First Mile First Inch

Lack of access to communications and information services remains a major obstacle to the economic and social development of the rural poor throughout the world — nowhere more so than in Africa.

Sadly, technological solutions that have proved effective in developed countries are often beyond the means of remote, scattered and poverty-stricken communities. Thus in South Africa, Telkom's ambitious rollout of communications infrastructure in rural areas has all but stalled with some 850 000 lines having been disconnected.

In the face of this reality, a collaborative project known as First Mile First Inch (FMFI) is working to identify and develop models and low-cost 'shoestring' technologies that will overcome such impediments to progress. Specifically, FMFI seeks to address the needs of rural communities by implementing low-cost, affordable technolo-

continued on page 2

The scenic picture of the Peebles Valley illustrating the challenges of implementing a mesh network in a rural setting.

Shoestring Technologies Improve Information Flow to Poor in Developing Nations

To benefit from information and communications technologies (ICTs), disadvantaged populations need access that is both affordable and available in an appropriate social and cultural context

FMFI projects demonstrated how access to Internet connectivity can be managed and maintained collectively by communities. This they called the "First Mile", turning the old telco concept of "Last Mile" to the customer on its head. The additional concept of "First Inch" refers to the need for applications that are easy to use by the communities they are designed to assist.

Innovative solutions embracing both First Mile and First Inch technologies have demonstrated significant success and deserve not merely wider recognition, but wider implementation.

First Mile First Inch

continued from page 1

gies and applications for Internet access and connection to the global information society that result in high use, potential revenue and/or dramatic cost savings for institutions and end users, and expanded use of Communication Technologies (ICTs) in remote African locations.

The FMFI project is a comparative study of Information and ICTs in different low-density contexts, across different projects in a number of countries.

This is a network project funded by the IDRC, a Canadian Crown corporation that works in close collaboration with researchers from the developing world in their search for the means to build healthier, more equitable, and more prosperous societies (*http://www.idrc.ca/*). The collaborative network was coordinated by the Meraka Institute of the Council for Scientific and Industrial Research (CSIR) in South Africa and 12 project partners in Angola, Mozambique, Namibia and South Africa. As such, the project comprises an in-depth exploration of five key objectives:

- Innovative First Mile and First Inch solutions
- Changed behaviour in use of ICTs
- Cost and benefits of solutions
- Scalability and replicability of technologies
- Influence on policy and regulations.

The approach taken by FMFI is essentially to foster "bottom-up" collaboration to achieve sustainable technical innovation that is scalable and replicable.

First Mile refers to the links between the access devices and the local access providers, and involved such connectivity technologies wireless (WiFi), wired Ethernet, powerline technologies, Bluetooth, narrowband HF/VHF/UHF, and mesh networks employing any of these technologies.

First Inch refers to the applications and access devices (PCs, thin clients, handheld Personal Digital Assistants (PDAs) and cellular devices). Importantly, this component of the project addresses the fact that it is often not enough simply to place technology in the hands of users; instead, the technology must be adapted to the local environment. Further, the users require training and education on the technologies.

Among the barriers to development of innovative solutions are that:

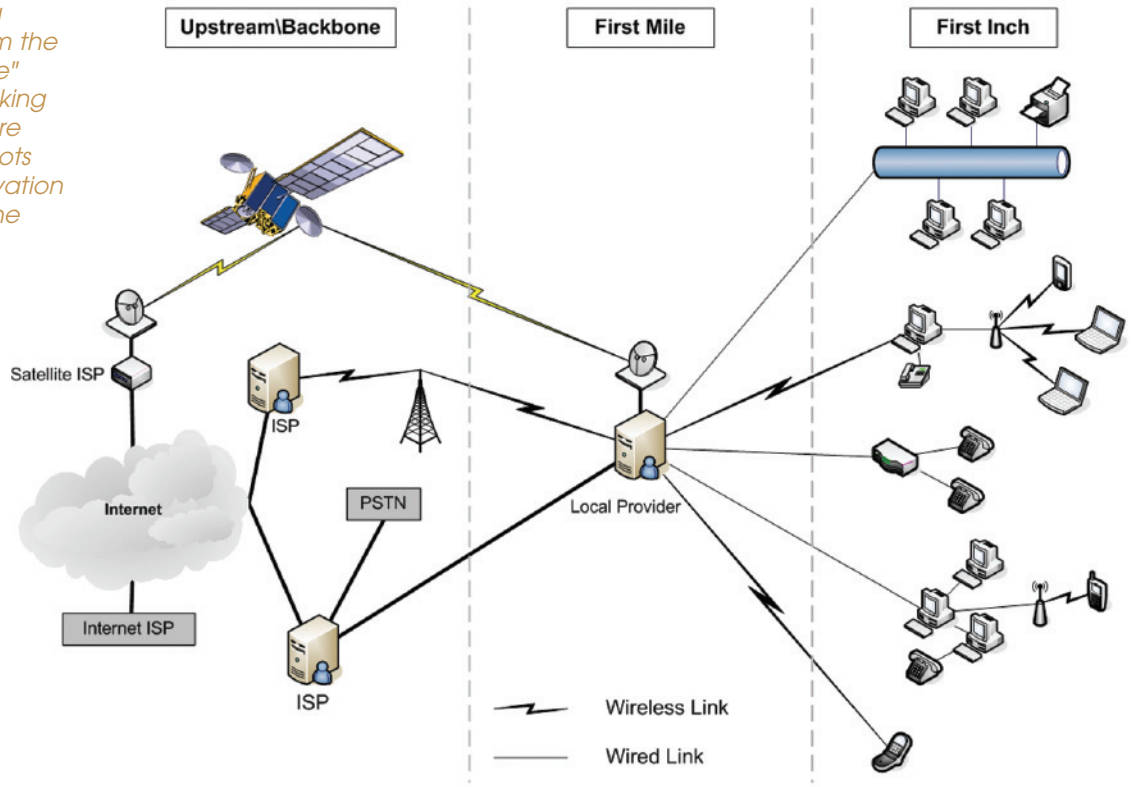
- First Mile technologies are frequently cutting edge and not yet supported by telcos that remain committed to older technologies servicing mass markets (a major reason why their existing business models have not worked for the rural poor); and
- Many countries have telecommunications policies that inhibit the use of First Mile technologies and require licensing.

As regulatory policy should support community development, not hinder it, the successful implementation of First Mile technologies that demonstrate real benefits the poor can influence governments in the development of regulatory policy.

Importantly, the challenges are not merely technological, but social and cultural. Success therefore depends on addressing all of these issues and in order to do this the project has adopted an Outcomes Mapping methodology, which focuses on changes in the behaviour of people, groups, and organisations involved with the programme.

As President Thabo Mbeki said at the launch of the National Research and Development Strategy in January 2002: "We have to ensure that as many of our people as possible master modern technologies and integrate them in their social activities including education, delivery of services and economic activity."

The First Mile First Inch (FMFI) project *is a paradigm shift from the traditional "last mile" and "last inch" thinking representing a more bottom-up grassroots approach to innovation and focusing on the end user.*



Satellite photo of the Peebles Valley in Mpumalanga, South Africa, upon which has been superimposed a diagram of the low-cost mesh network that has reduced communications costs for ta local HIV/AIDS clinic and other users, while extending telecoms services to some of the rural poor who were previously unconnected.

Peebles Valley

Achieving the Most with the Least in Peebles Valley, Mpumalanga

A successful example of First Mile innovation is a project centred on an community HIV/AIDS clinic in Peebles Valley, Mpumalanga Province, South Africa.

On one side of the valley is the Masoyi tribal, home to poor, peri-urban community with a population of 220 000, where it is estimated that one-third of the sexually active population is HIV-positive. Across the valley from Masoyi are prosperous commercial farms, all of which were paying individually for expensive Internet access.

The ACTS Clinic, which is run by anational non-governmental organisation was already paying for a satellite connection so it could report on the progress of patients being treated with antiretroviral (ARV) therapy to the NGO with which it worked. In addition, the clinic was spending a similar amount on mobile phone calls to speak to a hospice less than 5km away, but across a ridge.

The project wanted to test whether the high costs of individual connection could be amortised by aggregating user demand in resource-poor settings and be sustainable.

The technical team wanted to provide free voice calls by installing a wireless link between the clinic and the hospice.

Project Outline

WiFi, a consumer product used mainly for Internet access "hotspots" in urban areas, was experimented with to learn whether it could be used in poor rural communities that currently would have pay a high cost (anywhere from $300 to $3000 for 64 kbps) for Internet connectivity via leased line or satellite.

In the case of the clinic and hospice, however, there was no line-of-sight connection available – an essential requirement for a WiFi link. The team opted, therefore, for a mesh network.

To form the network, the team envisaged a small wireless network of nodes, each in line-of-site of at least one other node, connecting the clinic to the hospice via and community members, including commercial farmers, who all now share the cost of a single connection. Once installed successfully, very little configuration is needed to set up the mesh networking technology as it finds optimal routes through the network automatically.

After installing mesh software, the signal from the clinic was relayed via an antenna to a high site on a farm, then to a healthcare worker's house closer to the hospice and eventually across a ridge to the hospice.

Because mesh networks are easily extensible, the team was able to keep adding nodes, and did so to include the local public school and farmers further afield. The mesh itself established new links between nodees, creating a level of redundancy that is much needed in cases where power can be a problem.

Changed Behaviour in the Use of ICTs

The hub of the Peebles Mesh network was the ACTS Clinic. From that point where the VSAT connection was installed, the connectivity was distributed across the valley to an AIDS hospice, an NGO, a high school and some farmers in the region as well as individuals. The influence is across these different boundary partners, but with the main emphasis on the ACTS Clinic to manage and maintain the network and deal with user issues and costs.

The clinic had a vested interest in making the network work, because it pays for the backbone VSAT connectivity and had to put systems in place to recover some of these costs, as well as maintain an attractive service in the face of growing competition from commercial providers.

Within the ACTS Clinic, training and support created the critical mass of users. The internal objectives of using ICT technology to enhance service delivery at this level have been achieved. In terms of the overall changes in behaviour in this project, the primary site adopted the technology, integrated it into their activities and accepted the responsibility to be a hub for distribution in an under-serviced rural setting.

Further opportunities were created in the mesh network for individual users to have access at work first and then at home, where they could use it for their own development as well as that of family and friends.

Internet Challenges

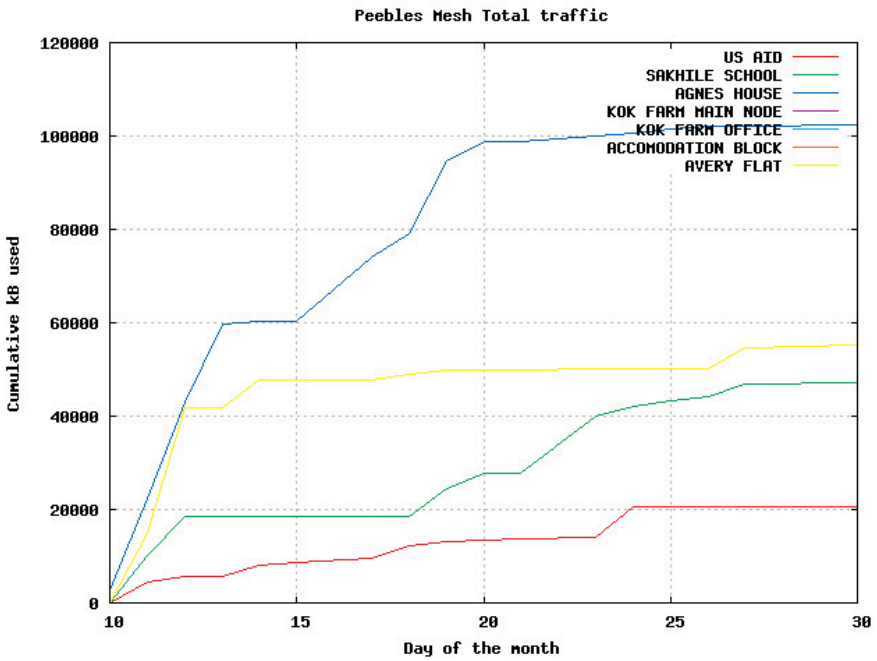
There were two critical issues to Internet cut-off: the daily provider cut-off, and the effect of bandwidth capping. The VSAT is cut-off every night by the provider, in part due to the capping mindset of broadband provision in South Africa. Many disconnect the user to do packet accounting and then decide if the user may reconnect. The result is that the connection is terminated.

The second issue meant that there was a need for bandwidth management. New users are often not aware of the cost of the Internet, and are quick to download music. The project team had to implement bandwidth management, which seems tragic when the whole idea was to provide access. The result for the clinic iwhen bandwidth limits are reached is quite severe, the connection is cut-off until the following month, and there is no option of a top-up.

Both of these issues were frustrating and indicated the chasm existing between the objective of legislators and the results in the field. All indicated the truly limited nature of broadband in South Africa and the frustrating waste of resources spent keeping usage down.

Cost and Benefits of the Solutions

The benefits are that an entire area can be covered with an inexpensive mesh network, providing connectivity to anyone willing and able to connect. The costs



Above *A 'dashboard' giving visual representation of bandwidth usage for individual users on the network.*

Right *A community member showing how easy it is to install a mesh node in the rural village. Note the simplicity of the use of the cantenna.*

The Acts Hospice, another node in the mesh network, enjoys the benefit of internet access

involve the equipment and the running charges.

Neither ACTS nor the CSIR has any form of connectivity licence for this project and, technically, the distribution is illegal unless the ACTS Clinic gets a VANS licence for using the connectivity in the community for its own operations. The illegality in terms of current South African legislation increases once there is a pay-for-service element.

The project was successful in gathering user support, but less successful in them sharing responsibility for both in cost and bandwidth use

Broadband leased lines are not available in Peebles, but cellular networks have upgraded their installations and 3G is encroaching on the area. Some commercial farmers in the area considered mesh, but opted for the 3G solution. In addition, the clinic's IT support company has just begun working on a community mesh in the town of White River, about 20km from the clinic, creating the opportunity to provide a wireless link from White River to Peebles and share low-cost ADSL with the clinic and mesh, probably at a much lower cost than the satellite connection.

The business model in the Peebles case is seen as a strategy about how mesh networks in community applications should be implemented. Consideration needs to be given to the impact of commercial service provision on the long-term sustainability of a community-based (and owned) mesh network.

Lessons Learned, Users and Uses

- Effective mesh networks can be introduced in rural settings to provide distributed ICT access.
- Testing and adaptation is part of the process to match planning with the reality to achieve a fully scaled mesh configuration
- The demand created at the main institutional ICT nodes in the mesh network can be expanded into the community

The Portia Effect

One of the most widely observed phenomena of ICT implementation is that it inevitably leads to valuable spin-offs. The human dimension of this is well illustrated in the Peebles Project.

In order to link an HIV Clinic with a Hospice, a PC and phone link were installed in the home of a volunteer HIV/AIDS counsellor. The counsellor's daughter, Portia, an unemployed woman in her early twenties, was shown how to use the equipment to search the Internet.

"She was given no formal training," says project member Dwayne Bailey. "Portia was simply asked the name of her favourite musician, who happened to be Alicia Keyes, and she was shown how to find information about her on Google. She was fascinated and from there quickly became adept at finding out other information."

As a result of this experience, Portia started a computer club for local children while homing her own skills. She began emailing out her CV to companies in search of such skills as she had developed, and now has a job in the formal economy in the Eastern Cape.

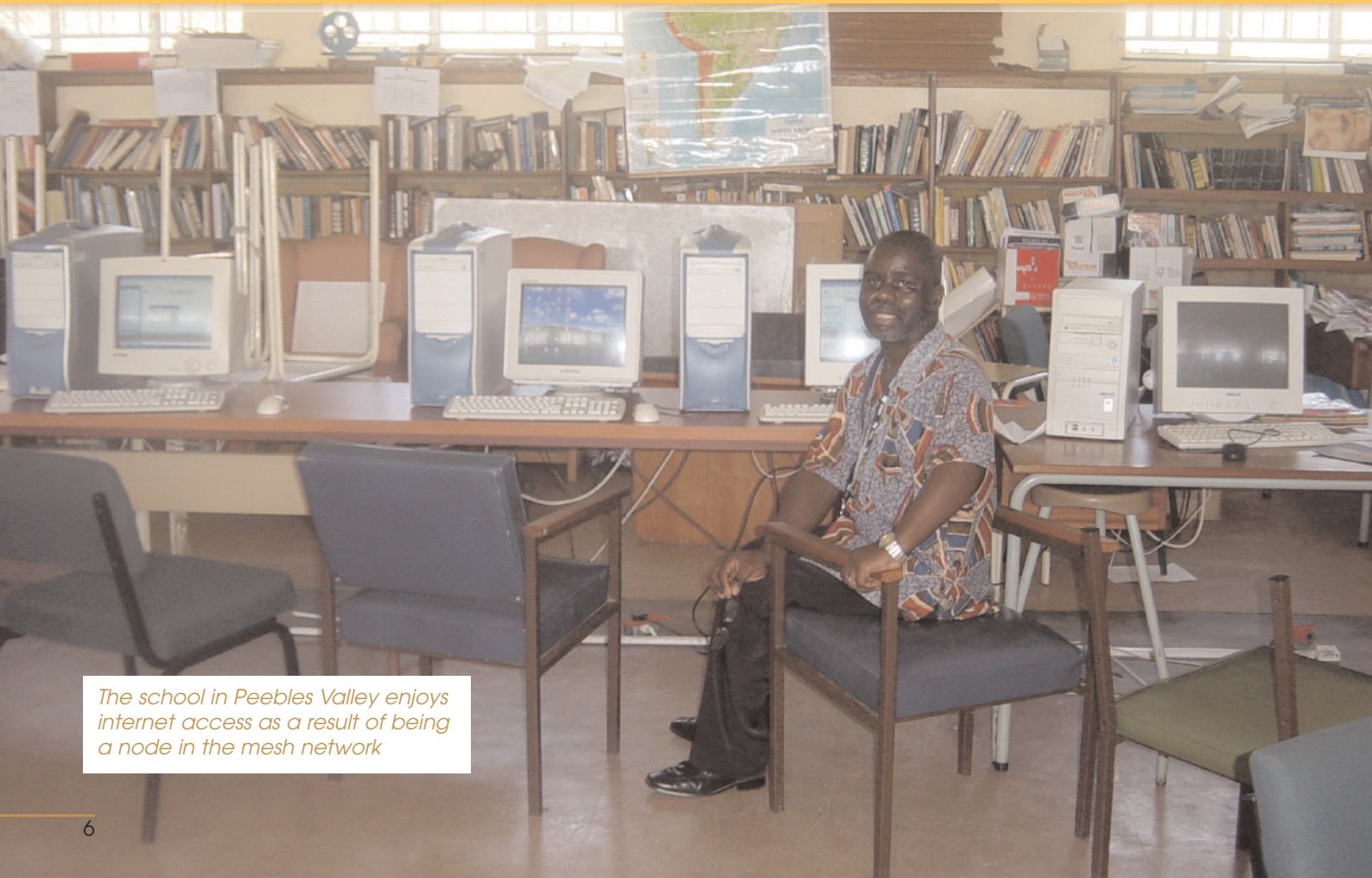
through providing affordable equipment and individual connectivity in the homes of current users.
- Community-based ICT service providers need to charge for services to sustain the connectivity they provide.
- Systems, people and budgets need to be put in place to maintain and grow ICT infrastructures.
- Adequate bandwidth management systems need to be put in place to ensure ICT resource usage conforms to the overall objectives and that key activities are not jeopardised by reaching bandwidth caps.
- The potential for broad scaling and replication of NGO-driven ICT projects depends on the extent of the support the initiative has. Initiatives with a national focus need to gather broad support at the community level as well as at the national level.
- Even if the research phase of a project provides free connectivity, community users need to understand that they will be paying for connectivity sooner or later.
- Bandwidth and download limitations need to be explained to users and managed from the outset.
- Research has to be done into available and emerging connectivity options to deal with potential obsolescence of the installed infrastructure, once alternative connectivity options become available.
- Users tend to have no loyalty to connectivity service providers and migrate to the optimum cost-benefit configuration.
- Building a business case on a technically illegal infrastructure is risky. The closer the primary user gets to having a workable cost-sharing and cost recovery mechanism in place, the greater is the likelihood that somebody will take the primary user to task on the legality of its service provision.

Outcomes

- The clinic has cut the high cost of its mobile phone bills, and a range of other new users have benefited (see *The Portia Effect*, page 5).
- After a year's exposure to the elements a rusty can that was formed the "dish" of a cantenna was shifted by the wind so that it no longer points in the right direction. However, it continued to connect perfectly to an antenna some 5km away in its line of site. The valuable lesson from this is that, while these networks are not an exact science, they can perform well even with home-built inaccuracies.
- Measurements in the mesh network revealed that users experienced an average throughput rate of 2324 kbps between each other; this far exceeds the typical ADSL link found in most homes. The bottleneck, however, is still the VSAT connection, which reduces throughput to 256 kbps on the downlink and 64 kbps on the uplink.

Conclusion

Peebles Valley is a great example of achieving the most with the least. The project leaders achieved their vision of getting the community free access while also benefiting the farmers, and it demonstrated that successful ICT4D does not necessarily need a lot of donor funding.



The school in Peebles Valley enjoys internet access as a result of being a node in the mesh network

Aerial view of the 130 homes in the Rooiwal community.

Tshwane Metro Delivers Low-Cost Broadband to Rooiwal Communiity

The City of Tshwane Metropolitan Municipality (CTMM), an FMFI project partner, has successfully delivered a First Mile solution that should be an object lesson for local authorities not merely in South Africa, but in the entire developing world.

The Municipality, which embraces South Africa's capital city, has demonstrated clearly that communication via existing power lines is both technically and commercially viable

Powerline communication (PLC) or broadband over powerline (BPL) converts the existing electricity grid into a network for high-speed data, voice and media transfer over existing power lines. Every power socket in every home or office connected to the system becomes a broadband communications point without the need for separate cabling

To prove the effectiveness of PLC, Tshwane Metro selected as a pilot project the small community of Rooiwal, a town owned by the city, and whose community mostly comprises employees of the Rooiwal Power Station.

Project Outline

In January 2004, Tshwane Metro deployed a PLC network at the Rooiwal Township to serve 130 houses working from the Pyramid Primary Substation. Tshwane provided a range of PLC, fibre-optic and wireless connectivity options in this village in order to ensure that it remains within the boundaries of the regulations governing its virtual private network (VPN) under its private telecommunications network (PTN) licence.

Nine houses were selected to receive Internet connectivity. Later the This library was included in order to provide Internet access to the broader community. Tshwane believed that if it championed municipal connectivity networks, it could influence the Regulator to allow self-provisioning of telecoms services within municipal borders, with the result that other municipalities would follow suit.

Innovative First Mile and First Inch solutions

The main question in the Tshwane Metro centres on how the spare capacity on its municipal fibre-optic network could be used to achieve social and economic objectives. Secondly, how could this be made economically viable to the level where the municipality could offer PLC connectivity directly to residents' homes.

Tshwane Metro's existing fibre-optic network is one of the most advanced in Africa. It comprises 60 primary sub-stations, 150 secondary sub-stations and 25 wireless high sites, and covers the entire metro, from Midrand in the south to Hammanskraal in the north, Mamelodi in the east to Hartbeespoort Dam in the west. At Rooiwal, innovation is in:

- Providing PLC connectivity to homes through existing copper wire infrastructure.
- Using the municipal fibre-optic network as the backhaul connectivity.
- Partnering with an existing Internet Service Provider (ISP) to provide Internet connectivity.
- Covering the gaps in the network with WiFi connections.

At Rooiwal, Tshwane has created a vision for building a new digital utility service to add to other services it is providing, such as electricity and water.

Each recipient building is equipped with a modem that typically retails at about R2 000, plugs into the back of a computer and direct into an electricity socket. The bandwidth of more than 5 megabits per second (Mbps) to each home and office in the community permits fast

Internet connectivity, Voice-over-Inernet Protocol (VoIP), high-quality television and video streaming. It is then possible to take any analogue phone and plug it into the modem to use it to make VoIP calls. The modem does the VoIP conversion itself and enables Rooiwal residents to make free local calls on the network. When residents need to make calls outside of the town, they are connected via a telecoms service provider to Telkom, a cellular operator or international lines.

It is planned that the pilot will eventually become a commercial venture.

Changed Behaviour in the Use of ICTs

Some issues emerging in the implementation showed that there would not be ready and easy acceptance.

Tshwane purchased 130 sets of PLC customer premises equipment to be able to connect every home in Rooiwal but only 80 residents indicated an interest in the installation. This means either that some residents felt connectivity was not for them and wanted nothing to do with it, or they were aware of alternatives.

There were initial technical difficulties with getting the PLC option to work at all. Once these were addressed, new problems emerged to the extent that users started regarding the PLC option as unreliable and started looking at alternative broadband solutions. Difficulties compounded when the ISP introduced an Internet connection for which residents were to be charged, but which proved unreliable. The ISP also did not respond adequately to requests for support. Reaction against this situation was so widespread the ISP was removed and another provider was found.

The sum total of experiences and the analysis of changed behaviours in this project must therefore be regarded with circumspection. Tshwane proved that it could provide a PLC option, but until the technical and service provision issues can be sorted out, broad adoption cannot be assumed and knowledgeable users will shop around for alternatives.

Cost and Benefits of the Solution

The first cost and benefit analysis for the Tshwane PLC is done at the user level, where households could sign up fro a free trial period of broadband access through a modem connected to the power supply in their homes. The initial free service would then be replaced by a connectivity contract with a commercial ISP, but still using the PLC link to the fibre-optic network. The suggested pricing for the connectivity provision from the ISP was in the range of what other ISPs could offer in the area for dial-up connections. The benefits for the user would then lie only in having free connectivity equipment, the bandwidth, convenience and reliability. Tshwane Metro would possibly not benefit at all, as the invoicing would be directly from ISP to customer.

The second business model is based on the potential this situation holds for ICT service provision by a municipality. The intention was to position Tshwane Metro as a digital hub, building on its available fibre-optic and copper-wire infrastructure to consolidate its position as a potential telecoms service provider.

In the case of new housing developments, PLC connectivity would be designed into the infrastructure of each house and connectivity would be available, should householders choose to use it. Payment for the service could possibly be bundled with electricity bills. Connectivity provision would also be extended into the business environment to the extent that Tshwane would provide a reliable, higher level service to ICT-intensive businesses and attract both skills and investment into the metro, using this service as a draw card.

The pilot study laid the foundation for testing the overall intentions of the metro. It also revealed the total busi-

A Rooiwal user at home enjoying the benefits of internet access over Power Line Communication.

ness approach needed create a new information utility a reality. The full business model extends upward from community provision to consideration of whether Tshwane should create a dedicated ISP and whether it needed to go as far as establishing an Internet exchange to serve potential demand for a broad range of services across a wide spectrum of users.

Scalability and Replicability of Technologies

The Tshwane project researched the details of providing broadband connectivity to homes through PLC, connected to a fibre-optic backbone terminating at an ISP, which would provide the Internet link. Although there were some delays in the rollout of the project, a number of scalability and replication issues became apparent in the project.

The fibre-optic link proved to be the most reliable aspect of the network and the difficulties arose with the PLC component as well as the ISP. Careful consideration also had to be given to user take up issues and responses to the introduction of connectivity in their homes.

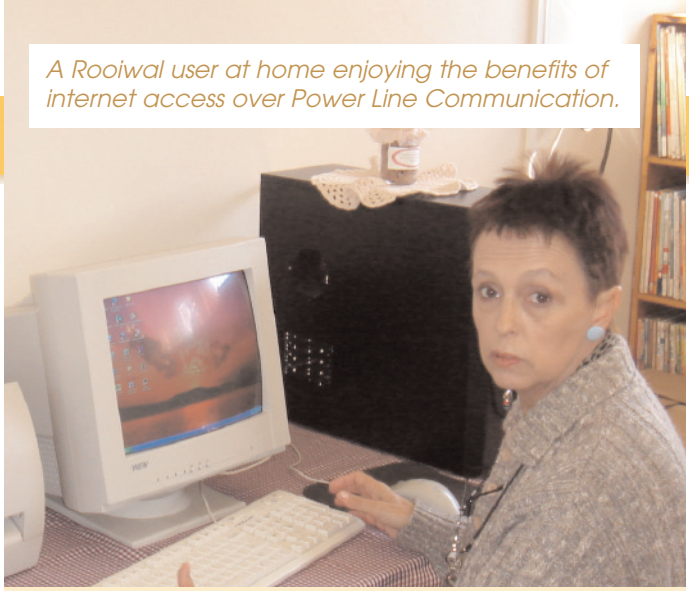
Having tested the PLC solution in some homes, Tshwane believed that the stage had been set to scale to all the homes in the Rooiwal community. This was a possibility, but what it found was that user acceptance was in the order of 60% (80 out of 130). The reasons for the relatively low adoption rate could not be attributed just to aversion to having connectivity, but was found in cost and service provision issues.

Tshwane Metro was in the position to scale and replicate, but some additional technical and social groundwork had to be done before its vision of populating the entire municipal area could become a reality.

Influencing ICT Policy and Regulation

A PLC solution, coupled with connectivity into an fibre-optic network as well as wireless links in some areas, owned by a local authority is a convoluted option in which careful consideration should be given to boundaries, and where they are being overstepped. Tshwane Metro holds a PTN licence, but not a VANS licence. Its initial reasoning was to run the Rooiwal project as a pilot study on a contiguous property Tshwane owned, which would remove most of the potential objections, as it was providing communication and connectivity services to its employees. This could be categorised under their PTN licence. But Tshwane had a bigger vision. To confound the issue, in the regulatory environment it was still not clear how local authorities should position themselves, in the following areas:

- Whether VANS can self-provide, in which case municipalities could apply for VANS licence, or
- By means of a separate dispensation for local government, or
- By virtue of having a PTN licence, which would allow them to provide wholesale services (reselling spare capacity) to operators and value-added service providers, which in turn could provide these services commercially.



A Rooiwal user at home enjoying the benefits of internet access over Power Line Communication.

Of Homework, Wedding Dresses and Vintage Cars

Libraries have long been in the forefront of the movement to introduce people to the benefits of information technology, but the experience has been mixed.

Rooiwal librarian Elize Pretorius reports that people of all ages use two PCs located in the public section of the library, both to send emails and access information of all types — from material for school projects to schedules of sports events, how-to information on restoring vintage cars and a even a pattern for a wedding dress. Regrettably, one user was found to have downloaded "adult" material.

Demand from schoolchildren has led to library hours being extended to 6.30 in the evening. However, not all users have been impressed by the facility. Some — especially those who have access to the Internet at work — complain that downloading information from the Internet at the library takes too long. However, at present the library is not paying for its Internet connection, so Helen feels they can hardly complain.

She feels strongly that formal training of library staff would enable them to provide more help to potential users.

Lessons learned, Users and Uses

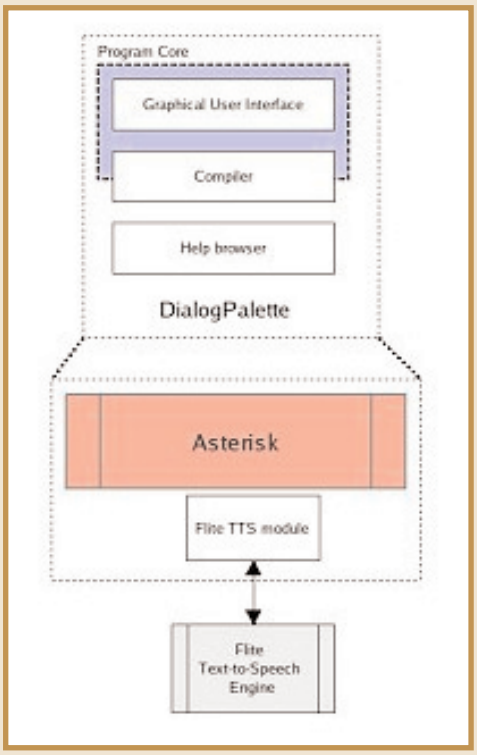
- PLC can be the carrier of broadband connectivity for households that are wired for electricity. in a developing country.
- Using PLC, Municipalities can provide cost-effective connectivity options for previously marginalised residents.
- Community-level pilot ICT projects can provide evidence for large municipalities to clarify their role and responsibility in providing low-cost connectivity and voice services to the broader communities they serve in order to achieve socio-economic objectives.
- PTN licences held by large metros can be expanded to provide broadband connectivity and voice services in the coverage area.
- Once users are familiar with ICT resources, they will expect a quality service.

OpenPhone First-Inch Solution Delivers Information Empowerment

OpenPhone is a low-cost open-source telephone-based information dissemination environment that designed to address the significant African need for information empowerment of its people. The system aims to make it easy and inexpensive for organisations and individuals to perform information transactions on the telephone – that is to make information available to, and gather information from, callers.

The OpenPhone project is a culmination of open-source technologies, human language technologies, human-computer interaction research, social research and open source-principles. It investigates the human and cultural factors that need to be considered when developing an information transaction platform.

Telephone-based service requires relatively low levels of infrastructure and user sophistication. Useful services can be made available to citizens equipped with nothing but a telephone (mobile or fixed-line), and requiring no more than the ability to understand and respond to spoken commands.



Huge costs are involved in developing PABX systems that support interactive voice response (IVR). In most cases these have to be outsourced to experts in the field, and maintenance costs are incurred if changes need to be made. Hence, there is a need for a low-cost interactive flexible tool that will enable people to develop and maintain IVR systems in a language of choice to service a diverse multicultural group.

The figure at left depicts the OpenPhone system.

The core of OpenPhone is the Asterisk PABX open-source system (www.asterisk.org). Asterisk does VoIP in many protocols, and can interoperate with almost all standards-based telephony equipment using relatively inexpensive hardware.

DialogPalette is a graphical user interface to Asterisk and allows a user to create telephony applications easily. It can be conceptualised as an authoring tool for telephony applications. The Asterisk system has been expanded to use FLITE, a text-to speech (TTS) engine designed by Carnegie Mellon University (http://www.speech.cs.cmu. edu/flite/index. html). FLITE enables the OpenPhone system to convert text to speech using a computer-generated voice. (The latest version of DialogPalette can be downloaded from SourceForge.net).

The primary role of DialogPalette is to act as an authoring tool that allows an information provider to design an information dissemination application. The information provider can record the prompts for the various phases in multiple languages. The application designer also has the choice of using the TTS engine to record prompts in a language of choice. The application design is guided by the use of templates. A training manual is available as part of the DialogPalette application.

Information users access the solution simply by phoning a number — ideally a toll-free or sponsored one. The user listens to the voice prompts and interacts with the system by entering the requested key presses.

Localisation: Key to Unlocking Technology

There is more to the digital divide than the difficulty disadvantaged populations face in accessing expensive information and communication technologies (ICTs). Indeed, the divide is partly built into ICTs—most software is developed in English and a few other Western languages that most poor people in developing countries don't speak.

IDRC and its research partners are at the forefront of an international effort to make ICTs more accessible and relevant to disadvantaged populations through First Inch solutions such localisation—the adaptation of software to local languages. Localisation is an ICT4D priority for several reasons:

- The need take into account all factors—technical, cultural, political, economic—that influence the success of a project. Language is often a fundamental part of that context. Localisation can help to ensure that ICTs are taken up by people who might otherwise be bypassed by the digital revolution.
- Localisation fits very well into IDRC's support of free, open-source software. While IDRC partners determine whether commercial or open-source software is the best match for their specific needs, there is a good fit between localisation requirements and the open-source movement, one goal of which is to make it relatively easy to develop a language module independently that can be plugged into the software. Users can pick the language they want almost as a drop-down menu.
- Finally, localisation can help languages become more flexible, making it easier to accommodate growth and evolution. Instead of just dropping in tech-

nology-related words from English or another language that have no local meaning or context, localisation finds ways of encapsulating how the technology is perceived and used within the culture. Localisation helps protect languages by embedding them in technology, rather than having technology push them aside.

Challenges

- Providing web content allows a measure of access through technologies provided by the First Mile component of the FMFI project. However, at the point where content is displayed on a device, one encounters First Inch problems. For instance, English content delivered to users who do not speak English is of no use. Thus for the delivery of content to be relevant it is necessary to deliver multilingual content.
- Documenting effective processes and approaches;
- Exploring ways to train rural people and others in using the localised software;
- Further developing localised applications and tools;
* Continuing to influence development policies.

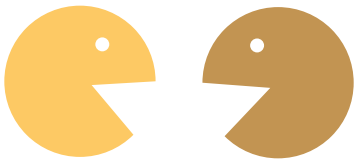
The HTML Translation Project

The HyperText Mark-up Language Translation Project is a collaboration between IDRC and Translate.org.za, and three boundary partners were identified each of which allowed a slightly different configuration around the translations:

- Creative Commons licences are copyright licences released in 2002 by Creative Commons, a US non-profit corporation. Many of the licences grant certain baseline rights, such as the right to distribute the copyrighted work without changes, at no charge. Creative Commons uses its own web-based translation system to translate its licenses. However, its system does not actively help translators. This boundary partner was chosen as, if the translation was successful, it would result in a high profile success that would allow wider adoption of the concept of translation through good tools.
- Pootle, a Translation Management System (TMS) developed by Translate.org.za to facilitate distributed translation, is used as by a number of established localisation teams. Use of Pootle enabled Translate.org.za a degree of control over the management of the results, but no actual control over the translators, who are volunteers who were encouraged by the knowledge that their work would be integrated into the product.
- FMFI participants. This group represented the highest risk in that the team was translating raw HTML content from the FMFI website. This made use of people who would not normally translate content but in the long term would probably be typical translation contributors. Being closely aligned to FMFI and also being a non-English group it was hoped that this group would rise to the challenge in that they could translate English content into other languages such as Portuguese.

Project Implementation

Key facilitating the project was the enhancement of a toolkit designed to enable the translation of computer software. It was now to be used to translate content, key content being raw HTML and wiki syntax. (A wiki is a website or similar online resource which allows users to add and edit content collectively.)



The Translate Toolkit allows users to convert various source texts (HTML, wiki, etc) into standard file formats such as Gettext PO and XLIFF (a translation interchange format). The key to good translation is to divorce translators from the layout, in the same way that content is divorced from layout in the HTML and CSS paradigm. Thus the toolkit allows users to take raw HTML and extract the textual content. This content is then translated and managed using Pootle and, finally, translations plus the original English are combined to create the translated content.

The existing HTML converter was enhanced to allow all content from the old FMFI static website to be translated. The existing text converter was enhanced to enable both dokuwiki and mediawiki syntax to be processed, allowing any wiki content to be extracted and converted to a translatable format.

Three components of the translation were used to cover three levels of engagement.

The first component, which required the most retooling and handholding, was the translation of the Creative Commons licenses into Afrikaans, Northern Sotho and Zulu. Translate.org.za did the complete conversions, managed the translators and then submitted the translations to Creative Commons.

The second was the translation of wiki content for the toolkit itself. Fortunately, in that area an existing localisation community was already in existence.

The third was the translation of the static FMFI website by FMFI project participants.

Outcomes

- The Creative Commons translations were completed and are now part of the official website.
- Once the translator-ready content for Pootle (the online translation management system (TMS) was published, members of the existing localisation community translated the Pootle Users' Guide into six additional languages fairly quickly.
- The Pootle TMS developed by Translate.org.za is now being adopted by many free open-source software localisation projects.
- The last community was the FMFI project itself. Here the existing static HTML website was converted, the content was published and participants in the FMFI project where encouraged to translate. However, none of the content has yet been translated.
- It is significant that in the first two cases all participants had a passion for and understanding of the need for localisation, and they were successful even when using volunteers. In the last case, localisation was not a priority and work floundered.

POLICY BRIEF

This policy brief highlights some of the critical challenges to be considered in order to achieve community access thereby helping build an Information Society and contributing towards the Millennium Development Goals.

Although backbone connectivity was not a key research component of this project, in order to understand the First Mile it is necessary to consider the whole value chain of communications.

In all 10 of the FMFI projects undertaken in Angola, Mozambique and South Africa, cost was identified as the key barrier to community access. The cost of VSAT ranged from USD2000 pm in Angola, USD1000 pm in Mozambique to USD500 pm in South Africa. The FMFI project partners had to find innovative ways to deal with these costs and create cost-sharing business models to achieve a level of sustainability.

The solution was found in sharing and distributing bandwidth to other users on a cost recovery basis. This was done through the use of WiFi connecting the VSAT/Leased line at the hub to other users within a 20km radius. An extension of this configuration was found particularly effective in the deployment of mesh networks. These solutions however, presented new challenges and require the following issues to be considered for policy:

- Liberalising the regulations around the use of the open ISM (Industrial Scientific and Medical) band for social objectives.
- National ICT initiatives in education and health
- Building partnerships with existing infrastructure owners to secure equitable access to ICT infrastructure and resources.
- Making provision for resource and cost sharing of ICT infrastructures.
- Government sponsorship of community connectivity and the potential use of Universal Access Funds in this environment.
- Implications of PLC and municipal ICT networks.

To maximise the use of the regulatory principles established in the FMFI context would involve escalating the regulatory debate upwards to the Communications Regulators Association of Southern Africa (CRASA) to have an impact on a broader audience than the three target countries as well as to CIPESA (East and Southern Africa) and ACRAN - African Communication Regulation Authorities Network.

General Recommendations:

- That an enabling regulatory environment supports community-owned networks
- Telecentres are recognised as key vehicles for ICT connectivity provision at community level.
- Systems, people and budgets need to be put in place to maintain and grow ICT infrastructures.
- An optimum solution design for scaling of ICT service delivery embraced a range of wireless & wired technologies, including satellite, WiFi, fixed lines and GSM options to create a full mesh network with built-in redundancy for health and education.
- Existing infrastructure should be used for rapid and affordable expansion of ICT networks.
- Universal access funds should be used for sponsoring connectivity and ICT resources for broad social objectives, notably health, education and community access.
- Recognition that training alone does not ensure adoption.
- It is crucial to develop and support a critical mass of competent and motivated new ICT users during the inception phase of ICT projects.

For more information go to:
www.fmfi.org.za

translate.org.za
FMFI FIRST MILE FIRST INCH
CSIR our future through science
meraka INSTITUTE African Advanced Institute for Information & Communications Technology
IDRC International Development Research Centre
CRDI Centre de recherches pour le développement international