events were partially funded by the European Commission.

The Forum has produced two White Papers [1,2], which report on an evolving international R&D agenda focusing on the development of an Information Society acceptable to all citizens, based on the principles of designing for all³. The proposed agenda addresses technological and user-oriented issues, application domains, and support measures. The Forum has also elaborated on the proposed agenda by identifying challenges in the field of human-computer interaction, and clusters of concrete recommendations for international collaborative R&D activities. Moreover, the Forum has addressed the concept of accessibility beyond the traditional fields of inquiry (e.g., assistive technologies, housing, etc), in the context of selected mainstream Information Society Technologies, and important application domains with significant impact on society as a whole (e.g., Healthcare).

The IS4ALL Working Group

Based on the success of its initial activities, the Forum has proposed to advance the principles and practice of Universal Access towards the wider Information Society Technologies (IST) community, by addressing Healthcare Telematics, a critical application domain, along with the emerging technologies shaping the nature and contents of this domain. IS4ALL⁴ [6] is, therefore, seeking to establish on a more formal basis a wider, interdisciplinary and closely collaborating "network of experts" (Working Group) to provide the European Healthcare industry with a comprehensive information package detailing how to appropriate the benefits of Universal Design.

³ The terms "Universal Design" and "Design for All" are used interchangeably in this document.

⁴ IST-1999-14101 IS4ALL (Information Society for All) Thematic Network, funded by the IST Programme of the European Commission. IS4ALL is a multidisciplinary Working Group co-ordinated by ICS-FORTH. The membership includes: Microsoft Healthcare Users Group Europe (MS-HUGe), the European Health Telematics Association (EHTEL), CNR-IROE, GMD, INRIA, and FhG-IAO. <http://is4all.ics.forth.gr/>

The primary focus of the activities of IS4ALL is on the impact of advanced desktop and mobile interaction technologies on emerging Healthcare products and services. The choice of the Healthcare domain can be justified on the grounds of it being a critical service sector, catering for the population at large, and at the same time involving a variety of diverse target user groups (e.g., doctors, nurses, administrators, patients). Thus, Healthcare provides an ideal "testbed" for exemplifying the principles of Universal Access and assessing both the challenges and the opportunities in the context of an emerging Information Society.

On the other hand, by emerging interaction platforms we mean primarily advanced desktop-oriented environments (e.g., GUIs, 3D graphical toolkits, visualisers), and mobile platforms (e.g., palmtop devices) enabling ubiquitous access to electronic data from anywhere, and at anytime. Such technologies are expected to bring about radical improvements in the type and range of Healthcare services. Accounting for the accessibility, usability and acceptability of these technologies at an early stage of their development is likely to improve their market impact as well as the actual usefulness of the end products.

LOOKING INTO THE FUTURE

The CHI2001 Workshop No. 14 "Universal design: Towards universal access in the Information Society" was conceived as an effort to further advance collaboration and international insight to the issue of universal design in the Information Society. By definition, the workshop seeks to bridge across different perspectives on universal design, to facilitate cross-fertilisation of knowledge and bring to the surface the need for interdisciplinary, collaborative research. Additionally, it aims to enable participants to establish a common vocabulary upon critical issues and obtain an understanding of current international research efforts. Future activities of the IS4ALL Working Group will include a Workshop in the context of the 1st International Conference on Universal Access in Human Computer Interaction⁵, New Orleans, Louisiana, USA, 5-10 August 2001.

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- The IPSNI R1066 (Integration of People with Special Needs in IBC) project was partially funded by the RACE Programme of the European Commission, and lasted 36 months (January the 1st, 1989 to December the 31, 1991). Partners of the IPSNI consortium are: IROE-

⁵ <http://uahci.ics.forth.gr/>

CNR, Italy; KUL, Belgium; IRV, The Netherlands; CSELT, Italy; Institute of Computer Science-FORTH, Greece; Technical Research Centre of Finland, Finland.

- The IPSNI-II R2009 (Access to B-ISDN Services and Applications by People with Special Needs) project was partially funded by the RACE-II Programme of the European Commission, and lasted 48 months (January the 1st, 1992 to December the 31, 1995). Partners of the IPSNI-II consortium are: IROE-CNR, Italy; DUMC, United Kingdom; IRV, The Netherlands; CSELT, Italy; KUL, Belgium; Institute of Computer Science-FORTH, Greece; VTT, Finland.
- The GUIB TP103 (Textual and Graphical User Interfaces for Blind People) project was partially funded by the TIDE Programme of the European Commission, and lasted 18 months (December the 1st, 1991 to May the 31, 1993). The partners of the GUIB consortium are: IROE-CNR, Italy (Prime Contractor); F H Papenmeier GmbH & Co KG, Germany; IFI-University of Stuttgart, Germany; Institute of Computer Science-FORTH, Greece; RNIB, England; Institute of Telecommunications-TUB, Germany; Department of Computer Science-FUB, Germany; Vrije Universiteit Brussel, Belgium; VTT, Finland.
- The GUIB-II TP215 (Textual and Graphical User Interfaces for Blind People) project was partially funded by the TIDE Programme of the European Commission, and lasted 18 months (June the 1st, 1993 to November the 30, 1994). Partners of the GUIB-II consortium are: IROE-CNR, Italy; Institute of Computer Science-FORTH, Greece; Vrije Universiteit Brussels, Belgium; Department of Computer Science-FUB, Germany; Institute of Telecommunications-TUB, Germany; IFI, University of Stuttgart, Germany; VTT, Finland; RNIB, England; F.H. Papenmeier GmbH & Co KG, Germany.
- The ACCESS TP1001 (Development platform for unified ACCESS to enabling environments) project was partially funded by the TIDE Programme of the European Commission, and lasted 36 months (January the 1st, 1994 to December the 31, 1996). The partners of the ACCESS consortium are: CNR-IROE (Italy) - Prime contractor; ICS-FORTH (Greece); University of Hertfordshire (United Kingdom); University of Athens (Greece); NAWH (Finland); VTT (Finland); Hereward College (United Kingdom); RNIB (United Kingdom); Seleco (Italy); MA Systems & Control (United Kingdom); PIKOMED (Finland).
- The AVANTI AC042 (Adaptable and Adaptive Interaction in Multimedia Telecommunications

Applications) project was partially funded by the ACTS Program of the European Commission, and lasted 36 months (September the 1st, 1995 to August the 31, 1998). The partners of the AVANTI consortium are: ALCATEL Italia, Siette division (Italy) - Prime Contractor; IROE-CNR (Italy); ICS-FORTH (Greece); GMD (Germany), VTT (Finland); University of Siena (Italy), MA Systems and Control (UK); ECG (Italy); MATHEMA (Italy); University of Linz (Austria); EUROGICIEL (France); TELECOM (Italy); TECO (Italy); ADR Study (Italy).

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