

## Universal Design for HCI in a developmental context: myth or reality? The South African example.

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### Abstract

Approximately 4 million people in South Africa suffer from disabilities and are emarginated from society. The ability to effectively communicate and to access/share information has been recognised as key need and the quickest route towards social integration and economic upliftment. In response to these challenges, the Meraka Institute of the Council for Scientific and Industrial Research (CSIR), in collaboration with national Disabled Peoples' Organisations and relevant South African Government departments have conceptualized a comprehensive national networking, communication and data sharing initiative for people with disabilities, known as the National Accessibility Portal (NAP), which is being built around Universal Design and HCI principles appropriate within a 'developmental' reality.

The goal of NAP is to use custom-made, innovative, cost-effective and appropriate ICT based technologies to support people with disabilities, to empower them economically and to enable them to play a full, participatory role in society.

The system's goal is to address challenges and needs related to all types of disability, without discrimination and towards full inclusion: the deployment countrywide is intended to be accessible to all, multi-cultural, appropriate for both urban and rural living and to address issues such as language, social context, training, inclusion and logistics. The final aim will be a system accessible on an 'anywhere/anytime' basis.

But is this a dream or reality in a developmental context? What are the preconditions for success?

The paper gives an overview of the challenges, specific to a rapidly developing SA, encountered in the scoping and execution of a project of such magnitude. It also describes how the success and relevance of technical outcomes and HCI choices must be linked to socio-economic, historic/cultural analysis and current realities.

**Keywords:** ICT, HCI, Design-for-all, assistive technologies, inclusivity, developmental context, global challenges.

## 1. A National Accessibility Portal for South Africa: current status

The project has reached a status of maturity, with dedicated software being developed and tested, with full system deployment on a site in Soweto, Johannesburg and with a dedicated team of experts and developers active at the Meraka Institute, in various teams configurations (Research, Software development, Open Source applications, socio-economic analysis, HCI testing, Ergonomics, international networking etc.).

The team configurations have also been chosen and assembled with the view of representing somehow the variety of the South African context and cultural diversity: representatives of various population groups, of different Disabilities, of different Scientific Disciplines and of different cultural backgrounds have been incorporated into sub-teams, addressing also the issue of language (eleven official languages have been recognized by the South African Government). However many questions have arisen during project execution: addressing such questions has broken new ground and created unexpected challenges, typical of a developing context, but of fundamental importance when one wants to carry such learning across a wider, even global developmental context.

## 2. Project developmental questions

### 2.1 Are Universal Design and HCI principles applicable and appropriate in such complex land and society?

‘Design for all’ and Universal principles are only appropriate in terms of creating a basis of departure and a solid ground for further exploration and development. Unfortunately the South African developmental landscape is a complex one: even much more complex when one considers issues relative to People with Disabilities.

- **The issue of language:** eleven official languages are recognized by the SA Government. Many more are in existence both as independent localized ones or regional dialects and language variations. This would impact enormously in choices relative to written and oral context in web-page design, digital communication and interactive data sharing. A unified, universally valid solution would therefore be inappropriate and contra-productive. Localized adaptations, automatic on-line translations and text-to-speech solutions are an appropriate answer.
- **The issue of culture:** the South African human landscape is extremely complex, being constantly re-shaped, through history, by subsequent people-migrations (in various forms, quantities and across various centuries) from other African regions. Other migrations have followed, in a ‘forced’ form, following subsequent colonization by various European nations, during the last four centuries. The discovery of gold, diamonds and abundant other minerals have also attracted fortune seekers and entrepreneurs during the last two centuries, creating complex human settlements, subsequently formalized into vast metropolitan conglomerates.

A recent economic rapid development has finally attracted large numbers of entrepreneurs, professionals and family groups from all over the world, in particular from Europe, and the Middle/Far East. The result is a totally multi-cultural, multi-lingual and multi-‘colored’ society, unique world-wide and extremely difficult to describe, coordinate and manage: in such complexity, the multi-faceted, multi-dimensioned issues and problems of people with disabilities become almost un-surmountable: only dedicated multi-cultural teams of experts (working closely with people with disabilities) can relate to the issues at stake and provide appropriate solutions, indicating the way forward for software/hardware developers and offering viable alternatives.

## 2.2 How can ‘Universal Design’ and HCI principles be adapted and implemented in a developmental context? What are the challenges?

*Universal Design* or *Design for All’s* goal is to address the current problem of exclusion of people with disabilities from using systems, application and devices by designing products, communication technologies and an integrated ‘enabled’ environment towards effective usability by as many people as possible. In theory Universal Design seems like the perfect solution. However, in practice this is not so easy to achieve. Designing a system that is usable by people with various disabilities, various severities of a specific disability, various disability combinations and which also takes into account a developmental context, as explained above, is not a trivial task. In a developing country like South Africa, a part from ‘language and culture’ issues, a multitude of additional issues should be taken into consideration when designing an appropriate system or application. Such issues are as follows:

- **Literacy level of the users:** literacy levels in South Africa are extremely low in general; among the disabled community it is even lower, due to low access to normal schools, very scarce and expensive specialized training and inadequate facilities. Technical abilities are directly related to this. The impact on HCI is enormous in magnitude, challenging and requiring ‘lateral and innovative thinking’.

An example: the majority of Deaf people in South Africa are illiterate, with their first language being the specific South African Sign Language (SASL), different from what is found elsewhere in the world. Therefore any digital system or communication device should either use a much ‘simpler’ vocabulary or represent concepts through either a ‘signing’ avatar or a descriptive video-stream representing an interpreter signing the text in SASL. The Meraka Institute is currently developing such applications.

- **Income levels:** People with Disabilities don’t always have the economical means to use expensive assistive devices or assistive technology. In fact less than one-percent of them are economically independent in South Africa. Standard, MS based software is often too expensive to purchase, maintain and upgrade. Cheaper communication & data sharing alternatives should be developed, for example by using Open Source solutions. The Meraka Institute is very active in this context and has already developed innovative applications. Complex and simple systems have been adopted; optical guided screen readers, screen magnifiers and voice assisting software are currently under development.

- **Social aspects:** as explained above, South Africa has many different cultures and eleven official languages. Social interaction at all levels is therefore complex and at times extremely difficult. Because of that and in connection with an economic stratification of the SA society, poor services provision, limited infrastructure and inadequate public transport, very often the under-privileged and in particular People with Disabilities are marginalized and even excluded from society. In order to achieve full integration and participation in society towards economic upliftment, social aspects are very important in any HCI technology planning and should be addressed, in all its SA complexity, to ensure that any appropriate system is user friendly and compliant, that end-users and trainers understand benefits, meanings and usage and that the system or application is accepted by the community at large. Again the Meraka Institute is following such strategy both at individual and community levels, through various social techniques and interactions

### **2.3 Should 'total inclusion' be a priority? Is it a myth or a possibility?**

The South African experience has indicated that the concept of Universal Design in a developmental context is more a myth than a reality. In spite of apparent advantages in terms of manufacturing, storage and packaging, distribution, uniformity of training, simplicity in distribution, and economic considerations, the complexity of a developmental context, as explained above, make "design for all" at an universal level an impossible challenge. Total inclusion for all is therefore, at this stage, still a myth. But the way ahead is clear: the solution stays with the creation of basic central modules (hard/soft ware) and the creation also of add-on components able to be interchangeable and quickly adaptive to different circumstances due to a variety of factors, in a variety of places, in a variety of communities, at different socio economic levels. The complexity of such systems is enormous but this is the only sensible way. The Meraka Institute is addressing such complexity, through full interaction with all stakeholders (DPOs, Government, Industry and Academia), through a multidisciplinary and multi skilled team, by the innovative use of OS software and through international collaboration and working consortia. It will take time but the solutions will be, without doubt, appropriate in a developmental context.

### **2.4 What is the basis for appropriate R&D and implementation? Is affordability an issue?**

Appropriate R&D should be carried out in a sequential manner, incorporating international developments in terms of software, hardware, wireless, broadband etc. new trends, in terms of new findings re: HCI and usability for the disabled, and in terms of latest theories related to Design-for-all current international movements, discoveries and R&D consortia. In that respect site investigations, community interactions and stakeholders' involvement are of crucial importance. This should be the preferred basis for effective R&D. This should be done however hand-in-hand with stakeholders from developing nations: sometimes the best solutions are the cheapest and simplest one. The affordability issue should be therefore resolved

through interaction with those users for whom it is a priority both in terms of acceptability and satisfactory distribution to all, anywhere they might be.

**2.5 How should intervention strategies and ‘design-for-all’ principles be planned and effectively implemented in such multi-cultural complexity? Is a global methodology of intervention a possibility? What are the pre-conditions for success?**

The process of development and implementation should not be approached and resolved in a ‘top-down’, arrogant approach. The whole R&D process should be planned through/upon a comprehensive ‘consortium’ basis, involving chosen representatives of all stakeholders at all levels be it social, economic, political and cultural. Technical experts in terms of HCI, usability and design-for-all should be part of the coordinating and decision making team, entrusted with the task to guide the process of development, in order to fast-track the process, avoid wastage and lead to appropriate solution in a national and local context

If such procedure is followed, then the strategic scoping, technical content, future implementation strategy, deployment vision and R&D methodology of such initiatives may also be transferable and applicable within a wider African and Developing World global context: the lessons learned could be of great use and significance to all.

### **3 Lessons learned and the way ahead**

‘Nothing for us without us’: this is the call by South African people with disabilities. The Disability movement in South Africa is extremely active and has a multitude of offices and Organizations spread around the Country. The ‘catchment’ capacity of such Organizations is however limited due to a variety of factors such as, inter-alia, low economic power and resources, low level of infrastructure development, low levels of skills and training facilities and personnel and low levels of education and economic independence of people with disabilities. Additional issues can be added, like those explored above, such as a multitude of languages, vast cultural differences, complex economic stratification of society, rapid migration to metropolitan areas, low levels of service provisions, stigmas and taboo’s, traditions and beliefs and so on.

The task of creating sound HCI solutions for all in a developmental context is therefore a complex one which cannot be resolved in isolation, far away in a well equipped American or European ICT Company/Industry.

Solutions can only be explored and resolved in a partnership with locally based experts and local Organisations of repute. Only in this manner the needs of people with disabilities can be addressed for the benefit of all Developing Countries; this will however also bring economic incentives of interest to developed/western nations seeking new and potential market outlets.

An international collaborative network and a working consortium would, without doubt, bring enormous benefits for all at a global level.

The Meraka Institute of the CSIR is well positioned to support and add value to such initiatives.

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