Towards Universal Access in the Information Society

Achievements and challenges

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\textbf{ABSTRACT}

This position paper provides an overview of some collaborative Research and Development (R&D) efforts in Europe in the field of Universal Access in Information Society Technologies (IST), and identifies some of the challenges lying ahead towards achieving the goal of universal access.

\textbf{INTRODUCTION: THE INFORMATION SOCIETY}

The on-going paradigm shift towards a knowledge-intensive Information Society has brought about radical changes in the way people work and interact with each other and with information. As a consequence of the emergence of an intelligent distributed environment, where access to information in heterogeneous databases and interpersonal communication is concurrently available through a variety of access technologies, existing computer-mediated human activities undergo fundamental changes, and a wide variety of new ones appear. This evolution is characterised by the growing impact of the fusion of the emerging technologies, and from the different dimensions of diversity that are intrinsic to the information society, and become evident when considering the broad range of user characteristics, the changing nature of human activities, the variety of contexts of use, the increasing availability and diversification of information, knowledge sources and services, the proliferation of technological platforms, etc\cite{1,2}.

One important issue, in this context, is that the products and services likely to proliferate in the emerging information age (i.e., information-based commodities), should be made available to anyone, anywhere and at anytime\cite{9}. This challenge, also referred to as \textit{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 \textit{universal design} becomes an important vehicle towards ensuring social \textit{acceptability} of the emerging Information Society.

\textbf{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 in the 20th century\cite{8}.

But, despite its origin, its focus is not specifically on people with disabilities, but on \textit{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 have frequently questioned 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 IST-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 effort to design products and services in a way that they are suitable for the broadest possible end-user population.

A RETROSPECTIVE

A number of European Commission (EC) funded collaborative projects and other international activities have shaped universal design thinking and have influenced the international scene.

A retrospective of evolutionary R&D efforts

These projects have pursued an evolutionary path by investigating reactive and proactive strategies to demonstration of technical feasibility. Thus, GUIB 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 a set of tools and demonstration prototypes to substantiate the viability of the universal design perspective in the field of Human-Computer Interaction. Subsequently, the principles of unified user interface development were applied in the context of the AVANTI project. Following the principles and practice of universal access [5], the demonstration version of the AVANTI web browser is inherently accessible by able-bodied users and users with

**Figure 1.** Chronological sequence, focus and some of the key outcomes of the projects reviewed (adapted from [7]).
disabilities (blind users and users with severe or mild motor impairments). For a more detailed review of these projects and their corresponding outcomes, see [7].

The ERCIM UI4ALL Working group
Efforts towards universal accessibility of the interactive components of Information Society Technologies have met wide appreciation by an increasing proportion of the international research community, thus leading to the foundation of working groups and scientific forums. Among them, the ERCIM working group on “User Interfaces for All” (UI4ALL)\(^1\), started in 1995, [10] aiming to address specific technical objectives as well as to bring closer researchers and teams working in the different ERCIM organisations (but also organisations beyond ERCIM or the European boundaries), who share common interests and aspirations, and would like to contribute to the endeavours towards making the emerging Information Society equally accessible to all.

The IS4ALL International Scientific Forum
This background led to the establishment, in 1997, of the International Scientific Forum “Towards an Information Society for All” (ISF-IS4ALL). The Forum was launched as an ad-hoc international group of experts sharing common vision and objectives, namely the advancement of the principles of Universal Access in the emerging Information Society. The Forum held three workshops to establish 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 universal design. 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), in the context of selected mainstream Information Society Technologies, and important application domains with significant impact on society as a whole (e.g., healthcare, education).

The EC Working Group IS4ALL
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 Health Telematics, a critical application domain, along with the emerging technologies shaping the nature and contents of this domain. The thematic network IS4ALL (IST-1999-14101) [6] aims to establish a wider interdisciplinary and closely collaborating “network of experts” (Working Group) to provide the European Health Telematics industry with a comprehensive information package detailing how to appropriate the benefits of Universal Design.

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 was based 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.

Emerging interaction platforms are intended in this context as 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.

\(^1\) \url{http://ui4all.ics.forth.gr/index.html}
LOOKING INTO THE FUTURE

It is important to acknowledge that universal access to Information Society Technologies is a long-term research target. It is just beginning to appear on a more systematic basis on the research agendas of non-market institutions (e.g., NSF in the USA and EC in the EU) and national research funding agencies. In the current stage it is important for the research community to establish a solid R&D agenda, before other support measures can be initiated. The pre-requisite for this is a clear and common vocabulary, which will identify the issues at stake. Following this, the R&D agenda can be discussed on the basis of existing proposals (e.g., [1,2]) or indeed new ones as necessary.

With regards to the common vocabulary, it is important to stress that universal access extends far beyond the accessibility issues regarding disabled and elderly people. This means designing to cope with diversity along different dimensions: in the user population, the technological environment and the increasingly ubiquitous contexts of use. New insights are needed to break away from contemporary assumptions about the scope and object of design, as well as to extend and enrich our understanding of the design activity. It is more than likely that in the search of responses to these questions, the discipline of HCI will need to revise / extend or develop new frames of reference, and will be confronted with several new challenges at the levels of theory building, methodology and engineering practices.

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