Evaluating the potential of automated telephony systems in rural communities:
Field assessment for Project LWAZI of HLT Meraka

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Abstract

We describe sociological fieldwork conducted in the autumn of 2008 in two rural communities of South Africa: Tshidilamalomo, in North West Province, and Kgautswane, in Limpopo Province. The goal of the fieldwork was to evaluate the potential role of automated telephony services in improving access to important government information and services. Our interviews, focus groups and surveys revealed that an automated telephony service could greatly support current government efforts to effectively connect citizens to available services, provided such services are toll free, in local language, and with content relevant to the particular rural community.

1. Introduction

"*South Africa's priorities are to meet basic needs of all South Africans [...], to redress disparities in wealth and **access to resources**, to create employment, to stimulate and sustain economic growth and to improve the quality of life for all South Africans*" (State of South African population 2000: 27).

Access to information is one of the key ways to unlocking social and economic growth. Through information, people will learn where, when and how to improve their livelihoods. In this millennium, information and communication technology (ICT) plays a central role in enabling widespread access to information, largely in the form of computers, internet and mobile telephones. In rural communities of developing regions, where infrastructure, distances, language and literacy are barriers to access, but where mobile phones are prevalent, automated telephony services could bridge an important gap and make a positive social impact.

"South Africa has the most developed telecommunications network on the continent" (South African year book 2006/2007:131)

South Africa is said to be the leader in ICT in Africa and is the 20th largest consumer of ICT products in the world (South African year book 2006/2007: 131). In particular, mobile phone usage has experienced massive growth due in part to its accessibility by non-literate people, and its "leapfrog" development, which skipped the interim solutions adopted in the developed world (Tongia & Subrahmanian, 2006). The amount of mobile phone users in South Africa is an astonishing 30 million people (out of a total population of 47 million) (Benjamin, 2007). The percentage of rural and urban households with mobile phones tripled from 2001 to 2007, while "landline" use declined (Figure 1).
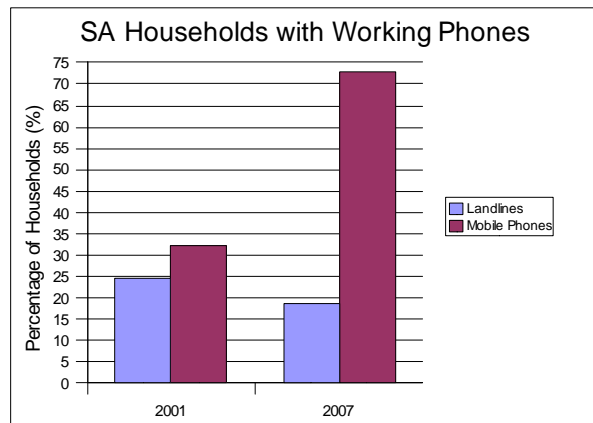

Figure 1: Phone use in South African Households. [Community 2007 Survey, Statistics South Africa]

Telephone-based technology also overcomes barriers such as language and literacy. In South Africa, there are eleven official languages. Private companies, NGOs and government offices who wish to reach South Africans through print or audio, find it extremely costly to do so for each language. English is by far the preferred language of the economic and political elite, and is commonly

assumed to be a "lingua franca" of South Africa. Heugh (2007), however, shows that in terms of proficiency, there is no single lingua franca (Figure 2). In fact, less than half of South Africans understand English, the language in which most government messages are currently disseminated (Heugh 2007:PANSALB 2001).
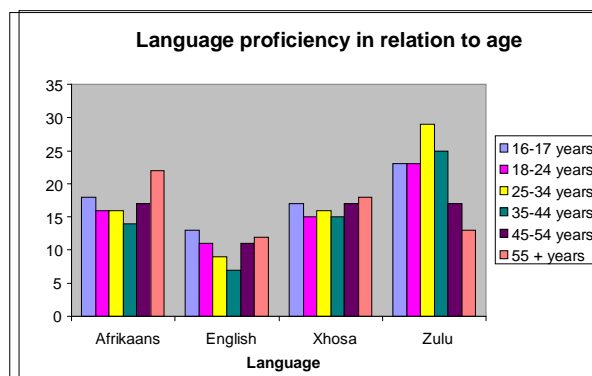

Figure 2. Language proficiency of South Africans

Heugh (2007) also reports that between 35% and 45% of South Africans above the age of 16 cannot read or write. Illiteracy is disproportionately high for women and for people living in KwaZulu-Natal, Limpopo and Mpumalanga. These three provinces also have a very high incidence of people living in rural areas.

Communities in rural areas struggle to access government services due to their remote locations. Most community members must travel long distances by foot or rare and costly public transport to access basic services. In their study of evaluating the costs and strategies of coping with chronic illnesses (SACOCO), for example, Goudge et al. (2007) found that people in rural areas do not go to (free) health care facilities because they cannot afford transport.

NGOs face the same challenge: Many produce information to assist households affected by HIV/AIDS, for example, but most of the materials are published on websites. Due to literacy, language, and a lack of infrastructure, the information remains inaccessible to the people who need it, especially those living in rural areas and townships (Benjamin, 2007).

We believe that automated telephony systems, especially those powered by human language technologies, can improve connection and access of citizens who may currently be excluded from government services due to language, literacy and location.

2. Background

The South African government is aware of the need to improve citizen access to services, as well as the specific challenges that rural communities face. In this section, we highlight a few ways in which the government is responding to these challenges (Section 2.1) and describe the particular ICT project known as LWAZI (Section 2.2).

2.1 Rural government service delivery

Thusong Service Centres (TSCs), formerly known as MPCC (Multi-Purpose Community Centres), were initiated in 1999 as a national initiative to integrate government services into primarily rural communities, where services and participation by citizens was limited due to the long distances they needed to travel (TSC 2008). On June 7, 2008, the 100th TSC was opened. Each TSC is a one-stop centre providing integrated services and information from government to rural community members close to where they live.

Community Development Workers (CDWs) were formed in 2004 as a national initiative to further bridge the gap between government services and eligible citizens, especially the rural poor (CDW 2008). CDWs are members of rural communities who are trained and employed by the Department of Public Service and Administration (DPSA) under the office of the presidency. They work within their communities and coordinate with municipal and provincial offices. The primary responsibilities of a CDW is to keep informed, notify and organize citizens about events, inform community members about services for which they are eligible and follow up with those members to ensure they successfully received these services.

In addition to the widely used media, such as radio, newspapers and magazines, government is also relying on ICTs to reach as many populations as possible. In addition, the department of communications and telephone providers have negotiated universal service obligations (USO) for the improvement of access to government information. These included supply of free phones

and public emergency services, providing internet access and computers to schools, public payphones in rural areas (at TSCs, for example) and free SIM cards. (South African year book, 2007).

Figure 3. Public phone outside the Thusong Centre in Tshidilamolomo

2.2 The LWAZI project

The Human Language Technology (HLT) group of the Meraka institute was awarded a three-year contract by the Department of Arts and Culture to develop a multilingual telephony system that would assist South African government service delivery. "LWAZI," derived from the IsiZulu word for *knowledge*, aims to make a positive impact in the daily lives of South Africans by connecting them to the government and health services they need (Lwazi, 2008). The ability of telephony to overcome barriers of language, literacy and distances, led the Lwazi team to imagine an application for the technology which would either be modelled after the current successful, national initiatives (e.g., TSCs, CDWs) operating primarily in rural areas, or which would directly support them.

3. Method

In order to evaluate the potential role of automated telephony systems in rural communities, the authors conducted site visits in 9 rural communities across 5 districts of South Africa. At each site visit, we conducted key informant interviews, focus group discussions, 'shadowing,' and community and household interviews. In particular, the team sought to investigate:

- **Information Needs.** *i.e. What types of information do rural communities primarily need?*
- **Information Sources.** *i.e. Where is this information likely to come from?*
- **Cultural and Social Factors.** *i.e. What is the language, gender, age, geography and cultural background of the community?*
- **Suitability of technology.** *i.e. Is speech an appropriate medium for an information service?*
- **User experience.** *i.e. What is the literacy level of the target group? What other technologies have they been exposed to in the past?*
- **Potential uptake.** *i.e. What is the usefulness, usability, and sustainability of a speech-driven telephony service likely to be?*

4. Results

In this section, we share findings from site visits in two communities: Kgautswane (Section 4.1) and Tshidilamolomo (Section 4.2). Drawing on themes seen in these two villages, we will illustrate the potential for automated telephony systems in rural South Africa, including possible applications, critical resources needed, and predicted impact of the technology in people's day-to-day lives.

4.1 Kgautswane: Limpopo Province

Kgautswane is located 350 kilometres from Pretoria in the Limpopo province. Limpopo has three principal languages: Sesotho sa Leboa (SePedi), (52.1%), Xitsonga (22.4%) and Tshivenda (15.9%). Limpopo has a population of 5.3 million people and an unemployment rate of 35.6%. The economy of the province is held largely by the mining sector and more than a third of adults older than 20 years have never received education (SA Year book 2006/ 2007).

There are 20 villages that comprise Kgautswane, located in beautiful mountains. The area is rural with dirt and gravel roads. Small businesses are common in this area; there is a '*spaza*' (a one-room shop) every 500 metres. There are 3 primary schools, 4 high schools, and a number of crèches for children under 6 years. Three buses in the morning (at 06h00, 08h00 and 10h00) travel 10 km to the nearest town (Ohrigstad) and neighbouring big cities, Lydenburg and Burgersfort. The majority of households in this area have electricity. Water is accessed through 'unreliable' communal taps or rain tanks.

The Thusong Services Centre (TSC) is headed by a woman. It is at the centre of the village, off the main road. There are no signs to the centre along the road or at the gate. The gate next to the centre is the entrance to the local clinic. The two big gates to the clinic are always closed (only opened when people go in and out). There is also no sign indicating that the building is a clinic.

The TSC focuses on six services namely: government social and administrative services, office services, education and skills development services, local economic development (LED) services, business services and community, information and communication activities.

The Kgautswane community speaks XiTsonga, IsiNdebele, IsiSwati and SePedi. The community learns about the services of the centre through home-based care visits and the chief. The centre manager sometimes sends messages to the community through school children. These messages are in the household's languages. In most instances, the elder members of the community seek information on their grants dates and possible change in policy, information on how they can get free services for the grandchildren in their care, and health services. The youth seek information on employment opportunities.

> Miriam is a pensioner who lives with three grandchildren. Their mothers (her children) live in Tembisa, a township in Gauteng. One of the daughters is working as a domestic worker and the other one is unemployed. Her household is struggling to make ends meet on her monthly R400 pensioner grant and R800 foster grants. She spends most of her money on food. The mud house itself is falling apart. Miriam does not have a telephone or cell phone. Her children sometimes bring an additional R200 to R300 when they come, but they visit irregularly. She lives within walking distance to the Thusong Service Centre which is a blessing for her in times when the children are sick or when she needs assistance such as reading a letter from children (since she does not read), advice and guidance when there is no food in the house.

Miriam of Kgautswane

During our visit to this centre we met one of the two CDWs in the area. Her services include assisting people to obtain relevant documentation, informing the counsellor of community needs and informing the community of meetings and events at the counsellor's office. She owns her personal mobile phone and everybody contacts her on it. For her communication costs, she uses approximately R55 per month. She does not receive a stipend for telephone or transport, although both are essential for her job.

The CDW reported that there were no homeless people in the community and that a majority of people could read and write their home language. The major economic provider for Kgautswane is agriculture and mining. There are public phones (by both Telkom and the four mobile service providers). The common mode of public transport is buses and taxis. On Sundays, only taxis operate. For the school-going children, the biggest challenge is lack of identity documents and birth certificates. This hinders them from registering and therefore from receiving social grants.

There are no medical doctors, pharmacists or birth attendants in this community. The distances to the available health services (clinic and community health workers) vary depending on the location of the household to the main road. On an irregular basis there is a mobile clinic. The CDW said that the community's major problem with the health services was that nurses were rude and that the clinic ran out of medication. She works closely with counsellors, and Home Based Care is the only active NGO in her community. The major concerns that the community has with the government are improvements to roads and access to water. There is also a huge problem of politics versus public service. The total monthly income per household ranged between R600 and R1000.

4.2 Tshidilamolomo

Tshidilamolomo is 115 kilometres east of Mafikeng, itself 50 kilometres from Zeerust in North West Province, and only 100 m from the border with Botswana. The North West province has 3.3 million people, 65% of them speak Setswana, then Afrikaans and IsiXhosa (8% and 6% respectively). The province has an unemployment rate of 32% and a literacy rate of 57% (SA Year book 2006/2007).

Figure 4. Private phone operator in Mafikeng.

The road from Mafikeng was only recently paved up to Tshidilamolomo in the last 3 years. The Thusong Service Centre there is also very new. There are no other facilities or private establishments in the town. There is one primary, one secondary, and one high school. There are several small tuck shops, and one bricklayer and Home Care group.

The Thusong Centre at Tshidilamolomo includes the following offices, with varying days of operation:
● South African Police Services
● Health Clinic
● Social Development
● SASSA (Monday through Friday)
● Home Affairs (Thursday)
● Department of Justice (once a week)
● Dept of Correctional Services (once a week)

The CDW of Tshidilamolomo also agreed to participate in our community survey. We learned that most community members could read and write their home language fairly well but that their English proficiency was poor. Many adults are trying to improve their literacy by attending Adult Basic Education and Training (ABET). The common economic provider is agriculture, manufacturing and retail. Transport facilities in the area are buses and taxis. There is one bus in the morning going to town and another one coming from town in the late afternoon. Many people travel by donkey cart. The taxis are new as part of the government recapitalisation programme. The distance to the nearest public transport is approximately 15 kilometres.

The challenge for the education system in this area is that there is close to 30% disabled children in the area. These children struggle to get education because there are no schools accommodating them. The nearest school accommodating these children is over 200 km away from the village. The CDW said that the community also has a challenge in that children as young as 10 years of age are being sexually active.

As in Kgautswane, there are no doctors, pharmacist or midwives in this community. There are 22 community health workers and 10 traditional healers. The nearest hospital and dispensary is 115 km away. Tshidilamolomo's major health problems is HIV/AIDS and related sexual illnesses. Again, as in Kgautswane, the community feels that health care providers are not practising "Batho Pele" principles of treating patients with respect and dignity. There is, however, an established home-based care group which takes care of the needy, more than the formal structures. The CDW said that the local governmental facilities such as the TSC and the police station were not accessible to the disabled members of the community.

This community's main social problem is that there are a number of mud houses which do not have electricity. The typical monthly household income in this community is R2600 (range R500 to R2000). In addition, she told us that this community was illiterate (meaning they did not have tertiary education) but friendly. She said that the counsellors needed to do something about public participation because community members were often scared to talk about problems.

George and Georgine are pensioners who live with three children, from 6 to 18 years old. The children lost their mother (Georgine's sister) when she died in a car accident about a year before our visit. Their father was a teacher and also died in a car accident two years earlier. One of the children has a diploma in electronic engineering but is struggling to get employment. The other has completed grade 12 but is unable to continue with school because he is waiting for their parents' pension money from the Department of Education. The youngest is at school. The family currently lives on the youngest child's grant of R210 and the pension of the couple (R940 each). The two teens get a chance to read newspapers and access the internet when in town (Mafikeng). They use the computer for email, general news and education. Georgine has a cell phone. Like all the locals, this household travels to

town once a month (after they have received grant payment). These pensioners can read and write their home language but can only speak English.

George and Georgine of Tshidilamolomo

5. Discussion

Information Needs and Sources
The communities of Kgautswane and Tshidilamolomo, as in other villages in rural South Africa, have different needs according to age group. The elderly population want to be able to access their pension fund (R940) with which they support their grandchildren. In most instances the parents are in other provinces seeking employment or working a low-paying job. In addition to pension information, the elderly in rural areas are interested in the state of the country's politics. They therefore like to be informed about the latest policy or current political news. This information they get via local radio stations or television (both in home languages).

On the other, hand the young are interested in entertainment, employment opportunities and social services. In the two communities discussed, youth's enthusiasm seems to differ, but the high level of unemployment is a common factor. In most instances, local employment opportunities would be provided by government departments or outside research groups. This will be communicated via the Thusong centres or local newspapers.

A telephony system in this instance would bridge the transport gap to the services needed by the community. For example, if they hear about a change in qualification age for child grant, they can call the system for full details. Or if there is going to be a new research project in the area they could get details thereof on the system.

In a recent deployment in Botswana, an automated telephony system that provided basic health information to caregivers of children with HIV was found to successfully support one small part of nurses' and doctors' roles in providing quality health care (Sharma et al., submitted).

Figure 4. Pamphlets, brochures, and magazines at a TSC. Materials are printed in dominant local languages, in this case English and Afrikaans.

Cultural and Social Factors
The rural areas in South Africa are typically characterised by particular language dominance. Of the two provinces we visited, North West is predominantly Setswana, while Limpopo has three dominant languages: SePedi, Xitsonga and Tshivenda. The population is usually older, taking care of grandchildren whose parents visit once or twice a year. Because economically there is usually no activity, these communities depend on government social grants.

Geographically the remote locations of these communities present a challenge to service provision. People are used to walking long distances or opting not to get services because of the cost of transport. The introduction of the CDWs was seen by many community members as a bridge to government service, but CDWs had a challenge of reaching all households in their communities. This is mainly because of the remote locations of the communities, which makes it a challenge to reach even by car.

Most households have at least one cell phone. A telephony system would bridge this gap easily. HLT is developing a system which will accommodate all eleven South African languages. Since it is going to be piloted at provincial level, each province will only have information in the local language/s.

ICT projects have been successful in connecting experts in urban areas to people in rural areas in places like India. An automated telephony system could allow citizens to leave questions about health

or government in their local language which could be answered later in the form of a voice message.

Suitability of Technology
The proposed multilingual telephony system is going to be free. Ideally, the team hopes to make it irresistible to government departments that they will find it the most useful way of disseminating their information.

An example in Tshidilamolomo is at the police station. They have an emergency line used by community members. Community members send a 'please call me' to this number and then the police calls them back using the station's land line. This shows that even though community members may have cellular phones, they may not have money to load airtime to call in times of emergency. The police commander mentioned that this line is often abused by both the community and police officers themselves.

User Experience
The user experience of telephony differs between young and old. As mentioned earlier, households have at least one cell phone. The older members of the community use it to make and receive calls from friends and children who are away from home. They do not know how to send text messages. Some of their children have saved the full 'Please call me' line as a quick dial so that they just press and dial them in cases of emergency. The young people on the other hand are well versed with telephony. Most of them are also familiar with the basic use of a computer. There is a challenge though that the available computer rooms are not properly managed and therefore unused.

Potential Uptake
We saw two main areas where a telephony service could be very useful. One area is in supporting communication between community and government. For example, a multilingual, automated service could direct calls from community members to the appropriate TSC office or CDW, or perhaps provide locally relevant information such as office hours of operation, directions to the office, and eligibility requirements for services. Such a service might reduce the amount of calls that a TSC office or CDW would need to take personally and could likely save a community member a trip if they were sure beforehand what paperwork they needed to bring and when the office was open. It is important to mention here that the project will get a buy-in from the local councillors of the communities where the pilot projects will be located.

Another area in which a telephony service could be useful would be in facilitating internal communication among government service providers. CDWs may need to meet community members face-to-face whenever possible. Coordinating with government staff across the municipality, district, province, or country could happen remotely and efficiently if government staff could use an automated telephony service to send audio messages to several staff members at once. The national coordinator for CDWs, for example, could notify every CDW in the country of upcoming events and policy changes with a single phone call.

Our field work revealed the effectiveness of national government programmes to connect rural citizens to available government services. Our major finding was that although particulars about the communities differed, individuals in both Kgautswane and Tshidilamolomo experienced barriers to information access that could be solved with automated telephony services, provided that such services are toll free and localized to the language and information relevant to the particular rural community.

6. Conclusion

The goal of this paper was to evaluate the potential role of automated telephony services in improving access to important government services. The Lwazi project will create an open platform for telephone-based services for government to provide information in all eleven languages. The design of the technology makes accessing government information as easy as calling a friend. An automated telephony system in rural South Africa will be especially useful as it will cut down on the distances that people travel to get information on government services and that government workers travel to check in with municipal offices.

A successful pilot in one of these communities will mean a national service for all South Africans to empower themselves through improved access to information, services, and government resources.

7. Acknowledgements

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