

Development of Sustainable Mobile Service Contents for a Wireless village.

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Abstract—The use of Mobile technology in developing rural environments so far has been mostly for call transactions and Short Message System (SMS) services. As Information and Communication Technology (ICT) innovations penetrate deeper into these marginalised regions, the various ICT strategies employed to improve the socio-economic well being of the community are merely not based on specific user communication habits and information requirements. This system of deployment tends to impose ICT services not always relevant to users in a specific region. This paper presents the initial stage of development of mobile contents for a rural marginalised region as determined by user requirements and their information needs.

Keywords – ICT innovation, Sustainable, SMS, Wireless village, Rural mobile services, GSM, Dwesa Living Lab (DLL).

I. Introduction

The user-behaviours related to electronic transactions have not been subject to intense research in the rural marginalised regions. This has led to so many ICT innovations not being entirely adopted by the whole community, regardless of the fact that these innovations are meant to enbetter their livelihoods. The profit hindering conditions in these rural environments also contribute to the slow pace of sustainable deployment of ICT facility in these regions, and these include intermittent power, intermittent connectivity, limited education and illiteracy [2].

As mobile phone technology continues to invade the wireless network, it offers potential solutions to all knowledge and information exchange problems faced in rural regions. Mobile phones have the advantage of being portable and cheap and any application to be deployed uses the already up and running networks from the Mobile phone service providers. With mobile phones one can still remain connected within wide remote areas, providing real-time voice communication and asynchronous messaging-based services.

II. Aim of the project

The purpose of this work is to implement user-based rural mobile services related to the community's information needs, challenges and communication habits to enhance the

economic and social development in these areas. This project is an extension of the existing system and aims at interfacing the Global System for Mobile Communication (GSM) component to the active systems in the Dwesa Living Lab (DLL) and other systems accessible via the internet.

III. Related Work

Various ICT innovation techniques have been designed in many emerging countries. SMS banking, virtual money transfer systems using airtime and the various microfinance systems are an example of systems deployed in various regions so far as traditional banking and financial institutions failed to reach out to, and address the information needs of the marginalised regions[3][9][10][11].

In Kenya, for example, the Centre for Training and Integrated Research for ASAL Development (CETRAD) uses SMS to work with the local communities' to promote protection and sustainable use of environmental resources [3]. Women of Uganda Network (WOUGNET) is a non governmental organization that uses the SMS function to share information and carry out SMS campaigns pertaining to different issues that affect them , for example gender violence and HIV/ AIDS [3]. In Zambia, Celpay deployed a mobile phone payment system that facilitates cash transfer via phone without need for a bank account [9]. In Philippines, Text-A-Withdrawal is a mobile phone banking service that uses GCash, a mobile money platform in Philippines, to turn mobile phones into virtual wallets. In this way users can buy or cash-in GCash credits, converting cash to GCash [10] [11].The applications developed cover a wide spectrum, including loan applications by farmers in rural environments, mobile banking and mobile phone camera (CAM) applications for capturing barcodes [2]. General problems faced in these marginalised regions are high unemployment levels, geographical isolation, market, hygiene, government services, projects and politics that exclude them from their human and legal rights. However, less has been documented as regard to the effectiveness and sustainability of the above ICT services to suit rural needs for information and knowledge exchange.

On the technology side, there are at least four main platforms available to mobile developers today - Sun Microsystems'

wireless Java technology, Microsoft's .NET, Qualcomm's BREW (Binary Runtime Environment for Wireless), and the Open Mobile Alliance's WAP (Wireless Application Protocol) Java is the only technology that has the inherent capability to run on any platform, on almost any device [1] [7] [8]. It is independent of the type of network the carrier is on, making it ideal for the development of the mobile applications of interest in this project.

IV. Conceptual Design

Dwesa, a completely rural region in the Eastern Cape, already has ICT technology implemented in designated places, namely e-government and e-commerce, using a satellite backhaul and a WiMAX local loop backbone.

DLL project is a new phase of ICT innovation being introduced in Dwesa that uses the concept of Wireless Village. In a Wireless Village, a local entrepreneur works with a regional operator and a microfinance entity to acquire a network access point which supports up to 70 Nokia handsets. The local entrepreneur then acquires subscribers and offers them, with help from the regional operator, mobile solutions to meet the needs of customers [12]. The proposed approach for this work is to first use a Baseline questionnaire to identify the information habits and needs of the Dwesa community, and then bring ICT-based solutions to their problems in collaboration with the various project stakeholders.

Figure 1 presents a general mobile architecture system. The supported applications can be linked to an online store, an e-mail server, e-government service portal, a bank or any microfinance company of interest to the GSM client. It provides a subscription based service that requires user authentication for data integrity. If the server decides to subscribe the user, the user information is placed in the database, which must also be protected from outside scrutiny [5]. Verification of user information occurs in the database.

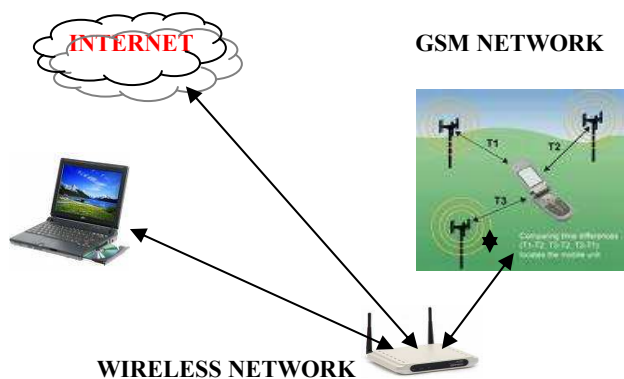


Fig 1: Structure of the mobile application

Mobile Information Device Profile, MIDP 2.0, combined with Connected Limited Device Configuration (CLDC), is the Java runtime environment for compact mobile information devices. Its integration with Java technology ensures secure encryption of communication between the client and any network.

V. Conclusion and Future Work

Mobile contents to be developed are to be user driven, specifically suited for the rural environment used as a case study. The questionnaire has been designed and initial stages of data collection are underway to get the initial data required from the Dwesa community. This is used as a tool to enable the community to identify themselves with ICT innovations that are meant to lessen the burdens they face every day. From the analysis of this data, the rural mobile services of interest can be determined and developed.

References

- [1] **Java Technology**
<http://developers.sun.com/mobility/developers/business/articles/kingpin/> [Last accessed 29 May 2008]
- [2] **Tapan S. Parikh and Edward D.Lazowska (2006).** Designing an Architecture for Delivering Mobile Information Services to the Rural Developing World
- [3] **Anil Gajwani, Telecom Asia (Dec 2006)**
http://findarticles.com/p/articles/mi_m0FGI/is_12_17/ai_n19052881 [Last accessed 29 May 2008]
- [4] **BNET Business Network** <http://www.elearning-africa.com/newsportal/english/news70.php> [Last accessed 29 May 2008]
- [5] **Sun Microsystems**
<http://developers.sun.com/mobility/midp/articles/security1/> [Last accessed 29 May 2008]
- [6] **Piroumian Varn:** Wireless J2ME Platform Programming: Published in May 2002. Available online:
<http://www.lavoisier.fr/notice/gbATOKR6KCLKOU2RO.html>
- [7] **A. Russell Jones:** Unpalatable Choices on Both Sides. Available online:
http://archive.devx.com/free/hotlinks/2001/pointcounter102401/pointcounter_CPvsRJ.asp [Last accessed 7 June 2008]
- [8] **Puneet Gupta:** Choosing between J2ME and BREW for Wireless Development. Published on 28 July 2002. Available online:
http://articles.techrepublic.com.com/5100-10878_11-1050333.html [Last accessed 7 June 2008]
- [9] **Nancy Wimmer:** Digital Development: Innovations push rural electrification. Available online:
<http://www.renewableenergyworld.com/rea/news/reworld/story?id=51563> [Last accessed 4 June 2008]
- [10] **Owens, J. & Balingit, C.** Technology series, Part 2: Virtual mobile Wallets. Available online:
<http://www.microfinancegateway.org/content/article/detail/43486> [Last accessed 5 June 2008]
- [11] **D.P. Mirembe, D.Tuheirwe, J. Kizito and H.N. Muyingi:** A Model for E-electronic Money Transfer for Low Resourced Environments: M-Cash. (Unpublished)
- [12] **Nokia Siemens Networks, Village Connection**
http://www.nokia.com/NOKIA_COM_1/Microsites/Entry_Event/Materials/Nokia_Siemens_Networks_Village_Connection.pdf [Last accessed 6 June 2008]



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