Cross-Cultural Participatory Design in the Developing World

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Abstract
The paper describes how the VESEL project which involves a distributed team of technologists and users from different cultural backgrounds is attempting to manage the process of user involvement and participation. In this case the developers are distributed but linked by a number of communication technologies while the users have very few technological means of communicating with the developers.

Keywords
Participatory methods, cross-cultural design, global user interface design, digital divide

ACM Classification Keywords
H.5.2 User Interfaces, J.4 Social and behavioral sciences, K.3.1 Computer Uses in Education

Introduction
One of the Millennium Development Goals established by the United Nations in 2000 states “Make available the benefits of new technologies – especially information and communications technologies (ICT)”. Technology is considered among the greatest enablers for improved quality of life but its deployment in the developing world has sometimes been ineffective, thus suggesting that there is a need for increased
technology research in developing regions. In particular, as a result of their disadvantaged socioeconomic position, rural African communities experience disadvantaged digital information access both in terms of the ICT itself and the skills required for the effective use of this technology, e.g. literacy and computer skills. Thus was born the VESEL project. The objective of the VESEL project is to explore the use of ICT by bringing it to groups of rural farmers in order to promote e-Science and provide local communities with access to information to improve the profitability of their farm products and quality of life. The project started in September 2006 to establish the feasibility of collaborating with groups in Kenya. Since then, there have been an additional three field visits using contextual enquiry to elicit the villages’ requirements. The information obtained is currently being utilised to develop the first prototypes.

This paper describes the current experiences and approaches of VESEL in implementing participatory design. The VESEL project involves the identification of novel ways of deploying existing ICT that are genuinely beneficial to the users. In addition, the project requires the development of new and/or the adaptation of existing HCI methods. The overarching aim of VESEL is to enable rural communities in Sub-Saharan Africa to use advanced digital technology to improve their agricultural practices and literacy levels. Collaboration between various institutions will enable the project to define the most urgent information requirements for a rural farming community and to design the appropriate technologies to meet these needs. This may mean providing sensors to give information about soil quality, cameras to take pictures of crops or the internet for up-to-date weather information and communication with other villages and the world beyond. A team of UK experts in telecommunications, renewable energy sources, sensor technology, education and user interface design drawn from five UK universities are working work with local experts at University of Nairobi, NGOs, agricultural information providers and teacher trainers.

The Challenges
The essence of the problem is that if there is not a good fit between the users’ needs and aspirations the ICT products developed will not be adopted. This project involves the identification of novel ways of deploying existing ICT in ways that are actually useful to the users. It is essential not to impose precipitously Western solutions to an African situation where the context is not clear. The team wished to involve users in all stages of the lifecycle not just in summative evaluations and it was anticipated that iterative and agile prototyping methods would be used. However when the viability of the potential user groups were considered it was recognized that participative methods require

- recognition of and understanding across cultural divides involving different rituals and values.
- Agile methods presuppose direct access to end-users.

In this project we need approaches applied appropriately in order to deliver a system which will bridge the digital divide, predominantly developed by technologists from a Western culture, for users from an African culture with little previous experience of ICT[3]. Otherwise there is a danger of producing a technologically effective system which the users will not make sense of and which will fail to embed in their
social context [2]. Local people will have their own concepts of knowledge and their own forms of information communication so that it is essential that they should be able to shape their use of ICT without the risk of losing their culture and identity.

The work conducted through these activities will also engage user groups in working with the research team to envision the potential solutions that ICT can offer them and in so doing help shape our understanding of future research challenges. Following an initial study in Kenya, two local communities in Kenya were identified for parallel development of ICT systems for the first phase of the project. One site, located near Nyeri in Central Kenya, will focus on the information needs of farmers to plant, nurture and bring to market the most appropriate crops for local and EU markets by making effective use of irrigation and pest control measures. The second site in the Kamba area in the south of Kenya has drought problems that need support with crop selection and irrigation management. Although initial phases will focus on the infrastructural issues, adaptation of cultural practices will be addressed as well because the project team concluded that this ICT project would only stand a chance of success if it was embedded in the needs and experience of the local community. Later phases will focus more on the issues of education and how to use efficiently the information exchange to improve the quality of life.

**Methods and Tools**

Participative design is a key aspect to ensure active user involvement but this means adopting an iterative development process linked to evaluation and evolving user requirements. Therefore one of the first approaches we have utilized is the adoption of an approach based on Technological Frames (TF) that will allow the VESEL team to anticipate and control problems that are likely to arise in the development of ICT system by aiming to design technology in line with the TF of user communities [1]. This involves an analysis that makes explicit and contrasts the TFs of the developer group with those of the users, for example

**Elements of Interpretation:** history of village, perception of socio-political boundaries, established expectations of tools and technology, perception of foreigners.

**Elements of practice:** interaction protocols for knowledge transfer among villagers and external organisations, tool mediation.

The TF elicited from these data are not static and change over the development lifecycle. This is done by an iterative cycle of production and evaluation of sociotechnical scenarios by the producers and, ideally, users of the technology (see [4]).

**Socio-technical evaluation**

Many participatory design practitioners believe that in designing new systems both the social impact and the technological aspects should be addressed together. Hence the notion of socio-technical approach/design. The final system is greatly dependent upon the level and structure of participation and its processes. These considerations explain Hansen’s advocacy for socio-technical experiments to take into account all aspects of future systems during the design process.
**User Involvement**

We are concerned to adopt usability evaluations that would have potential to be situated both in the design context and the user’s work. The need to study the context of work is evident in the popularity of ethnographic approaches to requirements gathering [6] and therefore two researchers carried out field work with the two communities in May 2007 in order to gain an in-depth understanding of the farmers work routines, problems and cultural context. In order to understand ethnographic characters of these local farming communities close interactions were established, observing their daily activities over a period of about a week on each site. The data collected during this field trip has since been compiled and global scenarios developed for each site. Use Cases have also been developed which were delivered to the technical team in VESEL to inform their design of technology. The developed prototypes will then be tested on real users and evaluated using HCI evaluation methods.

The user evaluation method we have decided to apply is based on DUCE (Developer User Contextual Evaluation) [5], an approach based on situated action techniques for the early identification of user interface issues and their translation into design factors that can lead to design improvements. The method involves linking DUCE sessions where developers observe user’s responses to an interactive prototype with sessions where a group of designers work together to derive design decisions with the evidence collected from the users. Although grounded in a user-centred approach, the users and developers have distinct roles and separate contributions that they can make to the design process. It is the user who experiences the system, interacts directly with the design factors that determine usability and benefits from the usability characteristics of the system. Users however are not experts in HCI and are not able to analyse or articulate directly their requirements for the interface. In the case of VeSeL, some of the users’ only knowledge of the Internet is from seeing Western movies in the nearby town. The users generally do not have electricity available in their own homes. It is therefore the responsibility of the developer who has the technical experience to provide access to power sources in a way that is socially acceptable to the community.

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**Example citations**


