Learning-Oriented Participatory Approach in Design of Projects for Technology-Enabled Maternal and Child Health Care

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Abstract

This paper presents the series of activities undertaken to design context sensitive IT enabled health care information services and solutions that would address the challenges of maternal and child health care in resource limited settings. Attempts are made to summarize the work done in respect of designing a collaborative action oriented research approach that would address the real needs of the rural community specifically mothers and children. Based on findings from discussions and consultation with various stakeholders, it presents the planned activities to be undertaken in the design and development of appropriate content and software solutions as well as in fostering collaborative learning and research works.

Author Keywords

Maternal and child health; Participatory design, mobile health; Collaborative learning, Usability studies;ICT4D.

ACM Classification Keywords

H.5.2 User Interfaces (prototyping; user centered design): H.3.5 Online Information Services (web based services): K.6.3 Software Management (Software Process). [3]

Introduction

The basis for this research project is to contribute to the health care sector in Ethiopia by using information and communication technology (ICT) platforms. It particularly focuses on design and development of ICT enabled access to health information. By using Ethiopia as proxy, the results of the research are expected to lay the ground to extend the reach of healthcare to rural communities in other developing countries.

The motivation for initiating the current study are (i) previous mHealth project experiences with the Clinton Health Access Initiative (CHAI) to increase access to and uptake of skilled delivery in primary health care units in Ethiopia via improved tracking and referral [1] and (ii) the pilot study by World Bank and Addis Ababa University on the impact of using mobile phones on the health outcomes of mothers and children in rural areas [2]. Reflections on these projects and other related ones indicated: significant duplication of efforts; lessons learned in one project (what works, what does not work, what factors contribute more to the success or failure, etc.) are not formally discussed, documented and shared; most of the applications are developed using a language which is not adequately understandable by the targeted user population (rural community); there is inadequate awareness of the health extension workers on usefulness of the application or the benefits that it may bring in the long run. What is more, most of the projects are short term (pilot projects) and they cover a limited geography.

It is also noted that the technology tools that were applied were not designed in relation to the challenges of the everyday lives of the rural community. As such, situations under which they operate were not strategically studied.

Among the recommendations made by workers in the area to tackle the aforementioned challenges is a change of strategy in requirement design and implementation of technology. In particular, the use of reflective and participatory design methodology and collaborative action research are considered appropriate in providing a holistic answer to the challenges of health care information delivery and management.

This paper, therefore, presents the series of activities undertaken to design context sensitive IT enabled health care information services and solutions that would address the challenges and allow for better usage of technology platforms and gadgets. In particular, attempts are made to summarize the work done in respect of designing a collaborative action oriented research approach that will address appropriate technology integration, content and user interface issues.

Research questions
The research questions addressed in this study were

- How should health care information be designed to better address the real needs of the rural community, specifically mothers and children?

- What emerging methodologies and technologies can one use in order to design

and develop appropriate content and software solutions?

- How can the challenges of heterogeneous ICT solutions be addressed in resource limited settings with illiteracy and many languages?

Methodology

Qualitative research methodology was adopted in addressing the research questions.

In order to uncover information regarding the challenges of implementing ICT solutions as well as to ascertain the level and focus of technology use, interviews and discussion were made with selected health practitioners and other relevant individuals. Experiences of researchers involved in ICT for Development were also reviewed. Moreover, informal discussions with professionals in the field of software engineering as well as consultation with colleagues from various countries (Germany, Denmark, Austria, UK and South Africa) were very important in coming up with the proposed design activities. A review of relevant literature regarding similar or comparable research topics in other allied projects was also considered essential and thus conducted.

Proposed Research Works

Reflections on the design so far reveals that development of contextualized participatory methods requires identification of the cultural and social dimensions that influence technology solutions design in maternal and child health care environment. This will help to develop contextualized participatory design methods [3]. As a collaborative action research project, the first activity of the project primarily focuses on co-designing, adaptation, demonstration and validation of innovative IT solutions with those people whose life would change as a result. Participatory design principles should be adopted so as to engage productively with the characteristics, needs and aspirations of the community rather than imposing one's own design and preferences.

The proposed project activity also relates to the technology components to be designed and implemented, namely: the mothers system, the health extension workers system and the professionals system. The mothers system aims to make maternal and child care information accessible to mothers. The Health extension workers system will be designed in view of utilizing the cultural links to positively deliver good health environment and have more informed health extension workers. The professionals system addresses the information and education needs of professional health workers in the health centers and hospitals serving the rural community. Accordingly, three major technology platforms are planned to be used to fulfill the purpose of the project:- mobile phones, satellite tablets and web based systems.

Furthermore, a community based intervention study will be important to assess the impact of the proposed solutions and to measure levels of accessibility and use.

Recommendations on the Way Forward

Based on the reflections and extensive discussions, the project envisages different activities/ tasks that would be addressed in collaboration with other stakeholders.

Accordingly, there are four aspects to be considered in design of the system namely: (i) Personalized

maternal and child health care; (ii) Educational materials support; (iii) Knowledge sharing amongst health professionals (iv) Emergency services support. Underlying these aspects are major activities of requirement determination through participatory methodologies; Contextualization and personalization of health care content specifically designed to meet the needs of the rural communities as well as application of appropriate software engineering methodologies and tools to custom design and develop software for efficient storage, retrieval and management of multimedia and multi language health care information.

Requirements are to be captured by way of working with target users to develop user stories, scenarios, mock-ups, prototypes and related artifacts. Based on the requirements identified, a participatory, iterative and incremental approach will be used to design and develop appropriate user interfaces (i.e., to ensure learnability, effectiveness, accessibility and satisfiability of the software to be designed and developed). It is assumed also that the participatory approach will help to further understand the mutual interdependence between culture and technology as well as the impact of socio-cultural settings on technology use.

Various software and other technology tools are planned to be developed at the different levels of the system for application in the platforms we use. (Desktop/laptop, tablets, smart phones, low cost mobile phones). The project also explores possible use of open source application and content management system software; makes use of other software already developed as part of community health activities and develops software to meet new requirements.

In order to assess the impact of the research project, a community based intervention study will be carried out. The study will be conducted in three selected districts within 100-200 KMs. from the capital city. After conducting a base line survey, randomly selected mothers in two districts will be provided with satellite tablets and mobile phones with appropriate training and use to access information on various topics for nine consecutive months. The Health Extension Workers and Health Development Armies (HDAs) or Voluntary Community Health Workers (VCHW) in these two districts will also be provided with satellite tablets as well as applications to use on their mobile phones to access information and learning packages in various formats including video, audio, text and images/pictures. Arrangements will be made for Health professionals working in these districts to use web-based systems to share their knowledge and best practices. They will also be provided with knowledge exchange platforms that support consultation and referral services at expert and professional level. The third selected district will serve as control with no technology intervention. At the end of the nine months, an end line survey will be conducted to examine the effect of the intervention.

Recommendations on Fostering Collaborative Learning

There are many existing HCI4D projects currently sharing similar context and objectives with the proposed project [4,5]. As such, we propose that the best way forward will involve active engagement with other researchers in order to leverage prior learnings and existing artifacts. At present, we have established conversation between our institutions in Cape Town and Addis Ababa, with hopes of sharing students and using

software developed for the Bophelo Haeso [6] and ASHA Assist [5] projects. We hope that through this consortium, all HCI4D researchers working on systems to support maternal and child health care and education will have opportunities to collaborate.

In summary, making this project successful will require the support of active collaboration and communications from those who have experiences in similar research projects. Collaborating across borders and international linkages will enable better exposure, experience sharing and most of all to share lessons learnt so as to avoid re-inventing the wheel. We hope that by establishing and expanding collaborative relationships we will increase our level of interaction with specialists in software engineering, user interface design, participatory methodologies as well as satellite technologies, and ultimately be more successful at our goals of improving mother and child health in Ethiopia.

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