Evaluating Naïve Users' Experiences Of Novel ICT Products

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Abstract
In this paper we discuss an approach to user evaluation for novel ICT products developed for a rural sub-Saharan context. We report on an evaluation study of the DUCE method using UK based and Kenyan based users.

Keywords
Usability methods, international usability evaluation, global user interface design, digital divide, DUCE

ACM Classification Keywords
H5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous. See [3] for help using the ACM Classification system.

Introduction
Evaluating user experiences of using innovative mobile devices and products with a high level of functionality is challenging. The globalization of information and communication technologies (ICT) and the development of their pervasive, ubiquitous, multimodal and adaptive character mean that the users' experience of such systems is richer and more immersive in ways that are difficult to capture using traditional usability methods.

The established approach to computer-based products has been based on ergonomics. However ergonomic methods tend to involve controlled experiments and metrics that do not capture the real world experience of users and may give misleading information about the likely adoption of the products. Therefore alternative approaches based on ethnographic methods have been used. At the same time that there are these challenging issues for evaluation the technology itself is changing rapidly so that devices are becoming overloaded with functionality that users find difficult to learn, recall and practice. Another challenge is that the products may be so innovative in concept that it is difficult to elicit users' needs using traditional methods because the users are required to envisage their future use of a product of which they have no experience.

These multiple challenges have faced the authors in a current research project where they are responsible for the user experience design. VeSeL (Village e-Science for Life), which began in September 2006, is a three-year project and is part of the Bridging the Global Digital Divide Network funded by the UK's Engineering and Physical Sciences Research Council. The VeSeL project's objectives, which are focused on Kenyan rural farming communities, address both educational and technological issues and, subsequently, designing and testing appropriate technologies to meet these needs. In terms of technology, VeSeL intends to identify and develop the most appropriate technologies including: novel technologies for collecting, analyzing, archiving and visualizing information to support farmers to develop improved agricultural practices; innovative communication access facilities for sharing between isolated and dispersed rural communities; and radically different user interfaces for illiterate or semi-literate user groups. The collected and stored agricultural and economic knowledge will be disseminated with interfaces to existing local communication channels and experimental channels through the VeSeL distributed resource kit (DRK).

Usability Issues

The essence of the problem is that if there is not a good fit between the users' needs and aspirations the DRK will not be adopted. We recognize that research suggests that only between 30% and 40% of ICT systems produced are ever successfully implemented and used for the purpose for which they were designed. Research into cross-cultural user interface design has established the existence of a cultural effect in the development and use of ICT which goes beyond language differences. At present the origins and consequences of this cultural effect remain controversial. However there are two key bodies of research: one which emphasises and extends usability principles to other cultures (Del Galdo, 1996) and another which emphasises the different context of developers and users (Suchmann, L. ,1995, Honold, 2000, Abdelnour-Nocera et al., 2003,). In this project we need both 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. 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 (Bijker, 1995, Woolgar, 1991). 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.

VeSeL Evaluations

We are concerned to adopt for VeSeL evaluations an approach which 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 (Suchmann, 1995) and therefore two researchers carried out field work in Kenya with the two communities in May 2007 in order to gain an in-depth understanding of the farmers work routines, problems and cultural context.

Methods and Tools

The user evaluation method we have decided to apply is based on DUCE (Developer User Contextual Evaluation). The proposed approach is 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. This approach can be used within parallel prototyping or iterative development. These techniques provide a rich source of user evidence that can be brought to bear on the enhancement of prototype user interfaces. 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 near by 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 and expertise to suggest potential interface design factors and alternative solutions. Our overall approach therefore takes into account the need for an effective balance between user and developer skills.

Usability Evaluations

Although an ethnographic approach is suitable for situations where a system already exists, in the development of high-fidelity prototypes created early in development there would not be the functionality or robustness for use in a real-world context for sufficient time for ethnographic methods to be applied. We therefore are seeking an approach to two problems. Firstly, an evaluation technique that would combine methods that would be situated and that would be feasible for early interactive prototypes and redesign of existing interfaces. Secondly a technique that would facilitate the identification of specific design improvements from the usability data collected. Two distinct activities for the identification of usability problems linked to design factors are being used:

- *developer - user contextual evaluation(DUCE) sessions* - in which, by interacting with an exploratory prototype and verbalising their experience, users are given the opportunity to provide evidence relating to the overall usability of the system with the designers taking a subordinate role.
- *team evidence analysis (TEA) session* - in which the evidence captured in the *DUCE sessions* is refined by a

team of developers into a number of design factors and possible solutions.
The philosophy behind user questioning within DUCE is not unique. For example questioning is also a feature of Co-operative Evaluation (Wright & Monk, 1991), however the questioning style we have developed is more exploratory and less inquisitorial, for example questions in the style of 'why did you do that' are excluded because we felt this would make the designer too dominant in the conversation.

One of the issues that concerned us was that the DUCE questions were developed and tested in a Western cultural context and we were uncertain whether the same style of questions would be effective with African users. Mutula (2005) states that the special situation in sub-Saharan Africa in terms of high levels of poverty, prevalence of HIV/AIDs, repressive regimes and diversity of cultural and linguistic factors requires the development of new models to address the digital divide. In addition Vatrapu and Perez-Quifiones (2006) have reported that the richness of data obtained from evaluations using structured interviews was influenced by the cultural match of evaluators and users. We have therefore investigated using the DUCE method with users from the UK and Kenya for one of the early products of the VeSeL project.

Method

The early prototype from VeSeL that was evaluated was a simple blog site which was created to raise awareness of one of the community based organisation in Kenya that the VeSeL researchers visited in May. The blog contains basic information about the organisation, their mission, vision and simple means of communicating with them.

The main objective of evaluating this blog site was to validate its main functions which include finding specific information, sending an email and publishing/posting a comment.

The evaluation was carried out on two sets of users, Kenyan based users and UK based users, who carried out 7 tasks based on the blog site. The users were matched by age, gender and levels of education background. They were not paid and were not informed about the experimental design and hypothesis. The evaluator treated the evaluation sessions as a regular usability evaluation and usability guidelines were adhered to. Each session was audio recorded. The evaluator was the same for both sets of users. The evaluator's laptop was used during all sessions.

The hypothesis was that there would be no difference in the type of response obtained from both sets of users.

Procedure

Before the start of each session, information regarding age, education background and a self-rating of computer use was obtained from each user. The user was then given one task at a time and asked to carry it out. During task execution, the evaluator asked questions using the DUCE format. The audio recorded scripts were then transcribed per user and later analysed.

UK based/English users

Elicitation of information from UK users was relatively easy and the feedback obtained was more, volume-wise.

Kenya-based users

Elicitation of information from this set of users was more challenging:

(i)The users perceived the evaluation exercise as a test on them and for every task that was incomplete; they perceived it as personal failure.

(ii) Previous experience with ICT genre had a significant effect. Users that had not interacted much with ICT found that the tasks were not as straightforward as those that had interacted with ICT more before.

(iii) Part of the DUCE method is a set of questions that seem similar but are nevertheless different. However, the users responded to these set of questions with constant irritation as it seemed as if one question was being asked 7 different times. This section of the evaluation was eventually not carried out because the users resulted in being frustrated and angry before the exercise was over.

Discussion

Initial indications from this experiment show that the DUCE method which was prepared within the Western cultural context may not necessarily be suited within another culture, in this case the African culture. There may need to be adjustments to the DUCE method so that the feedback to be obtained is as expected.

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