

User-centred Design in a Developing Country and International Context

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1. INTRODUCTION – ABOUT ME

I hold a PhD in Computer Science (Human-computer Interaction) from the University of York (UK), a masters and a honours degree in Computer Science, and a bachelors degree in Computer Science and Industrial Psychology, all from the University of North West in South Africa. My master dissertation, completed in 1982 titled *The Psychology of Computer Programming with Special Reference to Systems and Applications Programmers*, combined my background in industrial psychology and computer science and was one of the very first master dissertations in the emerging field of human-computer interaction (HCI) in the world. For my doctoral research, with the thesis title *The Use of Formal Models in the Design of Interactive Authoring Support Environments*, I ventured into foreign territory, i.e. the more mathematical side of computer science. I also hold two postgraduate diplomas in Education.

The University of South Africa (Unisa), a international, primarily distance teaching institution, is one of the mega universities of the world – in 2006 our student numbers topped 260 000, of which more than 30 000 at some stage enrol in the School of Computing. I joined Unisa in 1980 as lecturer in the then Department of Computer Science and Information Systems, while still busy with my masters degree. Until recently I was Director of the School of Computing, formed after the merger of the Department of Computer Science and Information Systems from Unisa and the Information Technology Programme Group of the former Technikon SA. I am currently Professor in the School of Computing and Director of the Centre for Software Engineering, associated with the School of Computing. The Centre focuses on industry and applied research, and the offering of short courses to industry and students not interested in doing a degree, or not meeting the stringent admission requirements for doing so. I also head the HCI Group of the School of Computing.

I have been involved with HCI in some or other way for the past 27 years, first through my own studies and then through research and teaching. I offered the first fully-fledged HCI course at Unisa to postgraduate students in 1990. The field has grown tremendously at the University since then, with HCI courses offered from first year up to masters level, combined with a flourishing PhD programme. Although I still teach, my major workload is, however, on supervising master and PhD students and leading the Design4All Research project.

In a democracy as diverse as South Africa's, technology could be the great leveller in enabling citizens to overcome differences in language, age, culture, financial means and

ability. The Design4All project aims to promote inclusive computing device design that leaves nobody out and is accessible to everyone. The project focuses on inclusive design of interactive systems in the widest sense. This obviously includes computing devices used for desktop computing but also goes far beyond that to incorporate embedded devices such as cell phones, digital cameras, video recorders, interactive television, coffee machines, parking ticket machines, intelligent keyboards, voice recognition systems, entertainment systems and so on.

Designing for diversity means designing devices and systems for the widest possible audience. The project aims to develop systems that are accessible in general, but adaptive for an individual's special circumstances. It takes into account factors such as disabilities, cultural diversity, cognitive development, age, language barriers, social restrictions, ethical issues and business or financial constraints.

The Design4All Project incorporates a range of sub-projects involving a variety of academic staff, researchers and postgraduate students:

- Design for children: This project involves setting up guidelines for designing age-appropriate technology for young children, based on respected theories of cognitive, emotional and social development, as well as on new and existing empirical evidence. The project leaders are Prof Paula Kotzé and Mrs Heleen Gelderblom.
- Design for multi-contexts and mobility: This focuses on the interaction between humans and handheld mobile computing devices, specifically cell phones. It also considers the factors that influence users in selecting and using mobile devices. Project leaders: Prof Paula Kotzé and Mrs Judy van Biljon.
- Design for multi-languages: This project addresses the challenges posed by multilingualism. One part of the project links up with a joint School of Computing-Department of African Languages project that addresses the computational analysis of the morphology of minority languages such as Zulu, Xhosa and Tswana. A second part of the project looks at the challenges of translating electronic content into all 11 official languages. Project leaders: Prof Laurette Pretorius and Prof Paula Kotzé.
- Design for multi-cultures: This project looks at models of usability and context of user frameworks that could be used to develop interactive software for a diverse multi-cultural environment such as South Africa's. Project leaders: Prof Paula Kotzé and Prof Ruth de Villiers.

- Design for the disabled and the aged: The purpose of this research is to highlight the challenges that many people face in their everyday life and to determine the extent to which the aged and disabled people can interact independently with electronic equipment. Of special interest are the needs of people with limited or no use of their hands and arms, the blind and people with other visual impairments, the deaf and hard of hearing, people with speech impairments, and people with mental and intellectual disabilities. The project includes the National Accessibility Portal (NAP) and the Independent Living (IL) projects, in conjunction with the Meraka Institute of the CSIR. NAP is a research initiative supported by national government through the Office of the Status of the Disabled in the Presidency. Both the NAP and the IL project aim to develop information and communication technologies (ICT) to empower people to live independently and to prevent marginalisation from the mainstream economy and society. The initiative is aligned with NEPAD's strategies and the goals of the Africa Decade of Persons with Disabilities (1999 – 2009). Unisa is actively involved in testing the software, especially the usability aspects, as well as in researching the issues involved. Project leaders: Prof Paula Kotzé, Prof Mariki Eloff and Ms Marde Greef (Meraka)
- Fundamental Usability Research: This project involves researching various aspects of usability, from design to evaluation. The aim is to establish guidelines to inform interactive systems design in general, up to return of investment and business-IT alignment issues, and for specific application areas such as interactive educational software, e-commerce and enterprise information systems. Project leaders: Prof Paula Kotzé, Prof Ruth de Villiers and Mr Tobie van Dyk.

2. EXPERIENCE AND FINDINGS RELEVANT TO WORKSHOP

Within the Design4All project we have extensively researched many issues related to the workshop over a number of years, yielding some very valuable contributions, unveiling many surprises and many more problems in developing systems for a diverse user base (multi-cultural, international, multi-lingual, multi-context).

For example, we did extensive research on cultural dimensions and its use in the design of interactive systems. We first argued that culture influences communication, and as interactive systems are dependent on communication, that culture is important in the development of interfaces to interactive systems. We used Hofstede's model as basis although we also incorporated other models. The rationale behind this was that Hofstede's model is the de facto model used for cultural studies internationally, whether the correct choice or not, and that it was found that that cultural dimension models influences usability from the perspectives of reducing the cognitive load, user acceptance, objective usability and context of use [3]. Our experimental results

following this approach were inconclusive in two unrelated projects: one on designing for the web [1, 2] and one on designing for the mobile phone context [4]. We also identified major flaws in international experiments that claimed to have used successfully used Hofstede's dimension models and those claiming that objective cultural issues have been resolved (which we found not to be the case). The mobile phone project revealed that certain of the Hofstede's cultural dimensions do affect mobile phone usage (i.e., uncertainty avoidance and individualism / collectivism), but that there are also other cultural dimensions that are very prominent, e.g. independence to explore and solve problems, efforts to maximise time and technology, and independence from assistance. This study highlighted the fact that there is a 'usage of technology culture' that may be different from 'personal culture', and which may override 'personal culture' – mobile phone usage did not conform to the cultural context of the user.

In order to counteract the problems with using cultural dimension as a 'way of classifying users' to inform design, we also investigated other issues that may influence the use of interactive systems. In this context, the mobile phone project revealed a link between motivational needs (as in the industrial psychology context) and usage variety.

Based on the results of our research we propose a more holistic approach to the development of interactive systems for a diverse (including international) community of users. We propose using usage spaces, which allows for a variety of contexts of use influenced by mediating factors (personal, demographic, socio-economic and social influence), in the design of interactive systems – focusing on cultural issues alone is not the answer [4]. We also propose a conceptual model of usability that can be used when studying usability in the context of diverse communities [2].

3. REFERENCES

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