The computer as a tool in Assistive Technologies Assessment Procedures: The Hyprofile test

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Abstract
The Information Society (IS) has impelled us do rethink several core elements of everyday living. The present tendency is clearly to look in depth to what we do and how the use of Communication and Information Technologies (CIT) can improve the efficiency and success of these actions. This position paper condenses some thought on the use of computers and the Internet as tools with a lot to say on what can be done in the area of user Assistive Technologies Assessment Procedures (ATAP) and in Assistive Technology Provision Processes (ATPP). Our main goal is not to advocate the overwhelming possibilities presented by these technologies, nor has the presumption of stating that the traditional procedures still in use are obsolete and should be dropped immediately. This paper should be interpreted as a compilation of ideas and conceptual proposals worthy of promoting some thought. Much of its content is related with research work done in the field of Assistive Technology (AT) and experiments already undertaken in the form of a test called the Hyprofile test. Our intention with this paper is to highlight a set of specific questions, possible answers and innumerable doubts. These will in the end stand for what we want to know, what we know and what we are keen on discussing at a broader level.

Keywords
Special Needs, Inclusive Information Society, Assistive Technology, Assistive Technology Assessment Procedures.

Introduction

People rarely take the time to stop, look around and assimilate the complexity of our life surroundings. The rat race has lured us into a tight rope scenario where each step is thought out and where human communication has gained new *modos operandis*. Computers and the Internet have gained an important part in our lives but unfortunately many of us are still to understand what it is and what can be done with it. Users with special needs have welcomed these technologies and have gradually adopted them hopping they will represent the instruments for an effective inclusion in society. They have been recognized, to a certain extent,as tools capable of improving their quality of life at various levels. Computed-based AT has linked people and communities otherwise discriminated and set apart from the world. Simultaneously ATAP have contributed to the correct identification of profiles and provision of AT solutions for people with special needs. These procedures have been carried out through the use and efforts of uncountable assessment tools, ATAP professional teams and organizations dedicated to helping match the user with the AT. The problem is that when we take a closer look into these teams' toolkit we rarely find computers. When we do these are seldom used as an active tool in the gathering and analysis of user profile data.

Users with special needs have gained a front row seat in the global concern with the inclusive IS. Be it in political speeches made out of catch phrases, or in national and European political

and strategical agendas [Raposo, 03], the truth is that finally someone found out that computers and the internet can really make a difference for some people. The question now is how are we to know what the user needs in order to interact with this new information and communication tool [Winograd, 97].

Transdisciplinary teams have developed this sort of work with the help of paper-based tools capable of assisting them in outlining user profiles. Our goal is the evaluation of the possibility of transposing paper-based assessment tests onto a digital media. However, our effort has not been a simple and straightforward one. This paper condenses some of problems which we labeled as worthy of individual analysis. In doing so, we seize the opportunity to subsequently propose, if only at a conceptual and theoretical level, some possible solutions for such problems.

The media all around us boasts the positive and all solving capabilities of computers and the internet. We are sold the idea that the Information Society is here and is happening at this instant. In spite of this statement we must ask ourselves the following question. Why hasn't it made its way into ATAP? We believe that it may have something to do with the fact that no one has explained what in fact computers and the internet can do for these types of procedures. It would be just excellent if we could present a user with special needs with a computer and tell him or her that it was the answer to all their problems. Transdisciplinary assessment teams would have it made if the simple fact of having computers granted them the ability of improving methods and results. Reality is however quite far from these simplistic scenarios.

The authors of this paper have dedicated a considerable amount of time to the issue of transforming the computer and the internet into technologies capable of assisting teams in ATAP and granting them alternative information sources and instruments for use in these procedures. Work done consisted of:

A. Conceptualizing the activities that could and should be undertaken by technology in these specific contexts,
B. Identifying an example which could be transposed from paper to digital media
C. Proposals and refinement of additional functions that could be implemented in order to improve results and functionalities in this media.
D. Implementing the digital version of the assessment test and some refined proposals
E. Identifying problems in the on-line version of the test;
F. Discussing and blue printing problems and solutions for an improved version of the online assessment test

Through the remaining of this paper each of the listed tasks will be explored with the purpose of outlining what was done, what was questioned and answered and what is still in need of additional feedback.

A - Conceptualizing the activities that could and should be undertaken by technology in these specific contexts

Contexts of use in ATAP were deconstructed in order to understand the group of interaction and information retrieval modules and resources which needed to be integrated in the assessment system developed in digital format. As it has already been said it is not enough to

just throw in a computer and expect to see progress in a blink of an eye. Work on our Hyprofile project began with a thorough analysis of what takes place during an ATAP. Who is involved, what is done, what kind of information is gathered, produced and shared, what is the need for all this information. At the end of this task each module and resource had a place and it was clear how they could influence and be influenced by work on other fractions of the assessment system.

The resulting main idea was that the computer should play a centered stage part in the gathering, indexing, analysis and presentation of information linked to each and every user assessed. We concentrated our attention on understanding how we would be capable of:

i. gathering this information;
ii. dictating a logical pattern capable of defining how it was indexed;
iii. identifying what should be considered when the information was analyzed and;
iv. defining how the information would present itself during interaction.

B – Identifying an example which could be transposed from paper to digital media

The Hyprofile test was based upon an existing Physical Characteristic Assessment (PCA) test created by an American company called Don Johnston Incorporated [McGregor et al, 94]. This paper-based assessment tool was used as the reference tool which we would attempt to transposed to digital media. In this particular test the answering of yes and no questions would lead us through it in a non sequential manner according to predefined paths. In order to be aware of, and predict the various paths which could be taken throughout the test, a structure in the form of a flow chart was drawn up and studied. In it we were able to visualize all the paths that had to be taken into consideration when conceiving the digital version of the test. These paths would be implemented in a manner in which who ever took the test would, according to answers given, be presented with predefined follow-up questions.

C – Proposals and refinement of additional functions that could be implemented in order to improve results and functionalities in this media.

The Hyprofile project took on its online life with the idea that when the user accessed it, he or she should be entitled to more than just access to a PCA test. It was decided that the test would be included in a site capable of disseminating additional information on assistive technologies, usability and accessibility issues.

Each team member believed in the idea that any assessment in digital format should be included in a context site capable of giving the user more than just access to a test. These sorts of sites should be developed as knowledge references with the ability to clear the users doubts, receive feedback and build on that same feedback. In the case of our Hyprofile test a lot of these additional functions where implemented but unfortunately many where set aside and kept in a blueprint essence.

The PCA test was deconstructed and analyzed in terms of functions in order to point out what could be improved and how. One of the most positive functions implemented in the online version is the capability of collecting data for statistical analysis. In a practical sense what the

Hyprofile test does is ask the same yes and no questions presented in the paper-based version and collect and save the answers in the system's data base. It also helps the user by leading the way through the paths transposed from the paper version. This procedure and the associated representation tasks, at a first glance, may seem a straightforward, obvious and easy to implement solution. However, the knowledge-based representation issues take us into much deeper research considerations as we will see further in this paper.

D – Implementing the digital version of the assessment test and some refined proposals

Much of the work done when implementing the online version of the PCA test was supported by a good number of documents drawn up during the planning stage of the Hyprofile project. The majority of ideas spawn in the previous phase were thought out in detail before beginning any sort of work on the digital version of the assessment tool. Flowcharts where drawn up as a way to overview the overall structure of the test. This sort of methodology was constituted as reference for our transdisciplinary team. The multiplicity of professional and academic backgrounds linked together within this project demanded a clear goal oriented plan and this would only be achievable if everyone had a clear image of how the test was organized, what was going to be done and each persons role.

E – Identifying problems in the online version of the test.

Our goal to implement and conclude the online assessment tool came to a stop when some problems were detected at a test structure level. Synthesizing, we identified some major gaps in the transposition of the paper version to a digital version. The paper version skipped some important questions related with body contact areas. Body contact areas are the parts of the body which are used to interact with the input devices. In the end the structure lined out for the digital version did not predict these gaps. In addition to this, while in the paper version we could easily turn back a couple of pages and correct our answer, the digital version needed to be rethought in order to correct answers and design ways of allowing multiple non linear correction actions. With this we mean that the user must be able to correct his answers at any already registered moment of the test and the system must be able to readjust the subsequent answers.

F – Discussing and blue printing problems and solutions for an improved version of the online assessment test

The identification of gaps in the test leads us to rethink the whole technological concept behind the online test. We found that the test needed to be redesigned with a structure and technological resources capable of supporting more correction actions and previous and subsequent corrections. The following sections of this paper are dedicated to a more incisive analysis of the main issues related with the redesign work done on the test at a theoretical and conceptual level. These issues will also be linked with major analytical and expert knowledge insights concerning assessment procedures.

How do we correct a test answer?

The correction of answers given in the Hyprofile test was one of the first problems to be identified as in need of correction. The question and answer routine accompanied by a pencil and paper annotation practice has suited needs for the past years but may need to be slightly altered to satisfy present needs in the digital era. Each error detected in these traditional

procedures has been corrected or deleted relying only on the team members' capability in detecting it, knowing its origin and being able to take a step back and change it. After doing so the assessment would continue and the following answers would also be corrected in order to suite the adjustment taken place.

We are sad to say that our initial approach and version of the Hyprofile test did not account for these apparently simple procedures. Instead, it maintained a certain rigid structure where any correction would be dealt with at an individual level erasing all subsequent paths already produced. The lack of these knowledge and decision instances leads us to think about what could be done to improve the already implemented data related web questions and answers. The immediate answer was that the test needed to be redesigned in order to predict a more complex list of associated information capable of establishing links among each other and with the possibility of implementing non sequential changes. This meant that any change would not delete subsequent answers but rather correct those in order to adjust them to new altered data input. In some cases these changes may represent the erasing of an answer, slight corrections or even the establishment of a new alternative path. A small correction could in some cases and in a particular answer, guide the test into a whole new path resulting in a completely new user profile.

It became clear to the team that the influence on the path and resulting profile established by these corrections had to be in close coupled relation with the already mentioned knowledge-based decision instances. These can be understood as decision nodes which represent important pitchforks in the paths taken throughout the test.

In our particular context the AT assessment tool should be capable of establishing a user profile pattern similar to the type of pattern established by what could be designated as the traditional ATAP teams. We must however draw some emphasis on the idea that this test does not intend to undermine the assessment teams' role. It should rather be handled as a complementary tool capable of assisting and improving the teams work. In some cases it could even be understood as an interesting tool for use in preliminary assessment procedures at a curiosity level but never as a flawless, all in one, self sufficient assessment tool. Collective and individual tacit knowledge inherent to the team members will always represent an important asset in ATAP, difficult to be reproduced in some sort of automatic or semi-automatic algorithm. Considering this, a knowledge based decision system is not contradictory but should be understood as a complementary instrument capable of archiving correlating knowledge instances.

The correlation of knowledge and path representation for user profile decision purposes

If we revert to common practices applied in ATAP the final result of this process is the indication of a particular solution in terms of Assistive Technology. The decision on what solutions should be presented depends on decisions made by specific team members. This may result in subjective perspectives on what the team member thinks and what sort of AT solution he or she is familiar with. To a certain level it may even be safe to say that the prescription of a final solution may be too limiting for some users. They might be interested in being presented with a wider range of AT solutions and may also be interested in gathering extra information on each solution presented. The redesigned Hyprofile test includes a prescription method based on the analysis of the knowledge and path representations gathered during the test. These representations take into consideration various predefined knowledge and decision instances scattered throughout the test and linked to key questions. Depending

on answers given, the test gathers specific keywords related with different AT solutions. These keywords are attributed as metadata to packages of information included in the database. At the end of each test the user is presented with a final report. These reports are generated automatically using as a reference information included database packages identified as being in conformance with the user's identified profile. The final report presented to the user includes:

- Thumbnails and images of the AT identified as possible solutions for users needs according to the identified profile;
- A list of companies capable of supplying such AT solutions;
- The companies sites and e-mails so that extra information can be searched and asked for.

At the time being this solution is still in a blueprint essence. Its completion will only be achieved further on after the complete redesign and implementation of the improved Hyprofile test. However some of these ideas have already been implemented in the first version of the test. Further information on what is already implemented in the Hyprofile test can be obtained through the following e-mail – raposo@ca.ua.pt.

Where do we go from here?

The present scenario in terms of ATAP must be understood as an important part of a growing global conscience related with what is commonly known as an all inclusive Information Society. The acceptance of this documented [Stephanidis et al, 98; Stephanidis et al, 99] reality lures us into also accepting that this participation in how the society and its members interact is fruitful in presenting us with new multilevel paradigms. It is however wrong to think that these deriving paradigms are limited within specific scientific areas.

The recognition that society itself feeds off transdisciplinary interactions easily help us assume that any paradigm will also be placed in a scientific co-relational area where it intersects several scientific areas without ever assuming an exclusive one. If we take a glimpse at what is being achieved in areas such as information technologies some paradigms linked to project development have led teams into new ways of approaching each problem. Assessment procedures with people with special needs and ATAP are not immune to this sort of sign of progress.

The question is what changes will take place in these specific areas. The team and project development process are clearly identified as areas suitable for the adoption of new sociological and management paradigms. However when we analyze ATAP their complexity ensures us that any novelty in these efforts will surely influence multiple scientific areas. It also ensures us that any paradigm related with these contexts will also be difficult to label. In order to narrow down our concerns we have decided to point our attention towards the sort of innovations that may derive as spin-offs from the work done in correcting and implementing a totally working version of our Hyprofile test.

Ubiquitous procedures for user profile tracking

What does ubiquity have to do with the Hyprofile test, the all inclusive Information Society and related interaction paradigms? In future contexts of use the concept of ubiquitous knowledge gathering may find its place in the Hyprofile test through alternative means capable of replacing the common Q&A procedure. A probable solution may be found in the use of simple point and click games with inherent actions related with essential answers

needed to outline the user's profile in terms of CIT interaction. After completing a couple of tasks the user would have passed on information in a non explicit, informal manner, with precise data on his or her needs and capabilities when interacting with CIT. After analyzing and processing this information the system would adapt itself with the goal of matching identified user needs. The interesting applicability of the test resides in the possibility of adapting applications and operating systems in order to adjust them to the identified users' profile. The future design of these applications and operating systems may even shift their core conception actions. Instead of creating them based on rigid structures, they might find a way to conceive adjustable solutions with the ability to mold themselves according to needs identified in the user. In a close to perfect scenario each time the user came into contact with the computer-based technology a saved user profile would adjust the technology to match the identified user. These sorts of ideas have already been put into practice in the automobile industry. The onboard computer has a list of predefined driver profiles. This might become an even more interesting discussion topic if linked with the growing use of biometric recognition systems. The identification of a fingerprint, face pattern or voice pattern might well be the input needed for search and retrieval of specific user profile data in CIT interaction scenarios

These concerns may even overflow personal computer-based technologies and merge into mobile communication technologies and associated services. The noticeable evolution in these technologies, in terms of hardware, software and services, may well be an additional incentive for using such adaptable possibilities. The increasing quality in broadband communication systems will possibly help to eradicate still existing flaws, concerning multimedia package transmission and share, thus improving the real-time connections to central server user profile databases. These databases would become accessible at any time from anywhere. The problem of the inexistence of some AT solutions may even be overcome if this adjustment feature became omni accessible provided that the technology used had ways of accessing the profile database. In "ways" we mean internet access, mobile communication systems access, generically network access.

Final considerations

This document should considered as a position paper on has been developed in our work and our concerns on ATAP and the evolving role that computers may and will represent in these processes. Although we are aware that our work is still at the beginning of a road we are yearning to travel down, we do believe that much of our design and planning efforts represent interesting subjects for discussion. Questions have already been answered as a result of the implementation of the first version of our Hyprofile test and we have now directed our attention to the flaws identified in it. These have drawn us closer the intent of further introducing and improving the optimized use of computers in ATAP.

We are also concerned with understanding how these sorts of tests may be optimized through the outlining of more complex networks of knowledge and decision instances. It is not a question of understanding how to get from point A to point B, but instead being able to design and predict spin offs resulting from multiple non sequential correction actions. The relationships established between instances will dictate how resulting information must be indexed, searched, retrieved and presented. They will also set the pace for evolving scenarios where user centered design [Almeida, 99] may even develop into user adaptable design. Future computer-based technology, or even mobile communication technologies, may probably even gain the ability to mold themselves to the users needs according to information retrieved from easily accessed profile databases or biometric sensors.

The all inclusive information society may not be just around the corner, but we do believe that we are heading in the right direction

Used Abbreviations

CIT - Communication and Information Technologies

ATAP - Assistive Technologies Assessment Procedures

ATPP - Assistive Technology Provision Processes

AT - Assistive Technology

PCA - Physical Characteristic Assessment

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