Practitioner Track – Short Papers

The role of the GSMA Development Fund in Mobile for Development

Nicola D'Elia
GSMA Development Fund, 7th Floor, 5 New Street Square, New Fetter Lane, London, EC4A 3B, United Kingdom
Tel: +44 020 7356 0600, Email: ndelia@gsm.org

Abstract: The GSMA Development Fund—a programme of the GSM Association, which represents the interests of the worldwide mobile communications industry—exists to accelerate economic, social and environmental development, through the use of mobile technology. It leverages the expertise of the GSMA and its members, as well as the development expertise of international agencies and non-profit organisations, to accelerate the availability of mobile services. Its flagship initiatives are (1) Mobile Money for the Unbanked, which seeks to provide 20 million customers that are unbanked or living on less than $2/day access to financial services; (2) Green Power for Mobile, which promotes the use of renewable energy in mobile network infrastructure in the developing world; (3) mWomen, which is seeking to close the gender gap in mobile phone usage and ownership; and (4) mAgriculture, which provides agricultural support services to over 5 million farmers in India and Kenya.

1. GSMA Development Fund: Background

The GSMA Development Fund exists to accelerate economic, social and environmental development through the use of mobile technology. We believe that providing tangible, accessible mobile services to people in developing countries is invaluable to society and can help improve people's lives.

The Development Fund leverages the industry expertise of the GSMA and its members, as well as the development expertise of international agencies and non-profit organisations to accelerate mobile services in six areas: Mobile Money for the Unbanked, Green Power for Mobile, Mobile Agriculture, mWomen, Mobile Health and Mobile Learning.

We are currently developing programmes in new areas such as mobile applications and innovation, access to rural markets, and measuring the developmental impact of mobile services. The Development Fund's role is to catalyse innovation, drive market scaling and increase knowledge dissemination across developing markets.

2. Current Programmes

2.1 – Mobile Money for the Unbanked

The GSMA Development Fund initiated the Mobile Money for the Unbanked (MMU) programme to make mobile money services available to 20 million new unbanked customers living under US$ 2 per day by 2012; and to extend the reach and reduce the cost of formal financial services such as microsavings, microinsurance and microcredit.

MMU works closely with mobile network operators who have existing or planned mobile money deployments, providing them with best practice and thought leadership in order to shape and successfully implement mobile money strategies. MMU also works to promote a

regulatory framework that enables mobile money deployments. MMU is funded by a grant from the Bill & Melinda Gates Foundation.

The $US 5 million MMU Fund has been established to award grants to support commercially viable and sustainable mobile-operator led projects in developing countries that contribute towards MMU's goal.

The specific objectives of the MMU Fund are to support projects that result in:

- Mobile Money for the unbanked becoming mainstream business for mobile operators
- Mobile Money services becoming extensively available to those who have been previously unbanked
- Extending the reach and reducing the costs of financial services such as savings, insurance, payments and credit to previously unbanked customers via the mobile channel

As of August 2010, approximately 80% of the fund has been allocated to projects around the world. The MMU Programme has awarded grants to AKTEL (Bangladesh), AXIS (Indonesia), Dialog Telekom PLC (Sri Lanka), Grameenphone Ltd (Bangladesh), MTN (Uganda), Oi (Brazil), Roshan (Afghanistan), Tata (India), SMART (Philippines), TRUE (Thailand), and Vodacom (Tanzania) amongst others. The funding from MMU will serve to accelerate these deployments, and by the end of 2011 the learnings will be shared with the wider industry.

2.2 – Green Power for Mobile (GPM)

The Development Fund's Green Power for Mobile (GPM) initiative, in partnership with the IFC, aims to help mobile operators extend network coverage, reduce operating expenditure and minimise environmental impact through the use of renewable energy sources.

By acting collectively through the GSMA, mobile operators can generate economies of scale and expertise that will enable the rapid development of solutions that will make the mobile industry and other sectors more energy efficient. By reducing energy usage, environmental solutions should also directly reduce mobile operators' operating costs. In order to serve the estimated 2.6 billion people living in areas with unreliable or non-existent access to power, mobile operators need to find economically viable and sustainable energy sources for their networks. To date, most off-grid base stations have relied primarily on diesel generators for power, but, as diesel prices rise and mobile network infrastructure is built in increasingly inaccessible regions, mobile operators need a viable alternative.

The GSMA Development Fund set up the GPM programme, with the goal of helping the mobile industry use renewable energy sources, such as solar, wind, or sustainable bio fuels, to power 118,000 new and existing off-grid base stations, in developing countries, by 2010 - saving up to 2.5 billion litres of diesel per annum and cutting annual carbon emissions by up to 6.8 million tons. The GSMA estimates that approximately 10,000 base stations today are powered, in whole or part, by renewable energy.

During 2009, the GPM programme also joined forces with the International Finance Corporation (IFC), the private sector arm of the World Bank Group, to provide mobile operators with technical assistance programmes, market research, and knowledge sharing programmes to help them implement large scale renewable energy powered networks. The GPM programme offers mobile operators a Feasibility Study service to assess the viability of their network for renewable energy.

Another GPM initiative is powering handsets. The GSMA's Charging Choices report identifies several potential solutions, such as solar-powered handsets, which could improve quality of life and access to information for millions of people, while also acting as a significant opportunity to fuel economic growth without damaging the environment. Other

potential solutions include standalone solar chargers and hand-crank powered mobile phones. If implemented effectively, these alternative charging solutions would extend service availability and could boost average revenues per user by 10-14%. The research found that there is significant interest in these solutions – 60% of mobile operators interviewed already have or are exploring off-grid charging initiatives.

2.3 – mWomen

The GSMA Development Fund formed the mWomen programme after identifying a sizeable gender gap in mobile phone ownership in middle and lower income countries. Our research found that mobile operators and the development community were interested in closing the gender gap to generate both new commercial opportunity and social development.

The GSMA and Cherie Blair Foundation for Women published *Women & Mobile: A Global Opportunity* at Mobile World Congress in Barcelona, February 2010. The report is the first global study of its kind and endeavours to understand mobile usage by women subscribers in low and middle income countries and highlights the barriers facing women's adoption of mobile technologies. It also shows that by extending the benefits of mobile phone ownership to women, a host of social and economic goals can be advanced.

Inspired by the data in the report, as well as the overwhelming response from development partners and the mobile industry, the GSMA Development Fund has designed an intervention program – mWomen - to halve the gender gap, from 300 million fewer women to 150 million, within three years.

The vision of the program is that through increasing access to mobile connectivity and services, BOP women in the developing world will feel and report a greater sense of security, independence, economic opportunity and sense of connection with the world outside their home. This in turn will lead to greater empowerment and control over their lives and those of their families, through more informed decision-making, thereby improving quality of life and positively affecting several of the UN Millennium Development Goals.

In developing countries today, women do not have an equal opportunity to access mobile services, thereby preventing them from benefiting from its transformative capabilities to help lift people out of poverty. As we know, empowering a woman has a direct and significant positive impact on her family and community's social and economic status, as recently reaffirmed by the United Nations Economic and Social Council (ECOSOC) who referred to "the vital role of women as agents of development." Therefore when a woman does not have mobile access, it is not just one, but a multitude of individuals who are disadvantaged. This program is therefore focused on mobile inclusion for women.

2.4 – mAgri

The GSMA Development Fund's mAgri initiative has been established to investigate the deployment of mobile solutions to serve the agriculture sector. With our partners the Bill and Melinda Gates Foundation and the Rockefeller Foundation we run projects in Africa and India delivering mAgri services.

The initiative is exploring the deployment of dedicated mobile services for the agriculture sector, which aims to help improve farmers' yields and productivity and boost the world's food supply. It is currently working with Bharti Airtel and IFFCO Farmer Co-operative in India to set up "Farmer Helplines", providing high quality and reliable information that will enable farmers to make more informed decisions throughout the preparation, planting, harvesting and marketing seasons. The Development Fund is also working to establish a Farmer Helpline to provide agricultural and climate information to Kenyan smallholders. It is envisaged that the Farmer Helpline will be broadly available across all of the mobile networks within Kenya.

3. Programmes in Development

3.1– mHealth

The Development Fund's mHealth initiative aims to accelerate the creation and deployment of viable mobile health solutions that improve access to appropriate, necessary and quality health services in developing markets.

Cost-effective healthcare solutions are in demand from the various stakeholders in the healthcare map to prevent, treat and monitor both acute and chronic conditions. The Development Fund's Mobile Health initiative aims to accelerate the creation and deployment of viable and affordable mobile health solutions that improve access to appropriate, necessary and quality health services in developing markets. Using mobile connectivity in healthcare could significantly reduce costs whilst widening the reach and accessibility of healthcare, reducing the impact of illness on people's lives.

To date, the Development Fund has supported three mHealth initiatives in Africa, Pakistan and Egypt and anticipates further mHealth engagements throughout the developing world.

3.2– mLearning

This programme examines at the role mobile technology can play in delivering learning and educational services to people in remote areas or who have no access to existing education provision.

An upcoming mLearning report refers to services that provide access to or deliver educational content and experiences through mobile devices using a number of technologies. Importantly, we are not focusing our efforts on classroom based education and resources alone, but adults and vocational or informal training also in order to find assess where the greatest needs and value lie.

3.3– mApplications

The GSMA Development Fund mApps initiative has been established to investigate the impact of mobile applications the developing world. Our main area of focus is to work with mobile operators, technology vendors, entrepreneurs and communities of developers to promote mobile applications as a tool for promoting economic and social development.

The initiative aims at supporting technological innovation in the mobile industry, identifying best practices and strengthening local expertise to support sustainable social and economic development.

The Jokko Initiative

"Jokko": communication or dialogue in Wolof, a national language of Senegal.

Guillaume DEBAR, Malick NIANG, Amma SERWAAH-PANIN
Tostan International, BP 2931, Dakar- Yoff, Senegal
Tel: +(221) 33 820 55 89, Email: guillaumedebar@tostan.org

Abstract: Mobile phones are rapidly expanding to cover the vast majority of African citizens, and are already commonplace even in many of the most remote villages. The technology holds great promise for more empowering and inclusive systems of communication, particularly if it can be made relevant, easy-to-use, and cost effective for the rural poor. In partnership with UNICEF, Tostan, an NGO implementing a non-formal human rights based education program across ten African countries, has taken steps towards this goal with the addition of a cell phone training component to its existing curriculum. This module, known as "The Jokko Initiative", uses mobile phones firstly as pedagogical tools to teach and reinforce literacy, and secondly as social mobilization tools that help to build consensus around local development initiatives via a virtual SMS forum. A recent evaluation of the program shows that it is both successful in meeting its goals, and that it is scalable. Building on the successes of the Jokko Initiative, Tostan is implementing three other programs that address the mobile technology needs of rural communities: RapidSuivi, a real-time monitoring system; JokkoDiaspora, which connects Tostan's participants to the diaspora via an internet website; and JokkoTelecenters, which provide rural communities with a solar-powered income-generating and social mobilisation opportunity.

1. What does Tostan Do?

Since 1991, Tostan, an NGO based in Dakar, Senegal, has implemented its Community Empowerment Program (CEP) – a holistic, human rights-based, non-formal education curriculum – to thousands of communities in ten African countries: Burkina Faso, Djibouti, The Gambia, Guinea, Guinea Bissau, Mali, Mauritania, Senegal, Somalia, and Sudan.

The CEP was born out of Tostan's mission to "empower African communities to bring about sustainable development and positive social transformation based on respect for human rights." The goal of the 30-month program is to provide its participants – approximately 80% of whom are women and girls – with the skills and knowledge to improve their lives in a sustainable way.

The program is implemented in two broad phases. First, the Kobi, whose translation from Mandinke means "to prepare the ground for planting." It focuses on social empowerment, covering modules on democracy, human rights, hygiene, and problem solving. The next phase is the Aawde, whose translation from Fulani means "to plant the seed." This phase focuses on literacy and economic empowerment, and its modules cover reading and writing in local languages, math skills, and project management.

2. The Jokko Initiative

In 2009, in partnership with UNICEF, Tostan added a new component – the Jokko Initiative – to its CEP to teach the practical uses of standard mobile phone functions and SMS texting. The pilot phase of this initiative, which ended in May 2010, was recently evaluated in

partnership with the Center of Evaluation for Global Action (CEGA), with some significant results discussed later in this paper.

Compelling observations drove the development of the Jokko Initiative: Mobile phones and their networks are rapidly expanding to cover the vast majority of African citizens, and are already commonplace even in many of the most remote villages. The technology holds great promise for more empowering and inclusive systems of communication, particularly if it can be made relevant, easy-to-use, and cost effective for the rural poor. However, Tostan found that many CEP participants, even when they had access to mobile phones, were only using them to make and receive calls, which at Senegalese rates, are approximately 5 times more expensive than text messages. The inability to compose or read messages was a factor that limited adoption of the technology. Thus, Tostan saw an opportunity to combine the existing focus on literacy development with new and practical technological tools.

The Jokko module, which was developed to be part of the general CEP curriculum, uses mobile phones firstly as pedagogical tools to teach and reinforce literacy, organization and management skills and secondly as social mobilization tools that help to build consensus around local development initiatives.

In the first of the module, participants are taught how to use a phone and navigate its applications. Keeping in line with Tostan's broader commitment, there is an emphasis on incorporating traditional learning and communication methods. For example, the phone menu is presented with the analogy of a mango tree, and participants visualise reaching a specific target such as a contact's name with moving up the trunk of the mango tree, selecting a branch, going along the branch, and finally picking a mango. This section of the module focuses on practical and useful phone applications such as sending and receiving text messages, storing and retrieving contact information, and using of some of the "extras" such as the reminder function or the flashlight.

The next section of the module trains participants to use RapidForum, a virtual, SMS-based community, developed using UNICEF's RapidSMS platform. It allows users to join a virtual community, after which community members can send – and pay the cost of – a single message, which is then disseminated to the larger network. The forum provides a platform for community members to exchange information, broadcast ideas, and organise advocacy efforts, all the while practicing many of the literacy and math skills developed in other parts of the Aawde curriculum.

Researchers and participants report anecdotes that illustrate the diverse benefits of the forum:

> "Teachers now say that students are staying in school. Previously, children would have had to take a bicycle riding from village to village to share news, such as a birth, a burial, a wedding, with other members of the community. Now, they can simply send a text message and it will reach the wider network." (Excerpt from interview with Finté Boiro, Supervisor of the Tostan program in the Kolda region, South Senegal)
>
> "A man in one of [the] pilot villages wanted to have his young daughter cut. He decided this despite his village's collective decision to abandon female genital cutting. Other villagers sent messages on the SMS Community Forum to warn community members of the man's intentions. The news spread rapidly, and in the face of overwhelming social pressure, the man renounced his intention to have his daughter cut." (Beltramo and Levine, 2010)
>
> "Forum users Khadiatou M'Ballo and Dieynabou Baldé are physically disabled. Dieynabou learned how to read, write, and send a text message in Tostan's education program. Now she uses the RapidForum to arrange transportation to community events that she might not otherwise be able to attend." (Beltramo and Levine, 2010)

3. Evaluation Results

Results from the CEGA evaluation of RapidForum pilot provide promising evidence of initial success in the role the forum can play in promoting literacy learning and mobile phone skills while fostering social networks and community empowerment. The study was carried out in 20 communities which had all completed the first part of the Jokko module (training on basic cell phone use). Fifteen of those communities had further training and access to Rapidforum, while the remaining five communities acted as a control group.

CEGA implemented a baseline survey in November 2009. At that point in the CEP, all the communities in the study had undergone the basic literacy and numeracy modules of the Aawde, but had not yet begun any of the Jokko modules. The survey covered demographic variables, as well as cell phone use and literacy levels. Some notable findings of the baseline survey:

- Only 41% of men and 14% of women demonstrated high literacy.[1]
- 85% of the respondents could not do the math problems.
- 58% reported that they had used a cell phone.
- 91% of the sample had only used cell phones to make and receive calls.
- 16% said they received messages, but only 9% could read them.
- On average people made 1.37 calls a week and sent only 0.2 messages and received 0.62 (mostly from the telephone company)
- Anecdotally, it was usually a younger male in the family who had some formal education who would be able to read the text messages.

The follow up survey was conducted in March 2010, shortly after all the communities had completed the initial Jokko module. The 15 communities had additionally completed the second part of the training and had had access to the SMS Community Forum from December 2009. Some notable findings from the follow-up survey:

- From 58% at the baseline, 98% of respondents now reported using cell phones.
- 68% could now send and receive text messages, up 60% from the baseline.
- 73% said they could now read the messages that they receive.
- On average, respondents sent 8.8, and received 2.9, messages a week.
- The 15 communities that had access to the SMS forum demonstrated a statistically significant increase in literacy scores.
- The share of participants scoring on the lower end of the numeracy tests (only getting one or zero questions correct declined.

To get a better idea of the demographics and purposes of the people using the community forum, researchers evaluated and categorized all messages that had passed through the server over the period from December 2009 – May 2010. This was supplemented with telephone interviews of a sample of forum users conducted in June 2010.

- 436 Aawde participants from the 15 villages joined the network.
- A total of 570 messages were sent over the five-month period.
- The most frequent categories of messages were social mobilization and meetings (31% – announcing inter-village meetings etc), health related (27% – sharing information about mosquito-net distribution etc), and personal messages (12% – greetings etc.)

[1] The literacy test asked people to link two pictures to the appropriate word, to read 2 sentences, and to read a paragraph and answer questions about it. Partial credit was given for the sentence reading and there were four facts to recall from the paragraph. If they read both words, both sentences, and remembered 2 or more of the facts in the paragraph they received a "high" literacy score.

4. Future Directions

The Jokko module and RapidForum obviously hold great potential in addressing the literacy, technology, and social empowerment needs of rural communities. Moreover, as the CEGA evaluation shows, the model is scalable. However, some challenges in the field remain. The gender gap that exists in terms of access to mobile technology is a pressing challenge. Men report more ownership, and in families where phones are shared, male members tend to have disproportionate access to them. (Beltramo and Levine, 2010) Another challenge is the lack of a consistent and reliable source of power to charge phones. Participants report having to walk or ride to neighbouring villages to find a charge station, often paying high prices and running the risk of damage to their phones (for example, charging phones with car batteries). Additionally, participants report limited availability of handsets or access to credit to make calls. And lastly, a problem which is not unique to Jokko – there is a lack of connectivity between villages and their extended networks. Much of the societal change that happens in the process of the CEP might be met with resistance by community members who have traveled, whether it is to Dakar or other urban centers within Senegal, or even further abroad and therefore don't have immediate access to the CEP's decision-making process.

Tostan is building on the successes of the Jokko module and RapidForum to develop other mobile-based programs which address the needs outlined above.

- *Jokko Telecenters* are an example of an innovative partnership with the Rural Energy Foundation. As part of the program, Community Management Committees (CMC)[2] are provided with training and the initial materials for a portable, solar powered charge station, where phones can be charged and small amounts of credit can be sold.
- *Jokko Diaspora* provides a social networking platform to connect members of the diaspora to villages over an internet page. Two trained members of each CMC will be able to text message updates to the diaspora website.
- *RapidSuivi* allows accurate, real-time data to be transmitted from the field. Facilitators of the CEP, members of CMCs, and some of Tostan's radio hosts are able to text a simple coded "phrase" to a server (an example "phrase" might include information on the number of participants in a CEP or the number of women in attendance etc.)

These are exciting future opportunities for extending the benefits of mobile technology, which is rapidly becoming ubiquitous across the rural African landscape. And with these initiatives, the technology is also becoming more relevant, accessible, and cost effective for the rural poor.

References

Beltramo, T. and Levine, D (2010) Do SMS Text Messaging and SMS Community Forums Improve Outcomes of Adult and Adolescent Literacy Programs? Evidence from the Jokko Initiative in Senegal.

Jaschke, L. (2009) Evaluating Adult Literacy Programs- A Core Competency Based Approach.

Tostan (2010) Jokko Initiative Concept Note (Accessed September 2010)

Tostan (2010). Our programs, Jokko Initiative: Mobile Technology Amplifying Social Change.
http://www.tostan.org/web/page/824/sectionid/547/parentid/547/pagelevel/2/interior.asp
(Accessed September 2010)

Tostan (2010) Our programs, The Community Empowerment Program (CEP)
http://www.tostan.org/web/page/552/sectionid/547/pagelevel/2/parentid/547/interior.asp
(Accessed September 2010)

[2] Community Management Committees are formed during the course of each CEP. They are composed of 17 democratically-elected community members whose role is to manage and coordinate CEP activities and ensure collaboration between CEP participants and other community members.

Speak Up! Enhancing the VOICE in the media of Marginalized populations in Tanzania

Dr. Minou FUGLESANG
Femina HIP, P.O. Box 2065, Dar es Salaam,Tanzania
Tel: +255 22 212 8265 OR +255 22 212 6851,
Email: minou@feminahip.or.tz

Abstract: Femina HIP's popular media products (magazines, TV/radio programmes, and an interactive website) have gained groundbreaking reach unparalleled by any other media platform in Tanzania. Every year, Femina HIP reaches an estimated 10 million Tanzanians of a total population of 42 million. During the past years, Femina HIP has encouraged its audiences to 'speak back' by using SMS and today each of our recurring media products has its own SMS number. These numbers have proved to be very popular. Every week Femina HIP receives hundreds of SMS from its audience, whereby its most popular TV talk-show programme alone can generate up to 1,000 messages from young viewers across the country. It it against this background that Femina HIP is finalizing plans to start a mobile information service branded 'Speak Up!' which aims to increase the access of two marginalized populations (youth and rural communities) to the media by using SMS technology as a gateway for them to increase their participation in Femina HIP's recurring media products. 'Speak Up!' will assist these groups to become 'agenda setters', thereby enhancing a more inclusive public debate and a more investigative reporting that mirrors everyday life in Tanzania.

1. Background

The media environment in Tanzania is to a large extent dominated and controlled from the main urban centers, most notably from Dar es Salaam. The media tends to have a top-down focus reporting on the agendas of decision makers. The Tanzanians – especially the youth and those who live in rural areas – are to a large extent marginalized from the mainstream media, and when their problems are debated this tends to be from a top-down perspective. In other words – their voices are not heard.

The TAMPS (Tanzania All Media and Products Survey) 2009 shows how limited most Tanzanians' media consumption and engagement is. During an average week, 77% of the adult population (>15) listen to radio, 42% watch TV, and 28% read a newspaper. Though more than 2 out of 3 Tanzanians live in rural areas the main part of the media consumption takes place among the urban populations. At the same time, the media consumption is to a large extent passive. The audiences are receivers of information with little or no influence on the agenda set by the media houses. They are not part of the broadcasting and do not participate in the production of media products.

The 'Speak Up!' initiative aims to increase the access of two marginalized populations (youth and rural communities) to the media by using SMS technology as a gateway for them to increase their participation in Femina HIP's recurring media products. 'Speak Up!' will assist these groups to become 'agenda setters'; thereby enhancing a more inclusive public debate and a more investigative reporting that mirrors everyday life in Tanzania. Femina

HIP's media products are extremely effective channels to meet this aim as they reach youth and rural communities on a scale unparalleled by any other media in Tanzania.

During the past years, we at Femina HIP have encouraged our audiences to 'speak back' to us by using SMS and today each of our recurring media products has its own SMS number. These numbers have proved to be very popular. Every week we receive hundreds of messages from our audience; our most popular TV talk shows can for example generate up to 1,000 messages from young viewers across the country. These give us an invaluable feedback and have become an important additional source of information that we use to develop our products and make sure that our content agenda stay in touch with our audiences. But through our experiences with SMS, Femina HIP has also come to realize that there is a huge, unexplored potential to use SMS strategically as an integrated part of our content and product development. Through 'Speak Up!' we want to increase our audiences' voice and ensure that their feedback, views and opinions shape our media products and the issues we feature.

2. Objectives of the Speak Up! Initiative

'Speak Up!' has two main objectives:

2.1. Enhancing the VOICE of marginalized populations in the media: (access)

For the past 10 years, Femina HIP has worked with participatory journalism giving marginalized groups a voice in the Tanzanian media landscape. We travel to remote areas with digital cameras and laptops and document the voices and experiences of those who are traditionally not heard in the mainstream media.

Through the logistics of mobile technology and SMS penetration, a significant number of audiences will be reached with reinforcing messages resonating with Femina HIP's content agendas. Tailored SMS messaging will bring information and communication to those who traditionally are not empowered to access media.

2.2 Promoting a participatory, user-driven media scene: (content)

'Speak Up!' will give marginalized groups the opportunity to move from being passive consumers of media products to becoming active contributors of content. With 'Speak Up!' we want to significantly increase our dialogue with our audiences and give them a bigger influence on what is reflected in our media products. We want to increase our audience feedback and actively use their input in our content development.

It is expected that the media platform will have a more user-driven agenda reflecting contemporary and local issues that are pivotal among groups often marginalized in the conventional media. Their voices will be collected, published and shared. Giving audiences an increased voice will create an important alternative to the Dar es Salaam-driven media agenda that characterizes many of the mainstream media houses in Tanzania today. Femina HIP's media products will become more accurate and reliable; and the Tanzanian media environment will become more inclusive, accountable, democratic and free.

3. Implementation progress and expected results

3.1. Implementation progress

'Speak Up!' will be launched early next year initially as a pilot project, whereby SMS will be used for a number of activities including:

- Dialogue with audiences around their feedback and views on our media products
- Sending out of bulk messages related to Femina HIP's content agenda
- Sending out specific information to audiences who subscribe to this. This will enable audiences to receive specific information on a broad range of topics that are relevant

to them; this can include information on local accountability, HIV prevention, entrepreneurship, condom use, etc.
- Linking audiences to concrete services, for example where to access information about clinics or micro finance loans
- Dedicated pages in Fema magazine and Si Mchezo! magazines will be used to discuss SMS and mobile technology; the 'Speak Up!' initiative, and to post audience VOICES. Audience voices will also be posted on Chezasalama.com
- Branding and promotion of the initiative through competitions and polls (prizes will include solar mobile chargers)

During the pilot phase, Femina HIP will also be gathering feedback and recommendations, which will be used in the transformation of Speak Up! from the initial pilot phase into becoming a sustainable brand in the Tanzanian media scene and an integrated part of the long term, recurring Femina HIP media products.

3.2. Expected Results:

In general, 'Speak Up!' aims to help create a stronger audience voice in Tanzania, empowering especially youth and rural audiences to take part in the production process and influence content. 'Speak Up!' will also increase accountability as the Tanzania media environment becomes more accountable to its audiences, their agendas and their media needs and options. Some of the expected concrete output results include:

- A tailored strategic management of SMS
- An estimated 50,000 (out of a potential 325,000) audiences reached (in the initial implementation of 'Speak Up!') through SMS with relevant content, tailored to audience needs.
- Audience VOICES collected and broadcast through other Femina HIP media products available to the target audiences (Fema and Si Mchezo! magazines, Fema TV talk show, Chezasalama.com)
- Dedicated content (articles) on mobile technology in Fema and Si Mchezo! Magazines published as a way of promoting the Speak Up! initiative
- The dedicated content will include editorial collections for Fema magazine, Si Mchezo! magazine and Fema TV Talk Show focusing on SMS and mobile technology as a means to access information and participation in the media
- Online discussion forums on Chezasalama.com (including Facebook pages and a blog) where youth can read each other's texts and engage in critical debates. This will change audience communication from a two-way conversation to a multi-party dialogue
- Increased capacity among Femina HIP editorial staff to work with SMS as a new media channel to reach audiences

4. Femina HIP's current reach

Femina HIP is a multimedia platform and civil society initiative working with youth, communities and partners across Tanzania. In its 10 years of existence, Femina HIP has continuously aimed to promote healthy lifestyles, sexual health, HIV/AIDS prevention, gender equality and citizen engagement. Today we are also evolving our agenda around entrepreneurship, financial education and livelihoods.

Femina HIP's main approach is edutainment. We entertain and educate audiences through real life stories, testimonials, role modeling and docudrama. Through our participatory, interactive production process we give ordinary people across Tanzania a VOICE to speak up and share their experiences.

Femina HIP's popular media products have gained groundbreaking reach unparalleled by any other media platform in Tanzania. Every year, Femina HIP reaches an estimated 10 million Tanzanians of a total population of 42 million.

While mainstream media are circulated in limited numbers, Femina HIP's recurring magazines Fema and Si Mchezo! are printed in 170,000 and 175,00 copies respectively making them the most circulated magazines in Tanzania. According to TAMPS 2009, 42% of the adult population (9.8 million people) know Fema. Each week the magazine is read by 2.8 million people making it by far the most read magazine - and probably the most read print media - in the country. Si Mchezo! is the second most read magazine with an estimated 2.6 million readers per issue. Almost 1 million Tanzanians are regular viewers of our weekly TV talk show; 3.4 million Tanzanians tune in every now and then.

Are Mobile Phones More Effective Learning Tools Than Computers in an African Context?

Peter Kisare OTIENO
African Medical & Research Foundation, 2769[1], Nairobi, 00506, Nairobi
254026993123, peter.otieno@amref.org:

Abstract: Africa currently has the highest mobile growth rates globally. As such mLearning can be used to educate health workers and influence behaviour change.

1. Introduction

From the beginning of the computer age many professionals from all walks of life have looked at the computer as an agent of change in education. There have been many innovative programmes like the One Laptop Per Child program by Seymour Papert that facilitate top down knowledge transfer, though the major inhibiting factors that still stands out are the cost of implementation and penetration of PC's in the rural areas where in most African countries 80% of the population resides.

In a study conducted by the ITU it was estimated that by the end of 2010 mobile subscribers will surpass 5 billion which accounts for 70% of the world s population [6] . By 2011 85% of new handsets will be able to access mobile web with the key drivers of mobile usage being money transfer, location based services, mobile search, mobile browsing, mobile health monitoring, near field communication services, mobile advertising, instant messaging and mobile music.

2. AMREF mLearning Initiatives

In a survey recently carried out by the AMREF virtual Nursing school, we found out that 100% of the students had mobile phones compared to 40% who had their own personal computers/laptops and the other 60% had partial access to a computer depending on when they visited an eLearning centre for a face to face session or exam.

3. AMREF ART Hub

Some of the initiatives being currently undertaken by AMREF as a result of this study to help achieve Millenium Development Goals 4, 5 and 6. The first one is the AMREF ART hub which provides health workers in remote areas with phones with unlimited internet access to an ART hub. Health workers are able to post complicated cases in the field of HIV/AIDS to experts on to the ART hub who reply to their queries and one of the experts acting as a moderator summarises and posts the summary on the hub. The health workers are able to access the information from their mobile phone and assist the patients that they are providing care to. This initiative has lead to a reduced feeling of isolation for health workers in remote areas as they can always access information at the their 'fingertips'. The healthworkers are also able to share ideas with experts from different areas of the world and as such are able to access groundbreaking initiatives from different HIV programmes worldwide and ape them in their areas of work.

4. AMREF Virtual Nursing School

The second initiative involves capacity building for Nurses from the AMREF Virtual Nursing School. Nurse Tutors schedule 'after hours' sessions with students and guide them through telephone tutorials on areas that are presenting difficulty to the students. This initiative acts as a complementatry initiative to face to face sessions. There result of this initiative has been tutors have had to look for creative ways in which to guide the students together with ICT support personnel which has led to adoption of innovative tools embedded in software such as skype and dimdim that enable the tutors have a tutorial with both voice and screen sharing capabilities.

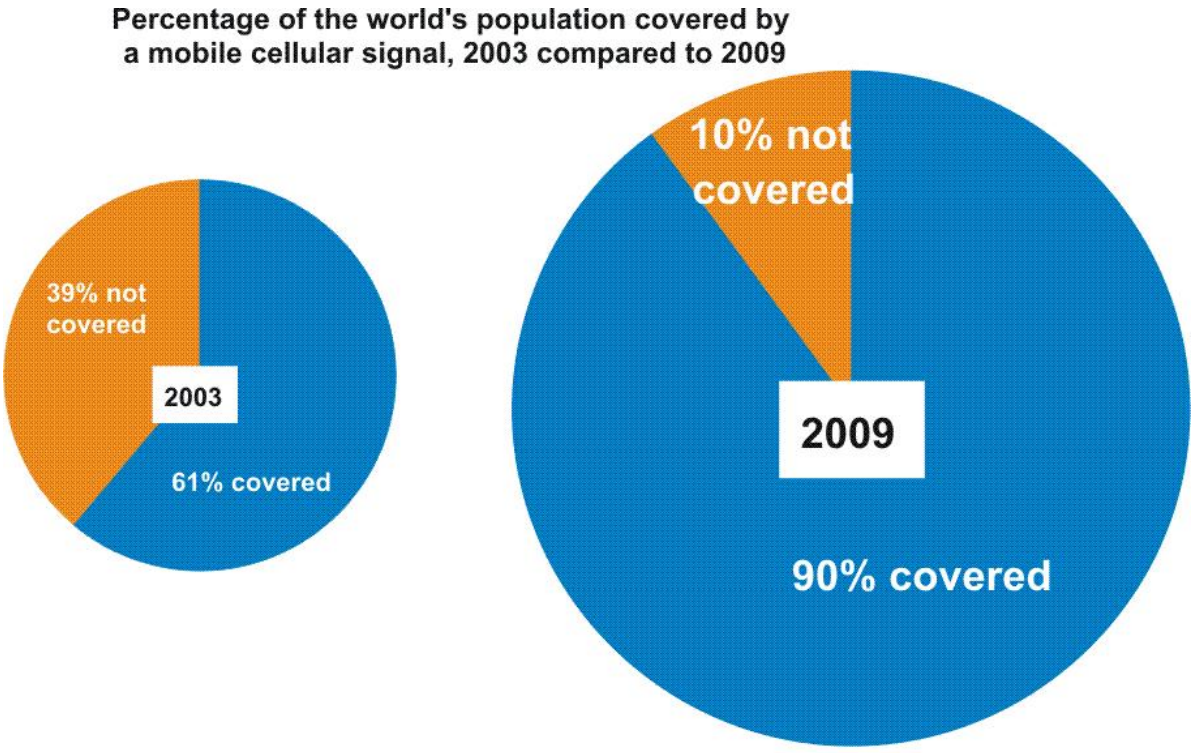
The third initiative involves providing remote health workers in remote areas with reference and reading material in the form of java applets that assists them in every day decision making. The result of mobile phones being used by the nurses to access material has resulted in a reading culture being adopted whereby students access materials from different areas worldwide and pick the different areas that are applicable to their work situation in order to improve better health services.

5. Facts and Figures

According to the Gartner group the total number of PC's in use globally will reach1.78 billion units in 2013, by this time the combined installed number of smart phones and browser equipped enhanced phones will exceed 1.82 billion and will be greater than PC's thereafter. Some of the reasons are; most organisations will opt to have leaner IT assets by implementing virtualisation, cloud enabled services and employees running personal desktops and notebooks on corporate networks.

Key Health outcomes that could be achieved as a result of adopting mobile learning are:

- redesignation of health workers/medical personnel by getting up to the date information from the field and uploading to a centralised database.
- Disseminating important changes in Government policy or methods of treatment thus ensuring that everyone gets quality treatment regardless of location and controlling disease breakout by updating medical personnel in the field on a real time basis on which areas to be quarantined and what steps should be taken next.
- Emergency response systems (road traffic accidents, and emergency obstetric care)
- Disease surveillance and control (Malaria, HIV/AIDS, TB, and chronic diseases)
- Human resources coordination, management, and supervision.
- Synchronous and asynchronous mobile telemedicine diagnostic and decision support for clinicians at point-of-care.
- Remote patient monitoring and clinical care.
- Health extension services, health promotion, and community mobilization.
- Health services monitoring and reporting.
- Health-related m-learning for the general public.
- Training and continuing professional development for health care workers.



Source: ITU World Telecommunication/ICT Indicators database.

6. Conclusion

Learning is acquiring new knowledge, behaviors, skills, values, preferences or understanding, and may involve synthesizing different types of information. The ability to learn is possessed by humans, animals and some machines. Progress over time tends to follow learning curves.

The benefits of mobile learning when lookin at Africa are: It encourages "anywhere, anytime" learning, its penetration is wider as compared to the PC when looking at populations in Africa thus people from disadvantaged communities and those from developing communities can access the same content regardless of location [5]. Mobile devices can help overcome many of the challenges associated with larger technologies as they fit more naturally within various learning environments, and with the adoption of web 2.0 communitiues of practise via social networking have enabled professionals and students from different areas of the world share cutting edge technology and/ideas in their various areas of expertise via tools such as Twitter and Facebook.

Other Mhealth initiatives being carried out in Africa are: Project Masiluleke in South Africa where under the guidance of an international, multidisciplinary team, the prohect provides a suite of interventions targeting the entire HIV/AIDS care continuum by promoting testing, treatment connection/adherence thus improving access to testing via an innovative home HIV test kit supported by mobile counselling [2]. In Georgia Save the children and Unicef have partnered to convert films into a format that is viewable on mobile phones. The films feature well known young actors potraying the potential health risks of everyday decisions and behaviours, it was disseminated by sending it to thousands of young georgians who were encouraged to pass it on to their friends [3]. Learning about living is another initative which provides the youth in Nigeria with an anonymous forum to learn about health, AIDS, sex relationships , personal development and living skills [4]. The program includes an interactive eLearning tool based on Nigerian Family Life and HIV/AIDS Education curriculum (FLHE) curriculum, as well as the mobile phone-based program My Question and My Answer.

References

[1] http://training.amref.org/
[2] http://www.unicef.org/ceecis/media_8237.html
[3] http://www.learningaboutliving.com
[4] http://ignatiawebs.blogspot.com/2009/04/why-mobile-learning-is-on-rise-and.html
[5] http://mobithinking.com/mobile-marketing-tools/latest-mobile-stats
[6] http://www.reliefweb.int/rw/rwb.nsf/db900sid/VDUX-85LLT8?OpenDocument

From Improbable to Inevitable: Dispelling the Myths of mHealth

Pammla Lusenga PETRUCKA[1], Sandra BASSENDOWSKI[2], HAZEL Roberts[3], Ian BROOKS[4], & GLENVILLE Daniel[5]

[1]*University of Saskatchewan, 4500 Wascana Parkway, Regina, Sask, Canada, S4P 3A3 Tel: 1 306 535-9597 Email: pammla.petrucka@usask.ca*

[2] *University of Saskatchewan, 4500 Wascana Parkway, Regina, Sask, Canada, S4P 3A3 Tel: 1 306 789-0735 Email: sandra.bassendowski@usask.ca*

[3]*Ministry of Health – St. Kitts-Nevis, Basseterre, St. Kitts-Nevis, Email:hazelroberts01@yahoo.com*

[4] *National Centre for Supercomputing Applications, 1205 W. Clark St., Urbana, Illinois, 61801 Email: ian@ncsa.uiuc.edu*

[5] *CompuZone Inc., Basseterre, St. Kitts-Nevis, Tel: +1-869-466-8919, Email: daniel_glen@yahoo.com*

Abstract: This paper presents an overview of a number of the challenges and resistances to the mHealth agenda. It reflects on the complexities and perplexities of mHealth in the current health care context globally. Of note, the alignment of much of the mHealth debate with a series of four myths was undertaken to provide a framework for reflection and reframing of the issues. The movement towards an mHealth enabled environment is posited against folkloric risks of being enamoured by the mermaid, entrapped within the minotaur's labyrinth, usurped in the cyclops' coup for power, or mesmerized by hydra's deadly presence. Each of the myths is considered and refuted in terms of the emergent and evolving mHealth paradigm.

1. Introduction

Concomitant with the exponential increase in access to mobile communications by those previously on the negative side of the 'digital divide' has been both anticipation and expectation for this technology to fill gaps in areas of health, education, governance, and so forth. What would have been improbable less than a decade ago in terms of reliable and robust technologies has now become expected. This paper posits that the mHealth imperative is now upon us. It suggests a series of myths which are often put before those practitioners and decision makers intending to move this agenda from improbable to inevitable. These myths are particularly relevant to those using, implementing, and considering mHealth at the local to global levels as they provide lessons and guidance.

1.1 mHealth: A Brief Context

The provision of health-related services via mobile communications (aka mHealth) [1] has not been an isolated activity. It has occurred within the context of technological, social, cultural, and ethical evolution as these relate to human-technology interfaces for health. There have been innumerable attempts to define mHealth – an observation which further reveals the complexity and the criticality of the topic. By contextualizing e-Health (using ICTs for health services and information) with m-Health as the sub-segment using mobile communications tools (for health services and information) the stage has been set to impact health outcomes through technologies [2] Regardless of whether one adheres to the

definition of mHealth being the integration of mobile technologies into the health care delivery system [3], or leans towards its conceptualization as the emerging mobile technologies for health [4], the core remains the co-dependence of health and mobile technologies. According to Mehael [5], the first definition is rooted within an ecosystem approach wherein the emphasis is to take existing devices and making them to each other for strategic purposes. Iluyemi [6] and Torgan [7], on the other hand, reminds us of the new technologies and enablers such as Bluetooth/GSM/GPRS/3G/ 4G/Wifi and so forth that can be accessed by health workers; each of these creates access opportunities previously unimagined in the health care sector.

There is significant optimism that mobile technologies will not only address but, in fact, catalyze health care services for some of the world's most marginalized and at risk populations. Within the development context, mHealth holds the appeal of potentially addressing challenges of disease prevalence [8], exponential population growth [9], and health system deficits [10]. When juxtaposing these challenges with the rapid penetration of mobile devices globally [11, 12] and promising practices in mHealth and m4D strategies [13, 14], it is anticipated that we are positioned to ''realize mHealth's full potential". [15, 16]

1.2 mHealth: An Emerging Field

The mHealth revolution is just beginning; mobile technologies are rapidly evolving; and the opportunities are seemingly endless. According to Mechael et al [17], the five key areas of mHealth emergence are treatment compliance, data and disease surveillance, health information systems, health promotion/disease prevention, and emergency medical response. Whether using SMS texting to remind a patient to take their tuberculosis medication, collecting data on a handheld device or conducting 'telemedicine' specialist consults; all of these strategies reflect the state of the art and create the mindset for the potentials for mHealth applications.

Despite these promising exemplars and the momentum globally, many would suggest that the lack of research, gaps in knowledge, and unknown futures perpetuate and reinforce a mystique around mHealth. When considering the contributing factors to this magnetism towards mHealth, four themes may be suggested. The first two themes are "Challenging the Status Quo' and 'Adopting an Emerging Lexicon'. Both of these considerations are rooted in the unique pressures accompanying the emerging mHealth environment which challenge the existing pre-mobile capacity paradigm. 'Challenging the Status Quo' reflects the warnings and strategies to slow down or approach mHealth with caution such as policy delays. When looking at the issue of the lexicon there is a strange admixture of trademarks and adapted terms within the mHealth context. The third theme is 'Embracing an Interdisciplinary Imperative' which considers the need for inter-dependence, transparency, and professional ethics within mHealth's operationalization. Policy, research, and education is required to build an environment which enables many sectors and disciplines to share, co-create, and co-exist to maximize the potential for mHealth. Finally, 'Imagining the Unimaginable' posits mHealth as a springboard beyond what is probable into the domain of possible and potential. Perhaps the most daunting task for those who are proponents of mHealth is to provide the vision for the future rather than to get quagmire in the currency and expectations of what exists.

2. The Myths: Described and Dispelled

Sceptics and opponents of an mHealth imperative frequently conjure images of bandwagonning and complacent uptake. Their warnings range from risks of blind compliance to unquestioning indoctrination and even to self-fulfilling prophecies. When considering these conjectures, the stories of four mythological creatures – the mermaid, minotaur, cylcops, and hydra – may further inform the dialogue and complexities of the mHealth debate.

2.1 The Mermaid's Mystique

The folklore of mermaids, much like that of mHealth, appropriately transcends borders, appearing in the history of nearly every corner of the world. One of the earliest mermaid myths derives from ancient Syria where the goddess Atargatis is shown as the sea creature who was full of the contradictions of the sea (and indeed of nature) [18] - gentle and violent; beautiful and destructive; full of life and deadly. Such depictions and parallels exist in the African lore such as Mami Wata [19] or Hindu stories of Sovann Matcha [20]. Most mermaid stories tell of the love of a mermaid for a mortal or enamoring of the mortal man for the beautiful mermaid inevitably ending in the demise of the mortal. Although there are many stories, the essence of the mermaid stories focuses on the relationship between people and the sea creatures, analogous to the mHealth dyad of people and technology. In carrying this myth forward, the challenge is to avoid the risk of being like the sailors - who upon catching a glimpse of the m-Health mermaid – become so enamored, leap into the m-Health sea to make contact, but drown in the process.

2.2 The Minotaur Rises

The Minotaur, half man-half bull, according to Greek mythology, was hidden by King Minos in the Labyrinth at the Palace of Knossos. The King's son was killed by the bull which leads him to demand that Athens send seven men and women each year to be sacrificed to the Minotaur. After a number of years, Theseus, son of the King of Athens came to the Labyrinth to slay the Minotaur. Most entering the labyrinth were lost in its complexity, but Theseus was assisted by King Minos' daughter, Ariadne, who provided him with a thread (clew) to unravel and follow back. [21] The story of the Minotaur is replete with deception, false promises, and sacrifice.

Some resistors would have us believe that m-Health is like the Minotaur representing the dark and devouring side of technology which upon encounter must be transformed and slain. They suggest that the mHealth context is a labyrinth from which escape is impossible within which we will be engulfed and consumed. The key challenge is to ensure that we are NOT entering the Minotaur's labyrinth unconsciously and without the 'clew' of self-observation and se;f-reflection to ensure our safe and successful navigation through the labyrinth of mHealth.

2.3 The Three Cyclopes – Ties that Blind

In mythology, we are introduced to the three blacksmiths of the gods - Brontes ("thunder"), Steropes ("lightening"), and Arges ("brightness") – who are consumed by their desire for power and greatness above those they serve. Their innovativeness and great skills are operationalized in the tools of Zeus (thunderbolts), Hades' (invisible helmet), and Poseidon (trident). However, their fate was to live imprisoned due to the fear and loathing of the rulers of the day and to die at the hands of Apollo for their creation of the deadly thunderbolts which lead to the death of his son.

In cautioning us against begin cycloptic, we are challenged to not to allow mHealth to become domineering, inflexible, and "abrupt of emotion" as was the case with the Cyclopes. As in the case of ancient mythology, the mHealth Cyclopes myth suggests mHealth will be seen as inventive and ingenius it will be restrained and 'imprisoned' – indeed at risk of succumbing as a consequence of its own designs (i.e., technological advancements). The mHealth mythologists suggest that we are at risk of losing our ability to see with both eyes (stereoptic) and to become increasingly cycloptic as the mHealth agenda vies to displace the pre-mobile context.

2.4 The im-mortality of the hydra

Perhaps one of the most perplexing tales is of the mythical hydra with its extensive regenerative capacities. In Greek mythology, the hydra, with its poisonous blood, and 7 to 9 heads with the middle one being immortal is one of the most daunting of creatures. The complexity of the creature is further characterized by describing how removing one head leads to two more growing back. Hercules is heroic in defeating the hydra by burning off the new heads and burying the immortal one. [23]

Like the Hydra with its many heads and noxious venom, opponents suggest that m-health brings an air of invincibility, self-perpetuation, and self-preservation. We, like Hercules, must be prepared to 'labour' to systematically contain yet not slay the mHealth beast.

3. Conclusion

In conclusion, the emerging and evolving mHealth agenda is one which we must consider and critically reflect upon. This paper has posited a series of key challenges and issues related to mHealth. By considering the relationship of humans to four mythological creatures (much like considering the relationship of humans to mHealth technology), we exposed and dispelled each of the myths as these relate to mHealth. As we follow through with this analogy, we potentially will become more adept at recognizing the probable, embracing the probable, and imagining the potential of mHealth!

References

[1] UN Foundation. (2009). *mHealth for Development:* The Opportunity of Mobile Technology for Healthcare in the Developing World. Geneva: Author.

[2] Ibid.

[3] National Institutes of Health. (2010). *2010 mHealth Summit Announcement*. Retrieved July 12, 2010 from www.mhealth.org

[4] Istepanian R., Laxminarayan, S., & Pattichis, C.S. [Eds.]. (2005). *M-Health: Emerging Mobile Health Systems.* New York: Springer.

[5] Mechael, P. (2006). *Health-related uses of mobile phones: An Egyptian case.* PhD Thesis: London School of Hygiene and Tropical Medicine.

[6] Iluyemi, A. (2009). Community-based health workers in developing countries and the role of m-health. Retrieved January 12, 2010 from http://www.idrc.ca/en/ev- 137420-201-1-DO_TOPIC.htm

[7] Torgan, C. E. (2009). *The mHealth Summit: Local and Global Converge.* Blog: Kinetics.

[8] World Health Organization. (2009). *WHO Disease and Injury Country.* Geneva: Author.

[9] UN Foundation. (2009). *mHelath for Development:* The Opportunity of Mobile Technology for Healthcare in the Developing World. Geneva: Author.

[10] Kinfu, Y., Dal Poz, M., Mercer, H., Evans, D.B. (2009). The health worker shortage in Africa: Are enough physicians and nurses being trained? *Bulletin of the World Health Organization, 87(3)*: 225-230.

[11] Cellular-news.com. (2010). Global mobile phone subscribers to reach 4.5 billion by 2012. Retrieved 7 May 2009 from http://www.cellular-news.com/story/29824.php

[12] Ansari, A. (2009). Weapon against epidemics: Cell phones. CNN.com/ technology. June 16, 2009. Retrieved on 1 July 2009, from http://edition.cnn.com/2009/TECH/science/06/16/cellphones.health.disease/index.html?eref=edition_africa

[13] Vital Wave Consulting. (2009). *mHealth for Development: The Opportunity of Mobile Technology for Healthcare in the Developing World*. Washington, D.C. and Berkshire, UK: UN Foundation-Vodafone Foundation Partnership, 2009.

[14] Calvin, K.B. (2008). MobiSUS integrating mobile phones for health data collection. Clinton Global Initiative. Retrieved on 1 July 2009, from http://www.clintonglobalinitiative.org/Page.aspx?pid=2646&q=299457&n=x

[15] World Bank. (2004). *Making services work for poor people: World Development Report*. Washington: Author.
[16] Gwatkin D, Bhuiya A, Victora C. (2004). Making health systems more equitable. *Lancet*, 364: 1273-80.
[17] Mechael, P., Batavia, H., Kaonga, N., Searle, S., Kwan, A., Gldberger, A., Fu, L., & Ossman, J. (2010). Barriers and gaps affecting mHealth in low and middle income countries: Policy white paper. Center for Global Health and Economic Development Earth Institute, Columbia University. Retrieved on September 10, 2010 from http://www.globalproblems-globalsolutions-files.org/pdfs/mHealth_Barriers_White_Paper.pdf
[18] Goodman, A.S. (1983). The extraordinary being: Death and the mermaid in Baroque literature. *Journal of Popular Culture, 17(3)*: 32-48.
[19] Drewal, H.J. (1988). Interpretative, invention, and re-presentation in the worship of Mami Wata. *Journal of Folklore Research, 25(1/2):* 101-139.
[20] Waugh, S. (1965). *Sea Enchantress: The Tale of the Mermaid and Her Kin.* Sacramento, CA: Citadel Press.
[21] Crook, S. (1998). Minotaurs and other monsters. *Sociology, 32(3)*: 523-540.
[22] Glenn, J. (2009). The Polyphemus myth: Its origin and interpretation. *Greece and Rome (25)*: 141-155.
[23] Hard, R., & Jennings, P. (2004). *The Routledge Handbook of Greek Mythology.* New York: Routledge Books.

Enabling Nurses Access for Care, Quality, and Knowledge through Technology: An mHealth Promising Practice

Pammla Lusenga PETRUCKA[1], Sandra BASSENDOWSKI[2], HAZEL Roberts[3], DELIA Graham[4], THOMAS James[5] & GLENVILLE Daniel[6]

[1]*University of Saskatchewan, 4500 Wascana Parkway, Regina, Sask, Canada, S4P 3A3 Tel: 1 306 535-9597 Email: pammla.petrucka@usask.ca*

[2] *University of Saskatchewan, 4500 Wascana Parkway, Regina, Sask, Canada, S4P 3A3 Tel: 1 306 789-0735 Email: sandra.bassendowski@usask.ca*

[3]*Ministry of Health, P.O.Box 377, Basseterre, St. Kitts-Nevis, Tel: +1-869-465-2521, Email: hazelroberts01@yahoo.com*

[4] *Dominica State College, Roseau, Commonwealth of Dominica Tel: +1-767-440-4961, Email: delia.graham@dsc.dm*

[5] *Apogia Ltd, 36 Cedarhill Drive, Ottawa, Ontario, K2R 1C6 , Tel: +1-613-791-8592, Email: thomasfjames@rogers.com*

[6] *CompuZone Inc., Basseterre, St. Kitts-Nevis, Tel: +1-869-466-8919, Email: daniel_glen@yahoo.com*

Abstract: The goal of the paper is to highlight the need for increased emphasis on M4D for nurses and allied health professionals as integral to quality of care and quality of work life. It will focus on the social and socio-technical considerations as these relate to the appropriation and utilization of mHealth by nurses in select developing contexts. Consideration will be given to the role of mHealth in nursing in achieving, monitoring, and evaluating the Millennium Goal agenda. The paper will include an example of a promising mHealth practice known as ENACKQT in the Caribbean context. A final consideration of a series of key question about future directions and imperatives respecting mHealth in nursing in developing contexts will be rendered.

1. mHealth and Nurses: The Context and the Case

According to the World Health Organization (WHO) [1], health human capacity is "the cumulative stock of all individuals engaged in promoting, protecting, or improving the health of populations." This includes all those contributing to health services, both formal (doctors, nurses) and informal (traditional healers, volunteers). One might query 'how significant is the human capacity issue and nursing in the development context?' WHO [2] stated there is a shortage of more than 4 million health care workers in 57 developing countries. In sub-Saharan Africa, the situation is dramatic (or perhaps dismal) with only 3% of the global health care workforce being located there [3]. To make these numbers more tangible, this translates to 937 nurses for every 100,000 residents in the United States, 995 in Canada, 779 in Japan, compared with 114 in Kenya, 28 in Nigeria, and 21 in Ethiopia [4].

Concomitantly, within the developing context, we have witnessed falling costs of computing and wireless Internet which has enabled some low income countries to show capacity for advanced level technologies [5]. However, these potentials have not been fully realized due to the lack of health human capital and policy-enabling environments. Silberglitt,

Anton, Howell, & Wong [6] listed emerging technologies expected by 2020, focusing on the front-runners being health services applications (i.e., improved diagnostic and surgical methods), access to information (i.e., wireless), and environmental sustainability (i.e., water purification). The caution remains that "technological developments make more effective health care a possibility; however, they do not make it a reality." [7]

Within this context the need for strategies to optimize the scarce human resources and their capacities becomes obvious. Nurses are the largest single group of health professionals who directly influence the quality of most health services provided and their outcomes [8]. In light of the increasingly complex and diverse client groups, nurses require timely, accurate, and appropriate information. Information is a central element in decision making and an essential requisite for the effective provision and management of health care. Despite nursing's presence, increased visibility, and demands for change, the information culture within the health sector remains traditional, paper-based, and labour intensive.

Access to information in traditional (i.e., paper based) formats in the developing context has proven costly, inefficient, and insufficient. It is time now to consider Information and Communication Technologies (ICTs) [including mHealth applications] and informatics in the provision of the best possible care for their clients [9]. ICTs are seen as an indispensable tool for increasing access to information which is so critical for health services/program planning, operations, supervision, and control [10,11]. Yet, anecdotal and experiential evidence suggests minimal mHealth uptake in developing countries with the exception being in administrative and management areas [12].

The challenges are rooted in ensuring adequacy (i.e., quantity and accessibility) of information, of nursing professionals, and of technological alternatives to meet the emerging health care needs in the developing context. Amongst the needs and targets requiring such redress are the Millennium Development Goals (MDGs). The eight MDGs – ranging from halving extreme poverty to arresting the spread of HIV/AIDS to providing universal primary education – have a target achievement date of 2015. There have been pressures from the institutional to the global levels for innovative and strategic interventions to ensure success or significant movement on each of the goals. One of the promising interventions for this imperative and other critical health sector needs is placing mobile devices within the purview of nurses as a tool for information dissemination, nurse extender, and a component of the health information tool kit.

2. An M4D Promising Practice

One potential mobile technology solution is the personal digital assistant (PDA) which brings to the academic and professional toolbox powerful capabilities and portability for nurses in a wide variety of settings. [13]This device brings the potential for better information management by putting the answers in nurses' hands, not at nurses' stations. It is also a strategic innovation which recognizes that nursing documentation is moving beyond inputting data into a paper format to that of integrating collection and input directly through a mobile system at the point of care delivery. These types of mobile technologies have been featured in a number of developing country exemplars where they have shown improved practitioner capacity to treat patients effectively; increased level of job satisfaction and nurses' positive perceptions about quality of care; and enhanced cost and resource efficiencies [14]. For the purpose of this discussion, the PDA will be the focus exemplar of handheld mobile technologies. It is, however, recognized that other tools such as smart phones, tablets, cellphones, and other devices (ipods™; ipads ™) are equally as powerful.

2.1 PDAs: The Uptake

Many researchers [15, 16, 17] have considered the potential for handheld mobile devices for nurses. Imagine placing a full reference library including drug formularies, laboratory and diagnostic manuals, full text articles and books in the palm of nurses' hands. PDAs were

introduced in the mid-1990s; however, less than 600,000 North American nurses were using PDAs in their practice [18]. At the same time, a third of Canadian physicians were using some type of hand held device in their practices [19]; and 47% of US physicians [20] used PDAs in their practice compared with approximately 18% of nurses.

PDAs hold much potential in areas of access and quality of health care delivery such as:

- Ensuring provider access to the most recent and up-to-date norms and standards of care available
- Ensuring provider access to relevant and current textbooks
- Ensuring access to current treatment algorithms (i.e., HIV/AIDS care)
- Permitting recording, trending, and risk identification for client care
- Encouraging provider access local and global discussion groups for linkages and connection to discussion of health issues
- Improving accuracy, minimizing errors and speeding up information sharing [21]

Miller [22] summarized a survey conducted by Skyscape, a provider of PDA references, in which ninety percent of the 900 physicians reported better patient care, 85% had less medical errors, and 40% said they treated more patients each day. Descriptive analysis of nearly 1000 respondents revealed that the PDA drug database saved time during information retrieval, was easily incorporated into workflow, and improved decision-making.

2.2 PDAs: The International Context

PDAs are featured in a number of developing country exemplars including projects in Kenya, Uganda, Ghana, and the Caribbean. These projects range from PDAs use in clinical applications for critical diseases (i.e., tuberculosis and malaria) to medication formularies; from medical references to medical calculators.

A noteworthy example of PDA use in mHealth for development occurred in Uganda with health care workers and physicians using PDAs to access, record, and transmit data. The study considered the technology's functionality, ease of user technological uptake in day-to-day workflow, and data quality [23]. Key findings were: increased documentation accuracy, increased sharing of health information, and email utilization using PDAs. As a result of the Uganda project, the Uganda Red Cross has undertaken a similar project; and, the medical students at Makerere University have now received and are using PDAs in their studies and clinical experiences [24].

There are significant advances being experienced in the area of remote monitoring using mobile devices. PDAs and other mobile handhelds are used to collect data wirelessly from biomedical devices and store it for future access, which may include distribution and proactively triggering alerts for care teams. The most widely accepted architecture for such remote health care monitoring involves the use of a personal mobile device (such as a PDA or smart phone) linked to the biomedical sensors and with a remote server acting as the storage repository for the data. This simple approach is attractive, as it allows remote monitoring to become a value-added application which potential saves times and increases patient safety.

The power and potential of remote monitoring lies in proactive detection of emerging medical conditions/trends, customized treatments, and monitoring of remotely located patients with practitioners.

2.3 ENACKT-ing: A mHealth Exemplar

The ENACQKT project is extending a user friendly information and communications technology (ICT) infrastructure (previously demonstrated in the LeaRN project [25]), augmenting quality of worklife and care in select health care sites on five Caribbean islands, and establishing an evidence informed approach to national/regional health informatics inclusive of Personal Digital Assistants (PDAs) or similar handheld devices for health care providers. The 'in progress' project's overall research question is to determine the role(s) and impact(s) of innovative ICTs such as PDA to wireless systems in enhancing clinical practice

and patient care through access to relevant health care information within select public hospitals. The project is based on the premise that there is a lack of integration of ICTs (specifically mHealth strategies) within the health care systems in the five participating Caribbean countries which impacts on clinical practice, clinical knowledge, and evidence informed patient care. Further, this project demonstrates that enhancement and appropriation of mHealth innovations are enabling access to real time or near time access to relevant health care information (ICT-mediated) within the participating sites thereby impacting on quality and capacity of care and providers.

This research challenge informed the development of the following three objectives for this project:

- **Objective #1** To demonstrate and analyze the use of the PDA2W system and integrated applications in enhancing quality patient care for identified specific conditions (i.e., diabetes; hypertension; HIV/AIDS) based on regional protocols and standards.
- **Objective #2** To research and build capacity of the end-users (i.e., nurses; student nurses) with the PDA2W network to facilitate its appropriation and contributions to quality of work life and care through applications and technology including podcasting, NurseONE, and ongoing training monitoring.
- **Objective #3** To develop a model aimed at local and regional policy and decision makers based on the findings from Objectives #1 and #2, that demonstrates and facilitates integration of ICTs across the spectrum from Point of Care to Health Information Management Systems within the Caribbean context.

It is noted that the culture of 'evidence based' (EBP) or 'evidence informed' practice (EIP) is increasingly emerging within the Caribbean context. In the original planning this concept was somewhat peripheral; however, this has evolved and become foundational.

During the course of this project there have been increased pressures and trends from national (health ministries), regional (CARICOM, PAHO), and international (UN Foundation), to move towards an m-health agenda in community based practices. Additionally, in maximizing the use of the emerging mHealth environment, the team has introduced the Canadian Nurses' Association NurseONE portal and a remote monitoring aspect to the project in partnership with Salveo and Alcatel-Lucent. The NurseONE application has been integral to the information access and capacity building related to resources and evidence based practice. The remote monitoring component is in the early phases of its uptake in this project.

3. Looking Forward: mHealth's Promise(s)

The future for mHealth is fast and furious. The introduction and innovation of mobile technologies has continued to far surpass anyone's imagination and expectations. But, as is the case in any technology, there is no substitute for sound clinical knowledge, experience, and keen assessment skills [26]. There remain critical questions respecting the promise of mHealth in the developing world, such as:

- What are the strategies to ensure that we respect the workload of the health human resources, but get the data in the optimal format to those who can use it to make a difference? [27]
- Can ICTs be used to stem the mass migration of healthcare providers from the South to the North and ameliorate the devastating diminishment of medical and health care skills, knowledge, and experience in poor countries? And given the stress on existing personnel, can we manage the human resource challenges posed by introducing new technologies? [28]
- How will the future nursing education models in developing countries allow them to meet the demands of the workplace with inclusion of mobile technologies as part of the foundational toolkit?

- Can we re-create the current health care context in developing countries to facilitate nursing's technological uptake and full utilization of mobile technologies?

4. Conclusion

There is not singular device, strategy, or solution to the challenges facing nurses, specifically, and the health care sector, generally, in developing contexts. However, the emergence of mobile technologies, extension of accessibility to the internet/wireless environment, and successful exemplars has created the opportunity for decision and policy makers to seriously consider mHealth solutions. Nurses are well positioned to play a key role in the successful advocacy, uptake, implementation, and evaluation of mobile technologies for the improvement health outcomes in the developing world.

References

[1] World Health Organization (WHO). (2003). *World Health Report*. Geneva: Author.
[2] World Health Organization. (2006). *The World Health Report 2006 - working together for health*. Retrieved May 20, 2007 from http://www.who.int/whr/2006/annex/06_annex4_en.pdf
[3] Ibid.
[4] Kaiser Daily. (2006). *Short of health care workers in developing countries undermines essential services*. Retrieved May 20, 2008 from
http://www.kaisernetwork.org/daily_reports/rep_index.cfm?DR_ID=44073
[5] Primo Braga, C. A., Daly, J., and Sareen, B. (2003). *The Future of Information and Communication Technologies for Development*. Paper presented at the Information and Communications Technology Development Forum, Petersburg, Germany, May 21.
[6] Silberglitt, R., Anton, P.S., Howell, D.R., & Wong, A. (2006). *The Global Technology Revolution 2020*. Santa Monica, CA: RAND Corporation, National Security Research Division.
[7] Burke, L. & Weill, B. (2005). *Information Technology for the Health Professions*. *2nd Ed.* Chicago, IL: Prentice Hall.
[8] Laschinger, H.K.S. (2008). Effect of empowerment on professional practice environments, work satisfaction, and patient care quality: Further testing the nursing worklife model. *Journal of Nursing Care Quality, 20*.
[9] Pan American Health Organization (PAHO). (2004). *Nursing and Midwifery Services Contributing to Equity, Access, Coverage, Quality, and Sustainability in the Health Services*. Washington, DC: Health Services Organization (OS) - Technology and Health Services Delivery (THS).
[10] WHO. (2003).
[11] PAHO. (2004).
[12] Canadian Nurses Association. (2006). *E-Nursing Strategy for Canada*. Ottawa: Author.
[13] Peterson, M. (2004). PDA and its future in nursing. *Kansas Nurse*, October.
[14] Bryant, M. (2002). *The expanding role of ICTs in HIV/AIDS program design and implementation*. Retrieved November 13, 2005 from
http://topics.developmentgateway.org/hiv/sdm/previewDocument.do~activeDocumentID
[15] Choia, J., Chun, J., Lee, K., Lee, S., Shin, D., Hyun, S., Kim, D., & Kim, D. (2004). MobileNurse: Handheld information system for point of nursing care. *Computer Methods and Programs in Biomedicine, 74(3)*: 245-254.
[16] Blair, R. (2006). Take-along tech and the training of specialty nurses. *Health Management Technology*, 27(3).
[17] Colevins, H., Bond, D., & Clark, K. (2006). Nurse refresher students get a hand from handhelds. C*omputers in Libraries*, *26(4)*: 6-8; 46-48.
[18] Davenport, C.B. (2004). *What Nurses Need to Know about Personal Digital Assistants (PDAs)*. Retrieved March 20, 2007 from http://eaa-knowledge.com/ojni/ni/8_3/davenport.htm
[19] Martin, S. (2003). News: Pulse. *Canadian Medical Association Journal, 169 (9)*. Retrieved February 5, 2004 from http://www.cmaj.ca/cgi/content/full/169/9/952a
[20] Solworthy, Y. (2003). *RNs are mobilizing*. Retrieved on October 22, 2005 from http://www.rnpalm.com/RNs_are_Mobilizing.htm
[21] Bryant. (2002).
[22] Miller, J. (2003). Doctors say PDAs improves [sic] medical care. Retrieved on October 22, 2005 from Rim Road: News at http://www.rimroad.com

[23] International Development Research Centre. (2004). *Uganda Health Information Network*. Technical report – IDRC Grant No. 102136-001. Ottawa, ON: IDRC.
[24] bridges.org. (2003). *The Satellife PDA project*. Retrieved March 12, 2007 from http://www.bridges.org/case_studies/351
[25] Petrucka, P., Bassendowski, S.L., James, T., Anonson, J., & Roberts, H. (2009). Mobile technology in a developing context - Impacts and directions for nursing. In Staudinger, B. & Osterman, H., *Handbook of Research in Nursing Informatics,* (23 pages). Tirol, Austria: UMIT Press.
[26] Baumgart, D. C. (2005). Personal digital assistants in health care: Experienced clinicians in the palm of your hand? *Lancet, 366(9492)*: 1210-1222.
[27] Satellife. (2005). *Handhelds for health: Satellife's experience in Africa and Asia*. Ottawa, ON: IDRC.
[28]Ibid.

Designing mobile services for non-literate communities

Gabriel WHITE[1]
[1]*Small Surfaces, GPO Box 9817, Melbourne, 3001, Australia*
Email:gabrielwhite@gmail.com

Abstract: Mobile phones are fast becoming a dominant delivery channel for services in developing countries. With almost one billion non-literate people in the world, the majority of them in developing countries, the need to create products and services that cater to communities with low levels of literacy is becoming more pressing. At present, effective use of almost all digital systems requires relatively advanced levels of literacy. The design of Motorola F3, a mobile handset designed specifically for non-literate people in developing countries is used as an example to show how some of these challenges can be overcome. It is shown that navigation and basic understanding of a service can be eased through simplification of the user interface to reduce cognitive load, and by encouraging the use of spatial and visual memory. In conclusion, a set of principles for the design of systems for non-literate people is presented.

1. Introduction

Access to mobile phones has been shown to have substantial benefit to the lives of people in developing countries. Ease of communication and access to up-to-date pricing information has been shown to help improve incomes of farmers.[1] Mobile money transfer services, most notably M-PESA, have made it easier for people earning money in cities to send cash home to rural families.[2] Several countries have launched services that allow people to determine whether medical drugs they have purchased are real or fake. The net economic effects have been demonstrated as well: research by the London Business School found that each additional 10 mobile phones per hundred people increased the GDP growth by up to 0.6 percent [3].

Many organisations that focus on development have chosen mobile phones as an important element in their strategy for facilitating change. While significant headway has already been made in delivering mobile services to poor populations, there are still some basic access issues that need to be solved for even those with the means to purchase a phone. Literacy is one of those challenges. Literacy is no small problem: more than three quarters of a billion people, or one in five adults, do not have even basic levels of literacy according to the UNESCO Institute for Statistics, with most of those people living in developing countries [4].

As governments, NGOs and businesses are increasingly working to deliver services to poorer populations through the use of mobile technology, there is a growing need to ensure that the solutions being created are able to cater both to literate and non-literate people. For governments wanting to improve health outcomes for poor rural populations, understanding how to use technology to connect with and change behaviour of people who are not literate will have the potential to significantly increase the reach and effects of such programs. For businesses which are targeting poorer populations, ensuring that the products and services can be understood and used by non-literate people will increase the potential market size.

Using mobile technology in any sophisticated way, though, requires relatively advanced levels of literacy. First, people need to be able to read (and sometimes write) to use a mobile phone. They need to be able to understand the text that is displayed to them on the screen in order to be able to navigate the menu system, and then to understand the functionality that is subsequently presented to them. Second, people need to be technologically literate. To successfully interact with a mobile phone, users need to be able to understand, for example, the concept of a menu-system or data entry. When designing services for non-literate people, many standard design working assumptions just do not apply. Experience derived from the research and design for the Motorola F3, a mobile phone designed specifically for use by non-literate people in developing countries, provides some unique insights into these issues.

2. Effective Visual Representation of Functions

Most people who UNESCO defines as non-literate would have some level of reading ability [5]. Most people can read numbers; many 'non-literate' people can recognize at least a handful of words and symbols. The practical benefits of learning a small set of words are significant enough for people to be motivated to learn in order to help them in their day-to-day lives. But most of the basic features available in mobile phones are potentially confusing for those who cannot read. Beyond entering a phone number and initiating a call, most functionality requires an ability to understand written labels and symbols used to communicate the product features and requirements.

The design solution for the Motorola F3 includes a visual icon-based user interface that is in turn supported by audio voice prompts. The voice prompts are used to help people navigate and learn the user interface, and to guide users through the tasks supported by the phone, such as changing the ring tone. The process of setting the alarm, for example, is guided using audio prompts as users step through each part of the task. The prompts also provide both audio and visual confirmation that the alarm has been successfully set. Significant efforts were made to provide the voice prompts not just in dominant national languages, but also in regional dialects—six languages for India alone.

By involving end-users throughout the design process, the design team was able to create visual icons that were meaningful and intelligible to target users. Subtle variations in the representation of objects had a significant impact on how effectively people could understand the meaning of the icons. For example, initial designs for the 'Call History' function used an icon based on an image of a classic phone handset of the style of desktop phones from the late 20th century. This representation was often not recognisable by people who had no exposure to telephones until recently, and so an icon that represented the exact shape of the Motorola F3 was used much more successfully instead.

When designing for non-literate people, designers should rely more heavily on mimicking real-world objects, interactions and commonly understood metaphors. Conceptual metaphor or abstraction has a much greater potential to create confusion for people who are not literate than for people who are able to read. For example, it was a challenge to find an effective representation for the 'Select Your Ringtone' function on the Motorola F3. The commonly-used iconic representation of a ring tone's function -- musical notes -- meant nothing to the non-literate target users of the phone. The most effective icon was a bell, an object commonly encountered by people in their everyday lives.

Finding effective representations of real-world objects can pose challenges in designing systems that are intended to be used in a variety of cultural contexts. In the case of the ring tone example above, cultural variations in the vernacular design of bells meant that finding a solution that was intelligible for all the target countries for the product was a challenge. In some cultures bells are traditionally curved at the top, in others they are normally square; in some cultures the clapper typically has a ball at the tip, in others not. These subtle variations in design had a big impact on people's ability to effectively interpret the meaning of icon.

3. Using Spatial Memory to Aid Learning and Use

Designing products and services to make use of people's ability to learn and repeat gestures makes them easier to use. Our everyday existence in the world is predicated on ability to interact with (and avoid) objects, and this is an ability that is very likely innate [6]. Taking advantage of people's ability to use their spatial reasoning and memory in digital design can make it easier for non-literate people to learn how to use and successfully interact with a product or service.

In spite of the challenges presented by lack of literacy, people who cannot read are able to successfully interact with some kinds of technology, very often using spatial memory. Audio-tape players, for example, are commonly used in many developing countries. Written labels that describe the function of different buttons and switches on a tape player cannot be used by non-literate people. Instead the Motorola research team found that people learn and remember the physical location of the controls, and their distinct appearance. Indeed, for most of the devices and tools used by non-literate people, each control has a unique location, appearance, and dedicated function. This makes it much easier for people (both literate and not) to use their spatial memory to learn and continue to use the device.

Often, non-literate people use their spatial memory to successfully interact with a digital system that would normally require some level of reading skill. In India, for example, the research team learned that non-literate people use automatic teller machines and that they do so by learning a sequence of gestures: moving their hands from button to button using a remembered sequence of movements. In situations like this, physical movement, rather than understanding the words shown on the screen, grounds the user's pattern of interaction.

It is often not possible to use these patterns of interaction for any sophisticated digital system. The same individual controls will often have different effects on the system in different situations. The "OK" button, for example, used to confirm actions on many mobile phones will have very different effects depending on the context in which it is used. In one situation it will delete a contact from the address book, and in another it will open the web browser. This functional overloading of controls limits people's ability to use their spatial memory skills to learn and use the system. This problem is in turn compounded by the fact that mobile devices are inherently small, and so only have limited space for unique buttons or controls.

The design of the Motorola F3 tried to maximise people's ability to make use of their gestural and spatial memory. First, key functions were made available through the keypad rather than the menu. For example, there is a dedicated button for the address book, the function most used, after those of making and receiving phone calls. Checking a prepaid account balance, a task carried out commonly by people who often have little money. As a consequence it is available directly from the keypad. By moving the most important functionality out of the digital user interface and into the physical controls of the device, users were more easily able to access the phone's features by utilising spatial memory.

4. Designing Simple Navigation Schemes

Of course, not all functionality in a digital system can be made available through physical controls. In fact most devices such as mobile phones have so many functions that it is necessary to organise them into sets and subsets of functions. Typically, this is achieved through some kind of menu system, whereby major groups of functions are presented first (for example, 'Messaging' or 'Media') and then subsets of those functions are subsequently made available depending on the selection made by the user (for example, 'Write New Message' or 'Photo Library').

The principal challenge non-literate people face in using complex digital devices is that the same physical space - the screen - is used to represent many different things. In one situation, what is shown on the screen could represent a list of contacts; in another, it is a navigation menu or web browser. Reusing the same physical space of the screen for vastly

divergent functionality in this way is at odds with people's bias towards using their spatial memory to interact with objects in the world. Without moderately advanced reading skills, it becomes very difficult to learn and remember how to use the range of available functions.

This is a challenge inherent in the design of mobile products and services. Mobile phones have small displays, and are intended to deliver a considerable amount of functionality to end users. On desktop or laptop computers, designers have the luxury of large screens that afford the possibility of building in both more cues that help orient the user and dedicating specific regions of the screen to particular functions. But with mobile devices screen real estate is scarce, and thus the opportunities to provide orientation cues are much less significant.

The Motorola design team addressed this problem by reducing the functional complexity of the Motorola F3 so that navigation and orientation issues would be minimised. Through research and concept validation on the ground in India, China and Brazil, the team determined the essential device feature set that is most important for the target customers of the device. By focusing on delivering only the most important functionality to end users, the menu navigation could be simplified. Instead of having a menu multiple layers deep, the Motorola F3 had a single-level menu that provided immediate access to the most important features. Access to setting the alarm or changing a ringtone, for example, were both available directly from the first level in the menu and needed no additional navigation.

By reducing the functional complexity of the device, it was also possible to dedicate an area of the screen to the display of the menu. The on-screen menu was displayed across the bottom area of the screen, with each of the icons representing the functions available through the menu being shown sequentially left-to-right as the user scrolls through the menu. This approach has two significant advantages: first, the menu has a dedicated area, so people can use their spatial memory to remember where the menu is located. Second, each of the items within the menu has a dedicated location so that it is easy for users to remember the meaning of the options using their spatial memory.

4. Other Considerations

While not explored by the Motorola F3 design team, touch-screen devices offer some significant opportunities for the design of systems for non-literate people. Firstly, touch screens use direct manipulation rather than indirect manipulation like that used on phones controlled by hard buttons on the device. Direct manipulation systems allows users to act directly on a screen object to carry out an action, while most mobile phones use indirect manipulation where a button or other physical control is used to act on what is displayed in an abstracted rather than direct manner (for example, using directional keys to scroll through a menu). Direct manipulation metaphors map directly to spatial interaction with the world. It is also much easier for people to remember where controls are: remembering to use the 'square control on the top left corner' is easier to learn than remembering to 'scroll to the third item in the list'.

When designing digital systems, literacy should not be considered solely on the basis of an individual's competence. Jan Chipchase has described the concept of 'proximate literacy', whereby people have some level of literacy competence due not to their own skills, but arising from those around them [7]. With the help of others who are either familiar with the tools or are able to read instructions, people are able to learn how to use technology in some basic ways even if they themselves are not formally literate. In the same way that using familiar metaphors when creating visual icons was shown to be important, it can also be very useful for designers to re-use existing metaphors or paradigms for interaction that are already familiar to the user. By mimicking the interaction of systems the end user (or person who is instructing the end user) are familiar with, the path to learning becomes easier. Thus it is important not just to consider the competence and attitudes of the end user of a system, but also the design attributes which are going to make the system easier to understand for people who may be instructing others how to use it.

5. Recommendations and Conclusion

The process of designing of the Motorola F3 yielded useful insights into the design of digital products and services for non-literate communities. The recommendations below are based on this experience.

- Understand that non-literate people are unlikely to be familiar with common computer interaction paradigms. Basic computing concepts such as menus and radio buttons may not be known or understood.
- Simplify functionality to the bare essentials to reduce the cognitive load created by remembering how to use the system. Reducing functionality ensures that users can focus on learning only the most important functions.
- Create shallow, simple menu navigation schemes to reduce cognitive load and create a gentler learning curve. Menus are not necessarily familiar to non-literate users, so make them as simple as possible in order to ease learning.
- Use iconic representation and a voice-assisted user interface in addition to written on-screen prompts. Visual icons are the most memorable way to represent functionality for non-literate users.
- Use spatial orientation and metaphors as much as is possible. Create dedicated locations for functions and use motion to imply spatial relationships between various functions.
- Consider using touch-screen services if practical. Touch-screen devices are inherently more spatially direct, and thus easier to learn to use.
- Involve end users through the entire design process to ensure that the product or service is designed appropriately to their needs. End users can have a significant positive impact on the design of a service if they are involved in appropriate ways from the beginning of a project.

Non-literate people make up a significant proportion of the world's population. When designing digital products and services in the development context, it is important to ensure that this group's needs are catered to appropriately. Functional simplification, voice-supported icon-based navigation, and using spatial orientation are all important design elements that can help increase the number of non-literate people who are able to access, utilise and gain from the provision of digital products or services.

References

[1] Jensen, R. (2007) The Digital Provide: Information (Technology), Market Performance, and Welfare in the South Indian Fisheries Sector. *The Quarterly Journal of Economics.* Pp879-924.

[2] Mas, I and Morawcynski, O. (2009) Designing Mobile Money Services Lessons from M-PESA. *Innovations*. Pp77-91.

[3] Waverman, L., M. Meschi and M. Fuss. (2005) The Impact of Telecoms on Economic Growth in Developing Countries. *Vodafone Policy Paper Series 2*. London, United Kingdom.

[4] UNESCO Institute for Statistics: Literacy Topic. http://www.uis.unesco.org/ev_en.php?ID=6401_201&ID2=DO_TOPIC (Retrieved on September 30, 2010)

[5] Findlater, L, Balakrishnan, R, and Toyama, K. Comparing semiliterate and illiterate users' ability to transition from audio+text to text-only interaction. *Proceedings of the 27th international conference on Human factors in computing systems*. Pp1751-1760.

[6] Wills, T, Cacucci, F, Burgess, N, and O'Keefe, J. (2010) Development of the Hippocampal Cognitive Map in Preweanling Rats. *Science.* Pp 1573-1576.

[7] Chipchase, J. Mobile Phone Practices: The Design of Mobile Money Services for Emerging Markets. (2009). http://www.slideshare.net/janchip/mobile-phone-practices-the-design-of-mobile-money-services-for-emerging-markets (retrieved on September 30, 2010)