A Mobile Phone Approach in Delivering Healthcare Information to the Marginalized Areas

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Abstract- The right to an efficient and effective healthcare service for every citizen in most countries worldwide is becoming a reality. Technological advancement has greatly influenced this in a positive way. Indeed, it is becoming a reality because of the improved access to information and easy of communication brought by the ICTs. ICTs can play an important part in the achievement of the Millennium Development Goals (MDGs) like the eradication of the problems such as poverty, combating serious diseases like AIDS and improving education and health facilities. This paper describes the development and deployment of a mobile application that will provide the Dwesa community with a portal that will enable them to browse healthcare information from the Internet and also from the Department of Health. Such technological advancements allow continuous flow of healthcare information, in and out of the marginalized communities in both developed and developing countries.

***Index Terms*— Digital divide, Healthcare Information, Millennium Development Goals, Mobile applications**

I. INTRODUCTION

The use of mobile phones and the Internet has now become a common entity to many people worldwide [1, 2]. As a result, this has greatly helped in the bringing of information to the people in marginalized areas and bridging the digital gap [3]. Mobile technology-based ICT services are also becoming prevalent as well. With this as a major advantage, it is indisputably appropriate to consider developing paradigm-shift application infrastructure to overcome problematic issues in present healthcare systems for Dwesa community. This project will be undertaken as part of the Siyakhula Living Lab Project. The project in Dwesa is a joint venture between Rhodes University and the University Of Fort Hare. These two Universities represent a strategic alliance in the execution of an ICT4D project, with one university being closely aligned to the context of implementation and the other providing an increased resourcefulness and technical capability [4].

The paper is structured according to the following layout. Section II discusses the problem scenario in brief. Thereafter Section III is included with the proposed solution model with descriptive PIM (Platform Independent Model) and Section IV, is the PSM (Platform Specific Model) level diagrams for the system Design and Development. Section V, the future works shows the next stages of possible development of the system to enhance its value. Finally, the conclusion along with the acknowledgements is included and the references will compile this paper.

II. PROBLEM DOMAIN

Dwesa area is a rural community located on the Wild Coast of the former homeland of Transkei and it has a hilly terrain. It is isolated from the global telecommunication service with poor cellular coverage and inaccessibility. In terms of infrastructure the area is still underdeveloped [4]. The road leading to the main town, Willovale is a rough earth road. Villagers travel long distances to acquire services and get particular healthcare information from a general hospital. Again, these services are still not using mobile infrastructure which can solve most of the bottlenecks on healthcare information dissemination. As a result, the community members suffer a lot because of the lack of appropriate and efficient applications to offer latest healthcare information [4]. There is a need to develop and deploy a mobile application to curb this problem.

III. SYSTEM ARCHITECTURE

Since the Internet usage and service penetration is low in the rural areas whereas there are significant mobile phone users, an application is being developed to overcome the above problems [2, 5]. The system is being designed so that it will deliver healthcare news and information sharing facility. Future extensions of the system such as mobile based prescription and drug administration have been taken into account as well. The system is being built using the Client-Server Architecture model. The architecture allows deciding thin-to-fat client scenarios which is highly dependent on end user parametric conditions [5, 6]. The system is being built to support and utilize GPRS and 3G capabilities of mobiles phones which are common in the area. Figure 2 below shows the high level architectural view of the system.

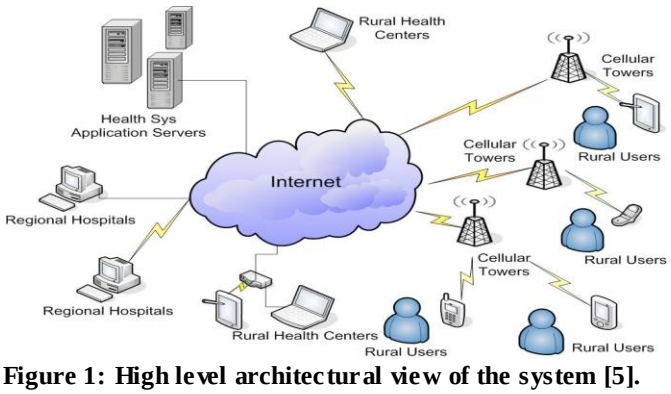

Figure 1: High level architectural view of the system [5].

Due to the limitations of resources at the client end, we decided to develop a simple and concise web interface with necessary functionalities. Since the system is mainly for rural users the following Use Case diagram according to UML 2.0 briefly shows this in Figure 2 below.

Figure 2: A system use case diagram

IV. SYSTEM DEVELOPMENT

The application is still under development and various technologies are being used to offer a more technically flexible system. We programmed the server side using PHP 5.2.8 and MySQL 5.5 as the database. From the PHP script, we used NuSOAP library to deploy the web services. To provide different resolution rendering for the client side web browsing, we developed WAP and WML supported PHP pages [7]. Figure 3 below shows server side architectural block diagram.

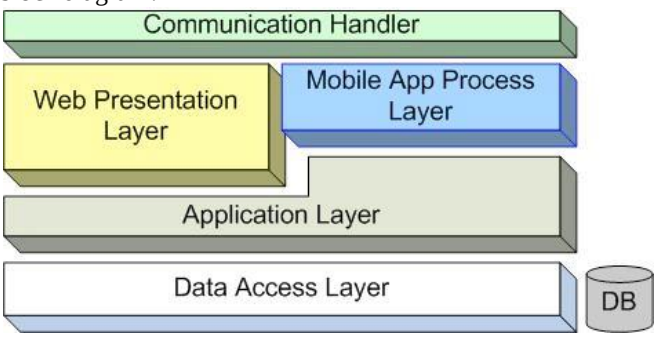

Figure 3: Server side component diagram [7].

For the client side application which is still under development, we are using Netbeans 6.5.1 with CLDC 1.1 Device Configuration and MIDP 2.1 Device Profile. This is based on J2ME environment with MIDlet programming. The emulator platform used Sun JAVA TM Wireless Toolkit for CLDC. The Figure 4 below shows the MIDlet client side state flow diagram.

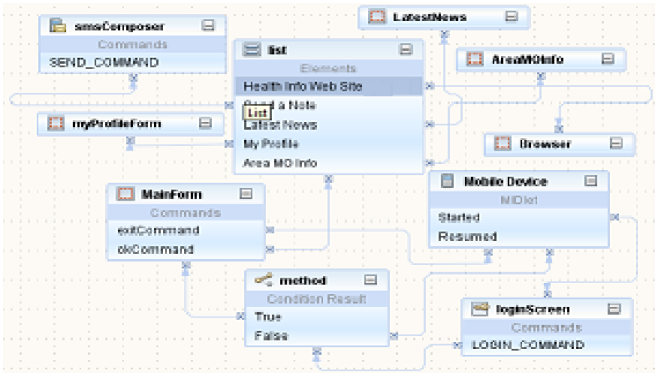

Figure 4: Client side MIDlet state flow diagram

We have developed a few application instances that show exactly how the finally system is going to look like. The architecture is a single sign on and different administrators with different privileges will be responsible in uploading and modifying the healthcare information. If the mobile phone is GPRS enabled then, a user can connect to this portal and access healthcare information and news. Figure 5 shows the developed system instances and the functions that a user could perform.

Figure 5: Running instances of the program

V. CONCLUSION AND FUTURE WORK

Limited access to healthcare information in rural areas has been problematic in the past. Various techniques and applications are being developed and deployed to curb this major problem [8]. The success of this project will open ways for major investments using mobile based ICTs in the marginalized regions, with most of the projects initiated involving the Dwesa community members [2]. Consequently, this project will lead a paradigm shift for healthcare services in rural areas of South Africa that would utilize modern mobile technology [9, 10].

For future purposes, the application can be localized to isiXhosa and also modified to incorporate various facilities such as medical prescribing, diagnosis, or any drug treatment methods facilitation. Though it seems a bit challenging, it can be an important start for the future of Dwesa community healthcare improvement.

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