IS4ALL: A Working Group promoting universal design in Health Telematics

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ABSTRACT

In this article, we present an overview of the work being carried out by the EC-funded project IS4ALL (IST-1999-14101). Specifically, we describe the methodological frame of reference, which drives the project's objective to introduce universal access principles into the design of Health Telematics applications and services. Health Telematics is chosen due to some distinctive characteristics, such as the variety of end users involved, the changing healthcare contexts of use and the penetration of new computer-mediated activities, which re-shape the way in which healthcare practices are structured and organized.

INTRODUCTION

IS4ALL (Information Society for All) – is an EC-funded project aiming to advance the principles and practice of Universal Access in Information Society Technologies, by establishing a wide, interdisciplinary and closely collaborating network of experts (Working Group) to provide the European Information Technology and Telecommunications (IT&T) industry in general, and Health Telematics in particular, with a comprehensive code of practice on how to appropriate the benefits of universal design.

Universal design is the term used to reflect a particular perspective upon the design of interactive products and services that respects and values the dimensions of diversity intrinsic in human capabilities, technological environments and contexts of use. The universal design movement has its roots in the conscious effort to address the special requirements of the ageing population and users with disabilities. Initial areas of application have been mainly concerned with the design of landscapes and built environments. More recently, universal

design became respected and practised in architecture, interior design, civil engineering, etc [1].

In the 1990's, universal design obtained a broader connotation and attracted considerable interest in the field of IT&T. Several projects were carried out (for a review see [2]) in an attempt to address technical issues, raise awareness and advance an understanding of the challenges pertaining to the appropriation of the benefits of universal design in IT&T. In the field of Human-Computer Interaction (HCI), universal design has addressed the shortcomings in traditional HCI design practices to cope with the different dimensions of diversity [2, 3, 4, 5]. To this end, universal design has been the focal issue of concern in the context of an International Scientific Forum[1] and several research and development projects over the past decade [2, 3, 4, 5].

These experiences have created the compelling need to establish on a more formal basis a wider, interdisciplinary and closely collaborating "network of experts" (Working Group) to provide the Information Society Technologies industry with a comprehensive code of practice detailing how to appropriate the benefits of universal design. This is currently being pursued in the context of the European Commission[2] funded project IS4ALL[3] (Information Society for All).

THE FOCUS

IS4ALL concentrates on the European Health Telematics industry and seeks to develop appropriate instruments to facilitate this industry towards approaching, internalising and exploiting the benefits of universal access. The particular domain of Health Telematics of interest to IS4ALL is the users interaction with Electronic Patient Records (EPRs). Users in this context comprise a broad and diverse community of humans interacting with segments of an EPR, including the medical community as well as end users. Moreover, such interaction may be carried out using different technological platforms (e.g., desktop machines, Internet appliances, mobile equipment), in a variety of contexts of use. Specifically, emerging interaction platforms, such as advanced desktop-oriented environments (e.g., advanced GUIs, 3D graphical toolkits, visualisers), and mobile platforms (e.g., palmtop devices), enabling ubiquitous access to electronic data from anywhere, and at anytime, are expected to bring about radical improvements in the type and range of Health Telematics services. Accounting for the accessibility, usability and acceptability of these technologies so as to facilitate universally accessible applications and services requires an early and explicit focus on the broad range of issues that pertain to universal access.

Toward this objective, IS4ALL will develop a comprehensive *code of practice* (e.g., enumeration of methods, process guidelines) consolidating existing knowledge on Universal Access in the context of Information Society Technologies, as well as *concrete recommendations* for emerging technologies (e.g., emerging desktop and mobile platforms),

[1] The International Scientific Forum "Towards an Information Society for All' was launched in 1997, 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 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 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 [3, 4].

[2] For an overview of the European Commission perspective and of the 5th Framework Programme on Information Society Technologies (IST), the reader may visit the web site: http://www.cordis.lu/ist/overv-1.htm#objective

[3] http://is4all.ics.forth.gr

with particular emphasis on their deployment in Health Telematics. IS4ALL will also undertake a mix of *outreach activities* to promote Universal Access principles and practice, including workshops and seminars targeted to mainstream IT&T industry.

THE APPROACH

The technical approach to be followed in IS4ALL builds on a scenario-based perspective to requirements engineering. IS4ALL scenarios are perceived as narrative descriptions of computer-mediated human activities in a Health Telematics environment. A Health Telematics environment may be bound to a clinic within the hospital, a ward within a clinic or even to the end user's business or residential environment. Working with scenarios in IS4ALL entails several steps.

Generating the scenario

Scenarios can be developed at different levels. They can range from vision-oriented statements of intended actions to concrete experiences with an implemented artifact. IS4ALL makes use of scenarios, which describe existing practices or *use cases* in a Health Telematics environment. Such scenarios are developed in collaboration with Health Telematics professionals or end users who declare how a task is being performed. The typical modality in which these scenarios are developed are narratives, accompanied with (paper or system) mock-ups of a system in use. The development of such a scenario involves a certain degree of iteration between IS4ALL and the people / experts responsible for drafting the scenario. These iterations mainly clarify elements of the scenario through structured "question & answer" sessions.

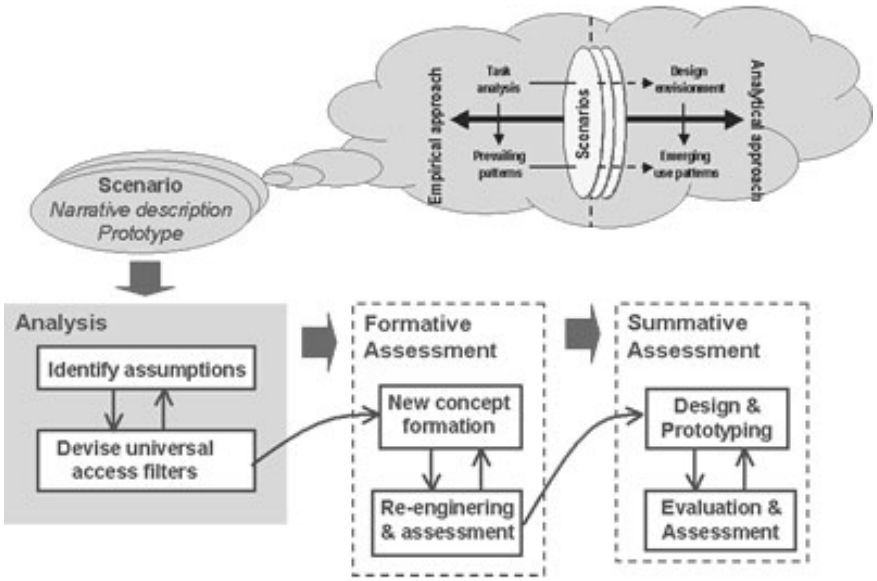

Figure 1: Working with scenarios - steps and phases

Since scenarios may or may not have an explicit focus on universal access, a key question is to devise suitable mechanisms or techniques for working with these scenarios to derive useful insights for the purposes of the project. This entails a reference model or a structured guide towards introducing universal access principles in the agenda of the Healthcare Telematics practitioners (see Figure 1).

Identifying breakdowns and envisioning new design alternatives

This is an analytical step (see shaded part of Figure 1), which involves a conscious effort to unfold, record and reflect upon implicit/explicit claims or assumptions embodied in the original scenario. For example, by inspecting (parts of) the current implementation of the user interface to the integrated electronic health record of HYGEIAnet, one can derive several implicit assumptions, such "the user interface is designed for desktop access", or "the user interface is designed for users with fine spatial control, fine eye-hand coordination, ability to pull and push targets, ability to initiate movement on demand, etc." Relaxing some of these assumptions facilitates insight into novel usage contexts. Articulating concrete proposals for these novel usage contexts is a critical step towards introducing universal access principles.

Scenario screening

Scenario screening refers to the task of articulating concrete specifications for envisioned contexts of use, thus fostering an iterative re-engineering process of the initial scenario towards universal access. A prime concern of IS4ALL is to define and document techniques, which can be used for scenario screening. These techniques may be informal – based on intuition – or formal means through which designers can reason about tentative scenarios. One approach, which seems to be popular, entails the definition of universal access filters, which lead designers to explore alternative pathways towards deriving accessible solutions to potential design breakdowns. Universal access filters may take several forms. The most popular is that of questions, which seek to provide insights into how a particular task is to be carried out (by a user, using a particular access terminal in a context of use). Figure 2 depicts a revised version of the illustration in Figure 1, which denote the role of universal access filters.

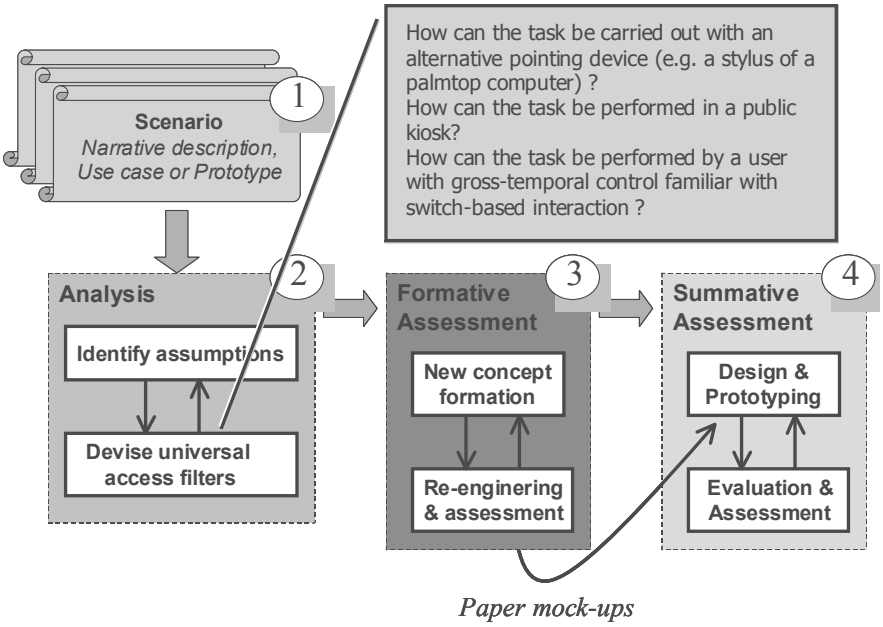

Figure 2: Using universal access filters

What is important to note is that universal access filters are useful when there is a tentative design to be assessed. In such cases, they help designers identify potential break down or shortcomings in the use of the product by certain user groups. Moreover, they can be used as

a basis for argumentation during design, thus fostering an analytical insight to universal design. Nevertheless, accessibility filters do not provide answers or design concepts; rather they motivate the designers to think about a problem or certain aspects of the problem. Another shortcoming is the fact that they are usually experience-based, thus relying on intuition rather than a formal basis. This means that there may be needed several categories of filters to inform and facilitate an all-inclusive design process (or universal design).

DISCUSSION

In the previous sections, we have described recent progress in IS4ALL with particular emphasis on scenario development. In the context of the project, scenarios constitute the primary means for eliciting requirements for universal access in Health Telematics, and in particular EHRs. In many ways, the approach is similar to the trend towards requirements engineering with scenarios, which has become popular in Software Engineering communities. Nevertheless, there are distinct differences between the IS4ALL work and other similar approaches in the treatment and articulation of scenarios. For IS4ALL, scenarios offer a preliminary design resource and a common reference ground for design deliberations. These deliberations should aim to unfold critical design issues, which bind the original scenario (i.e., the target users, the underlying technology and the context of use). Such binding conditions subsequently form the primary means of a re-engineering process, which extends the original scenario with insights from universal access. This re-engineering process is referred to as *scenario screening* and is depicted in the diagram of Figure 3.

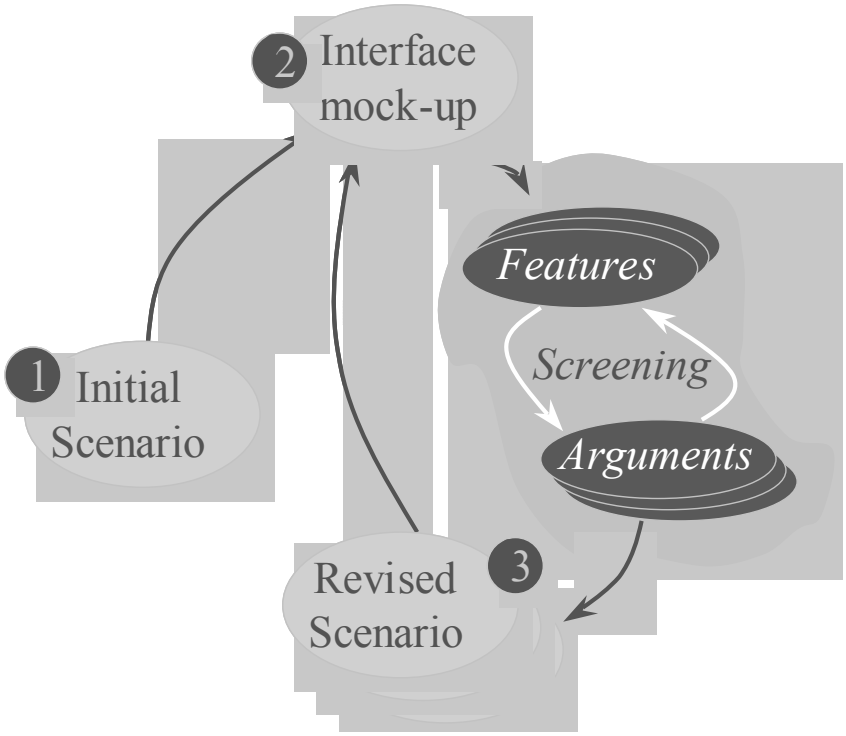

Figure 3: Elements of a re-engineering approach to facilitate scenario screening for universal access

Scenario screening serves the purpose of extrapolating the universal access design considerations relevant to a particular scenario. Work has already begun aiming to use a designated set of scenarios as design resources to guide the development of a code of practice, which would enable Health Telematics application developers to systematically identify the

elements of an artifact, which can become subject to universal access re-engineering. In particular, the IS4ALL project is working on three distinct scenarios reflecting diverse usage contexts, universal access requirements and prospective solutions.

One scenario is drawn from HYGEIAnet [10], the regional Health Telematics network of Crete and in particular the services designed around the Virtual Electronic Patient Record. The current version of these services are desktop-oriented and IS4ALL is exploring alternatives for the WWW, and various network-attachable devices, including a WAP phone and iPAQ. The second scenario is based on the EC-funded project WARDINHAND [11]. This project develops a ward-bound information system accessible through a palm device. The final scenario is inspired from the EC-funded project C-CARE [12] and describes how concepts from this project are hosted by a national EDI for medical data in Belgium. In the future, these scenarios will be further developed to depict, through prototypes and mock-ups, new work patterns resulting from universal access insights. These developments will be periodically documented in future reports as well as in the project's web site.

Acknowledgement

IS4ALL is a multidisciplinary Working Group co-ordinated by the Institute of Computer Science of the Foundation for Research and Technology – Hellas (ICS-FORTH), Greece. The membership includes: Microsoft Healthcare Users Group Europe (MS-HUGe); the European Health Telematics Association (EHTEL); Consiglio Nazionale delle Ricerche – Istituto di Ricerca sulle Onde Elettromagnetiche (CNR-IROE) Italy; Fraunhofer-Gesellschaft zur Foerderung der angewandten Forschung e.V. - Forschungszentrum Informationstechnik GmbH (FhG-FIT), Germany; Institut National de Recherche en Informatique et Automatique – Laboratoire lorrain de recherche en informatique et ses applications (INRIA), France; and Fraunhofer-Gesellschaft zur Foerderung der angewandten Forschung e.V. - Institut fur Arbeitswirtschaft und Organisation (FhG-IAO), Germany.

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