

From User Interfaces for All to an Information Society for All: Challenges and Opportunities

Constantine Stephanidis

Institute of Computer Science (ICS), Foundation for Research and Technology-Hellas (FORTH), Science and Technology Park of Crete, Heraklion, Crete, GR-71110, Greece
Department of Computer Science, University of Crete

The radical innovation in Information Technology and Telecommunications, the ever-growing demand for information access, and the proliferation of computers across the different industry sectors and application domains, are the driving forces of the on-going paradigm shift towards an Information Society. Such an evolution brings about radical implications on the current and future HCI research focus and agenda. Firstly, it becomes increasingly complex for designers to know a priori the profiles of the users, and, therefore, it becomes necessary to design for the broadest possible end-user population. This raises implications on design methodology and instruments, as well as on the technical and user perceived qualities to be delivered. Secondly, designers should progressively adapt their thinking to facilitate a shift from designing tools for productivity improvement, to designing computer-mediated environments of use. Finally, another challenge lies in shaping the construction of novel communication spaces. It is more than likely that no single design solution, analogy or metaphor will be adequate for all potential users or computer-mediated human activities. Design will increasingly entail the articulation of diverse concepts, deeper knowledge and more powerful representations to describe the broader range and scope of interaction patterns and phenomena.

The realization of these trends led researchers to engage in and explore new pathways that would elevate HCI to address the challenges. One of those pathways builds on the notion of *User Interfaces for All*, which was proposed as a research theme in the framework of the ACCESS project¹, and was introduced in the international bibliography in 1995 [Stephanidis, 1995; Chapter 1 in Stephanidis, 2001]. The underlying vision of *User Interfaces for All* is to offer an approach for developing computational environments that cater for the broadest possible range of human abilities, skills, requirements and preferences. Consequently, *User Interfaces for All* should not be conceived as an effort to advance a single solution for everybody, but rather, as a new perspective on HCI that alleviates the obstacles pertaining to Universal Access in the Information Society.

The roots of *User Interfaces for All* are to be traced in the notions of *Universal Design*. The term *Universal Design* is well known in several engineering disciplines, such as, for example, civil engineering and architecture, with many applications in interior design, building and road construction, etc. While existing knowledge may be considered sufficient to address the accessibility of physical spaces, this is not the case with Information Society Technologies, where *Universal Design* is still posing a major challenge. Universal Access to computer-based applications and services implies more than direct access or access through add-on (assistive) technologies, since it emphasizes the principle that accessibility should be a design concern, as opposed to an afterthought. To this end, it is important that the needs of the broadest possible end-user population are taken into account in the early design phases of new products and services.

1 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).

In an effort to provide a deeper insight towards Universal Access in the Information Society, the *Unified User Interface development* methodology was developed in the context of European collaborative R&D project work² [Chapters 19 to 24 in Stephanidis, 2001]. It is a new methodology conveying a new perspective on the development of user interfaces, and providing a principled and systematic approach towards coping with diversity in the target users groups, tasks and environments of use. Unified User Interface (U²I) development entails an engineering perspective on interactive software, and a collection of tools that allow the specification of a user interface as a composition of abstractions. A U²I comprises a single (unified) interface specification, targeted to potentially *all* user categories. The U²I development methodology has been validated in various application domains in the ACCESS project, while its most extensive application has taken place in the development of the AVANTI³ Web browser. The distinctive characteristic of the AVANTI Web browser is its capability to dynamically tailor itself to the abilities, skills, requirements and preferences of the end-users, to the different contexts of use, as well as to the changing characteristics of users, as they interact with the system [Chapter 25 in Stephanidis, 2001].

Despite the recent rise of interest in the topic of Universal Access, and the indisputable progress in R&D, many challenges still lie ahead. An effort to identify some of them is reported in [Stephanidis et al., 1998; Stephanidis et al., 1999]. One of the challenges is the availability of tools to design and implement Universal Access features. In the past, the availability of tools was an indication of maturity of a sector and a critical factor for technological diffusion. As an example, graphical user interfaces became popular once tools for constructing them became available, either as libraries of reusable elements (e.g., toolkits), or as higher-level systems (e.g., user interface builders and user interface management systems). In the area of Universal Access, methods and tools for building interactive systems exhibiting the required properties are still at the infancy stage. The recent literature reports on only few related efforts (e.g., [IPIE, 1995; Stephanidis, 2001]). Additional research is needed to define novel user interface architectural frameworks to facilitate context-sensitive processing, and provide alternative interactive embodiments of computational systems.

References

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- 2 The Unified User Interface development methodology and related tools were developed in the framework of the ACCESS project.
- 3 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).