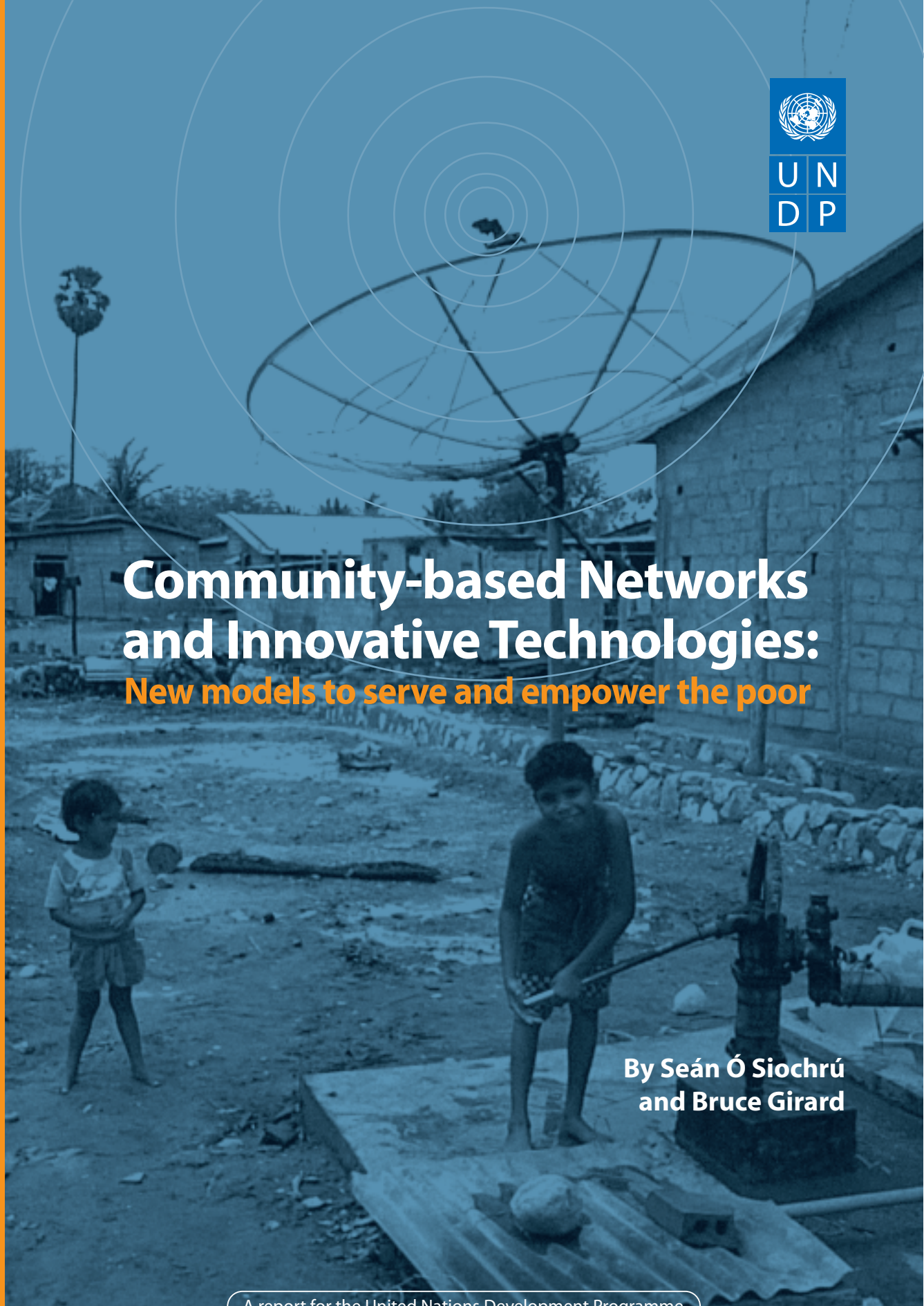
Series: Making ICT Work for the Poor



# Community-based Networks and Innovative Technologies:

## New models to serve and empower the poor

By Seán Ó Siochrú and Bruce Girard

A report for the United Nations Development Programme

# Community-based Networks and Innovative Technologies:

## New models to serve and empower the poor

## About this Report

This report is part of a series of knowledge products initiated by the Poverty Group, Bureau of Development Policy, UNDP New York to facilitate evidence-based discussion of innovative and emerging policy options and implementation modalities in the context of its programme of support to "Make ICT work for the Poor".

These reports will not only explore the issue at hand but also highlight how existing policies and financing mechanisms could be made more responsive to exploiting the emerging options. Further, even in focusing on access and connectivity issues, an attempt will be made to move away from pure connectivity oriented models to identify approaches where access and connectivity form part of the development agenda, so that there is a focus both on the *how* as well as the *why* ICT is important for development and for the community/stakeholders under consideration.

UNDP's own work in this area focuses on advocacy, policy and programme support to foster progress along two-tracks: (i) Strengthening the development and empowerment dimensions of ICT policy and programming, or ensuring a focus on "ICT as if development mattered"; and (ii) Supporting a mainstreaming/integration agenda with a view to realizing the "full potential of development in the age of information and communication technologies". More specifically, in the context of making ICT work for the poor, it focuses on:

- Policy options and models to foster pro-poor and inclusive access to ICT;
- Policy support to facilitate the integration of ICT into poverty reduction strategies and MDG related strategies and development programmes;
- Programme and policy support to foster the use of ICT to facilitate the effective use of public resources and enhance the delivery of services, information and social support to the poor;
- Programme and policy support to foster the use of ICT to strengthen local development, livelihood opportunities and to catalyze local entrepreneurship.
- Support to programming to ensure that inequities in access, capacity and use are addressed and that ICT is used to strengthen gender equity and social inclusion;

## Comments on this Report

Radhika Lal
Policy Advisor, ICT for Poverty Reduction & MDGs
Poverty Group, Bureau for Development Policy,
United Nations Development Programme
email: radhika.lal@undp.org

*The authors can be contacted at:*
Seán Ó Siochrú: <sean@nexus.ie>; Bruce Girard: <bgirard@comunica.org>

The report is available for download at http://propoor-ict.net

The authors would like to thank Amy Mahan for her research and editorial assistance.

Cover photo courtesy of Gabriel Accascina. © G.Accascina 1999

UNDP is the UN's global development network, advocating for change and connecting countries to knowledge, experience and resources to help people build a better life.


# Community-based Networks and Innovative Technologies:

## New models to serve and empower the poor

By Seán Ó Siochrú and Bruce Girard

**A Report for UNDP**

**Series: Making ICT Work for the Poor**

# Preface

Development and technology landscapes are being rapidly transformed, providing a good opportunity to take stock of what is working and also to explore emerging technology and organisational options that could enable ICT to serve poor and under-served communities more effectively. In the context of this report, current developments raise an interesting question: In many developed countries, community networks and cooperatives played a key role in bringing telephony to rural and under-served communities; has their time come and gone in light of the increasing role of the private sector? Or does the low cost access offered by mobile telephony and wireless technologies allow for new community-based configurations to emerge, to be responsive to the broader development needs of the communities concerned and to operate sustainably, whether as community-based networks or small and medium scale enterprises?

*The Cooperative/Community-owned Infrastructure Difference*

While access to ICT is indeed expanding rapidly and dynamically on a market-driven basis, many areas – particularly rural and poor urban – often remain under-served. There are a variety of reasons for this including that they do not meet a for-profit calculus, the sheer scale of the "universal access" challenge (ITU estimates that 800,000 villages, 30% of all villages worldwide, lack even basic telephony services), and the difficulties of roll-out in poor and sparsely populated regions through more conventional means. The research undertaken in the context of this report and its attendant case studies suggests that there is an important role for community-based infrastructure and access options.

Not only are community-owned infrastructure and networks able to draw on community resources and labour and hence be sustainable and expand in contexts where the market might fear to tread, but more importantly, such networks have a stake in the continued development of the community. The case study of Poland points to the catalytic development impact and the spin-off activities that were sparked by the cooperatives which continued to re-invest in the community: "the cooperative approach helps solve development problems. As a direct result, WIST and Tyczyn communities have launched new initiatives such as environment friendly production, recreation centres and socially important services. Unemployment in these regions has significantly decreased due to creation of new businesses and new jobs." A similar point was made in 2003 in the USA by the National Rural Electric Cooperative Association which in its book *The Cooperative Promise: A Community and Economic Development Guidebook for Electric Cooperatives* points out: "A cooperative's first responsibility is providing reliable electricity. But com-

munity and economic development are necessary to preserve and expand the existing residential and business base and… attract new economic activity."

*The Development Imperative*

If this is indeed the case, current ICT-for-Development and broader development strategies and financing mechanisms will need to be adapted. Not only will it be important to undertake 'strategic zoning' and provide incentives to serve poor-under developed areas, but ICT policies will need to go further and to be open to doing so by allowing for a variety of options. Ideally they will not only adopt standards of *technology neutrality* but also *operator neutrality* – with a view to allowing communities to avail of options and to bid for public financing, where offered, to serve themselves. It also means that addressing the *last-inch* or *last mile* would have to be seen as being important for the broader development agenda.

Given the uneasy – or should we say relatively unexplored – relationship that often exists between the technology, ICT for development, and broader development communities, the communication and development needs of the poor are often viewed as a second order priority best left to the market without the need to explore roles for the community or public sector. At the same time, scarce public resources are expended on 'development activities' that are often visualized as though taking place in a world that has not changed. New – and potentially more effective – ways to address the needs of the poor, enhance learning, deliver healthcare and catalyze economic activity in under-developed regions could be facilitated by the deployment of ICT for development. While the achievement of the *Millennium Development Goals* and *Universal Access* are both on the development agendas of countries, attempts to explore their inter-relationships are currently in their infancy.

However, it is becoming clear that achieving the MDGs will "require rising above current growth rates, ensuring that the gains are more equitably distributed and substantially accelerating investments in healthcare, education and physical infrastructure – particularly in the poorer and underserved areas" (Nishimoto and Lal, 2005). These are all areas where the deployment of ICT can be both strategic and helpful. It can assist in managing logistics and monitoring the impact of expanded distribution of life-saving drugs even in poor and under-served communities and assist in addressing capacity gaps created in the wake of the HIV/AIDS pandemic. It can help to scale up the delivery of educational content and teacher training, making learning more interactive and powerful for poor children, and potentially offer them a path of upward mobility in an age where knowledge of ICT is becoming a necessity. It can help to enhance the delivery of rural extension, financial and business support services without which sustainable agriculture, job creation and entrepreneurial activities would be that much more difficult. If such a deployment of ICT is to take place in the service of the MDGs and poverty reduction, it must ensure that the *last inch* and *local level* are addressed with the same degree of importance as the macro and national levels. Without this, local communities will be unable to catalyze development activities, and their voices will be less likely to be heard in the distant places where policies are made. In this task, the role of community networks and community-owned infrastructure remains vital.

Radhika Lal, Bureau for Development Policy, UNDP

# Table of Contents

# Acronyms

| | |
|---|---|
| ADSL | asymmetric digital subscriber line (transmission technology) |
| bps | bit per second |
| CBO | Community based organisation |
| CdoT | Centre for Development of Telematics (India) |
| COPAS | UN Committee for the Promotion and Advancement of Cooperatives |
| DGIS | Directorate-General for International Cooperation (Netherlands) |
| DFID | Department for International Development (UK) |
| EAIF | Emerging Africa Infrastructure Funds |
| ENTel | Argentina state telephone provider |
| EU | European Union |
| FAO | United Nations Food and Agriculture Organisation |
| FITEL | Fondo de Inversion en Telecomunicaciones (universal access fund – Peru) |
| GPRS | General Packet Radio Service |
| GSM | Global System for Mobile communications |
| GTH | Gilat-to-Home (rural telecom service provider) |
| ICT | information and communication technology |
| IDB | International Development Bank |
| IDRC | International Development Research Centre (Canada) |
| IEEE | Institute of Electrical and Electronics Engineers |
| IICD | International Institute for Communication and Development (Netherlands) |
| ILO | United Nations International Labour Organisation |
| InfraCo | Infrastructure Development Company |
| IP | internet protocol |
| ITU | International Telecommunication Union |
| km | kilometre |
| Mbps | megabit per second (1,000,000 bps) |
| MDGs | Millenium Development Goals |
| MIAP | Mini-Infrastructure Apex Programme |
| NGO | nongovernmental organisation |
| NTCA | National Telecommunications Cooperative Association (US) |
| NTIA | National Telecommunications and Information Administration (US) |
| PC | personal computer |
| PDA | personal data assistant |
| PIDG | Private Infrastructure Development Group |
| PRI | Panchayati Raj Institution (India – locally elected body) |
| RAX | Rural Automatic Exchange |
| SDNP | Sustainable Development Networking Programme (UNDP) |
| SECO | State Secretariat for Economic Affairs (Switzerland) |
| SIDA | Swedish International Development Cooperation |
| SMEs | small and medium sized enterprises |
| SMS | short messaging system |
| STD/PCO | subscriber trunk dialling/public call office |
| TELPIN | telephone cooperative in Pinamar, Argentina |
| TPSA | Polish national carrier |
| UAF | Universal access funds |
| UN | United Nations |
| UNDP | United Nations Development Programme |
| USAID | United States Agency for International Development |
| VAN | value added network |
| VSAT | Very Small Aperture Terminal |
| VoIP | voice over internet protocol |
| WAP | wireless application protocol |
| WiFi | wireless fidelity (otherwise known as wireless networking) |
| WiMAX | worldwide interoperability for microwave access |

# Summary

## The Development Opportunity and the Challenge

Where communication facilities are available, the poor rapidly embrace them. Where schools offer courses in ICT or use ICT to make educational content more interesting, parents are often supportive since they see it as a source of upward mobility and recognise its potential to ensure more effective learning. Where ICT makes available critical information, financial services, and reduces the maze of bureaucracy, people benefit in terms of reduced time and resources that need to be expended. Where ICT facilitates access to information about new economic opportunities and helps avail of them, small and medium sized enterprises and cooperatives demonstrate interest. Where ICT access is available, it helps to stimulate investment. But it is not just a question of facilitating economic and social development, community radio and related technologies are, for example, also proving useful in facilitating participation and strengthening the voice of communities.

In many instances, at least in urban areas, the communication needs of the poor are acknowledged and telephony markets – formal and informal – are emerging to serve them. However, rural areas and sparsely populated communities still tend to be underserved. The main obstacle is simple. Installation costs are often higher because of lack of developed infrastructure such as roads and electricity. Sparser populations and low levels of income mean that conventional approaches appear to be economically unattractive, whether for market-driven or more traditional public sector providers who are now unable to benefit from cross-subsidies to roll-out services. In some countries, universal access funds (UAFs) are being used to provide targeted subsidies to encourage the provision of mainly telecommunications services by private operators in areas considered to be otherwise uneconomic. But these are still an evolving mechanism in many developing countries and have thus far proven to be inadequate to the scale of the problem and face many obstacles of their own. While mobile telephony has been expanding rapidly in developing countries, particularly where it is coupled with the use of pre-paid cards, network providers often appear to be sceptical about roll-out in rural areas. Even where networks do reach, coverage does not necessarily mean access for poorer sections of the community. Attempts to address this by *pooling* demand in telecentres, cybercafés and small phone-shops have had success in some regions, particularly in peri-urban areas, but overall results to date are uneven. Further, these centres often do not go beyond telephony and related services to more fully address the development needs of the poor, although some are evolving in that direction.

The technology-development landscape is continuously evolving not only in terms of market dynamics and technology opportunities but also in terms of permitting new approaches to meeting the development and communication needs of the poor and underserved communities. This research considers one of these evolving options to address the problem particularly at the level of *last-mile* or *last-inch* access: an innovative combination of community owned enterprises and the new wave of wireless and related technologies that together may have the potential to extend networks and offer new services to poor communities and to empower them to develop solutions that are more focused on their development needs. While a lot of attention is being paid to wireless and related cost-effective technologies, the focus has been mainly on connectivity and perhaps not enough on how this might permit new approaches to development at the local level that could also be effective in empowering communities.

In combination with a number of positive regulatory trends and ideas, these emerging options could make a significant difference to network access, delivery of services and economic and social opportunities for poorer rural communities. They can drive down costs and make maximum use of community resources, enabling the emergence of new business/development models that are both more economically sustainable and more empowering than anything else available. Furthermore, a high degree of community control can significantly enhance the viability and development impact of 'hybrid' public/private/community networks and service solutions.

## Why Community-Driven Enterprises?

Certain advantages of a community ownership model have long been demonstrated in infrastructure projects, in both developed and developing countries. Whether in irrigation or water systems, local electricity plants or bridges, community ownership, control and participation usually means that infrastructure can better address community needs, that community resources such as manpower and public commons can be leveraged, that the community is willing to invest in them, that they are more highly valued, and that they are better maintained. In recent decades the benefits of community ownership and participation in terms of empowerment have also been recognised and exploited to good effect.

Few realise that there already exists a rich and ongoing history in rural telephony cooperatives, now moving into ISPs, broadband and wireless access. In the USA many of the thousands of cooperatives that first brought telephone service to rural areas in the first half of the last century are still in operation, now providing modern telecom services, including broadband access. More recently, rural telecom cooperatives have appeared in countries as diverse as Argentina and Poland. Local authorities have also taken up a similar role. They are highly successful in terms of price and quality and, more importantly, have been shown to contribute and often stimulate other development activities locally. In poorer countries, local community control and participation is widely recognised as critical to the success of ICT projects such as telecentres and application development. And rapidly expanding programmes for local access in India in recent years combine both network provision and community-driven applications development and supply provision.

These are often presented as merely niche areas or historical phenomena that are no longer valid for more general application in terms of in light of technological advancements and the growing role of the private sector involvement in the ICT sector. However, research demonstrates that this is an option that is being explored and implemented in both developing and industrialized countries.

## The Role of Technologies

It is, in part, technological innovations that increase the potential of this model now as a candidate for serious consideration. New and emerging technologies, especially wireless, are particularly suited to the deployment of community owned network infrastructures because of their low level of initial investment and scalability, their relatively simple technical deployment, their low-cost and open standards, and their adaptability to voice and data requirements.

Wireless technologies of different types are beginning to demonstrate their value in those regulatory pockets that allow them (and in some that do not). Not only pilot projects, but also a few full-scale rollout programmes are deploying low-cost wireless to reach low-income rural communities, where beneficial applications are being developed from the ground up.

## Regulatory Openings

Of course, regulatory obstacles to new technologies and players have often been the major barrier to progress in many areas of ICT development. But there is some evidence that there is more openness to trying out new solutions such as 'voice over IP' and wireless protocols, particularly in areas that are seen as otherwise unattractive for investment and service provision. Single formula solutions are also no longer seen as being supportable. The reality of ICT environments and needs, of vested interests and investment possibilities, varies hugely. But principles such as technology neutrality, '*open access*' to backbone infrastructure, and a '*public good*' rationale in certain ICT network components are beginning to be heard, for instance in the context of the WSIS preparatory meetings and in a number of developing countries. A layered approach to network development, each with potentially a different set of regulatory and ownership possibilities, is emerging. Alongside private or public ownership, partnerships, local authorities, SMEs and indeed communities are seen as having a role to play.

It is early days yet, and the emerging possibilities will take some time to come clearly into focus. But there is little doubt that paradigms in ICTs are becoming more varied and complex, each component more suited to different possibilities, and that the simple binary of public monopoly versus private competition no longer constitutes the poles in this dynamic. Analogous to technology neutrality, it could be argued that 'operator neutrality' is needed in the regulatory space to facilitate service and network provision by local actors.

## Putting Innovative Technologies and Community Ownership Together

These technology innovations, and at least glimmerings of regulatory openings, could open the door to a powerful *local level* dynamic in a couple of directions.

One is towards local entrepreneurs and/or SMEs taking the entrepreneurial role, perhaps backed by external capital or as subsidiaries. The second is towards a community ownership model. Both models will hopefully find their place. Each is oriented towards different circumstances, but there is also a significant area of overlap where variations of either model, and hybrids, are possible.

SMEs can take advantage of many of the conventional supports for private investment, and when they support local economic activity and ownership they are to be particularly applauded and deserve support. But the research evidence, from the case studies and documentation, also strongly suggests that the community ownership model *potentially offers significantly larger benefits, especially in a development context*. The community ownership model and hybrids based on the same principles have the potential to viably extend networks further out into poor rural communities, to provide more affordable services, and to ensure that these services have a greater development impact through linking directly with the needs of these communities. They also have the potential to act as community catalysts and as a support for a range of other development activities. For these reasons, we believe that the model deserves, and requires, specific attention from the international and national development community and from those governments that are interested especially in the impact of ICT on development.

## Where and How can they be made to Work?

There is general agreement that no single model of local ICT network and service development is suitable everywhere, and efforts at transplantation have had mixed results. Three identified variations of a community driven approach are the user/community owned cooperative, the local authority owned network, and the hybrid entrepreneurial/community-driven model. Each might suit different circumstances. Community ownership in general, our research suggests, works best where there is quite a high level of community institutional organisation (NGOs, CBOs etc.), strong leadership for the initiative itself, significant support in the local political context (partly to negotiate openings at other political levels), and where the demand for ICTs emerges directly from the experience of community social, economic and other needs.

However, elements of an enabling environment can be identified to enhance the prospects of implementation and success. Indeed, in the absence of at least some of these it seems likely that their potential will remain largely unexploited.

### *1. A Supporting National Policy Strand*

Areas of national policy that would support the emergence of local community owned enterprises include:

a) Identification of areas where current approaches are failing (reach and/or provision of affordable access);

b) A suitable legal structure that would be flexible enough to support different partnership structures;

c) Tax exemption or benefits for non-profit enterprises, and a means to ensure that surpluses are reinvested in local communities;

d) A National Support Unit, or some such modality, to kick-start community owned initiatives, and to design, provide or oversee many of the proposals below.

### *2. Regulatory Climate*

The following would create a regulatory climate generally favourable towards local network deployment and a few specific favouring a community owned approach, to be applied in areas identified as suitable.

a) Technology neutral licenses, so that services use the most effective and cheapest available;

b) Flexibility should be allowed in license award and conditions;

c) License exempt spectrum for wireless use should be free of costs and administrative burdens;

d) Interconnection pricing should be favourably set, including 'asymmetric' pricing;

e) Universal service funds should be accessible for development of community owned networks, including at the application and content level;

f) An 'open access' policy for connections to the national backbone could be promoted, that would also recognise the development benefits and higher conventional costs of services in rural areas;

g) Local regulations could be developed to ensure that service and application initiatives embody significant elements of community ownership and control.

### *3. Investment and Financing*

Here too some innovative thinking is needed to develop mechanisms for communities to gain access to financing for viable network development. These might include:

a) Tax and other finance mechanism reforms to give cooperatives and not-for-profit ventures fair access to existing investment mechanisms;

b) Institutional mechanisms for low cost loans, including adapting existing donor mechanisms;

c) Institutional structures that will attract local area investment, from users and others.

### *4. Resource and Capacity Building*

This is one of the major areas for support. It is widely acknowledged that business and organisational skills are in short supply at local level. This could be addressed in a number of ways:

a) Capacity building activities and materials developments;

b) Establishing national pools of resources and expertise;

c) Linking to experience and expertise elsewhere, through information sharing, peer-to-peer support, study visits, building networks and so forth.

Many of the above would best be provided as a coherent and sustained package by a national support institution, agency or initiative specifically charged with designing and implementing a supportive environment for community owned and community-driven networks.

# Community-based Networks and Innovative Technologies: New models to serve and empower the poor

## 1. Introduction

### *1.1 The Problem*

There is justified concern that the ICT revolution underway is bypassing the poor – especially the rural poor. Progress during the 1990s in fixed line telephony, the explosion of mobile telephony, and the widespread emergence of internet cafés and telecentres have begun to extend beyond urban areas and towards poorer communities. Yet the majority of poor across the world are still beyond affordable reach of ICTs. Globally, in many countries, less than 10% of rural areas have access to basic telephony. Both the level of investment and the growth rate of fixed line telephony in many countries, especially in sub-Saharan Africa, has fallen since the turn of the century (ITU 2003e).

The causes of fixed line failure are complex and not reducible to inherent limitations of privatisation or liberalisation *per se* (or indeed their absence in many countries). It is the result of a difficult combination of entrenched economic, political, regulatory and social factors that for many years virtually paralysed progress (Gillwald 2004).

These factors continue to exert a powerful grip, but a number of factors might point to solutions. The potential for further mobile roll-out as part of licensing agreements is being recognized. By 2001, mobile subscriber numbers had overtaken those of fixed lines, making Africa the first region of the world to achieve this. However, there is a long way to go yet. At the end of 2003, it was estimated that less than half of Sub-Saharan Africa was covered by a mobile cellular signal.

While it has appeared that mobile telephony has been the way forward, for some a casualty of this growth has been the lack of investment in "backbone infrastructure" and consideration of options that could enable more widespread and cost-effective access. However, new ideas are emerging that might work to relieve the regional and global bandwidth bottleneck (DFID 2004a) and provide a mechanism to encourage investment in this area so as to enable more effective resource use as well as ways of delivering public services and the exchange of information, goods and services. At a national and in some instances, even a regional level, an 'open access' approach to backbone/s is seen as possibly eliminating

economic incentives for inaction by incumbents and for enhancing the prospects for attracting investment – both public and private (*info*Dev 2005). In general, notions of technology neutral regulation, of fair and non-discriminatory access to bandwidth and of transparency are gathering pace. Many African countries, if haltingly, are beginning to act on the implications.

However, for building out local level access in rural areas, traditionally known as the 'last-mile', and for developing appropriate and affordable applications and services, fewer solutions are in sight.

The main obstacle to serving poor rural communities is quite straightforward and widely acknowledged. The cost of reaching rural and remote communities is relatively higher and the level of disposable income is lower. Current thinking around ICT access to poor rural communities tends very quickly to narrow down to a few possibilities.

Within areas already enjoying network coverage, the goal is to drive down tariffs through competition, and to pool usage through private entrepreneurial franchise models at an individual level (for instance using mobile phones) or collectively (through internet and telephony kiosks), or through community-run and publicly funded telecentres.

Where network extension into poorer areas is needed, the emphasis is on regulation to render these areas more attractive and profitable to major telecom operators, in recent times through for instance technology-neutral licenses or the use of universal service funds and 'smart subsidies' to attract commercial operators. The focus has traditionally been on attracting investment and inducing existing telecoms operators to address poorer areas, if necessary using public and donor funding to spur private initiatives (World Bank 2005). Donor-funded telecentres equipped with satellite connections to the internet are also used to bring basic connectivity to excluded areas even though most evaluations of these agree that they have performed poorly:

> [T]he evaluative evidence of numerous donor-funded telecentre efforts – including several high profile initiatives in Africa – reveals fundamental problems and limitations. For example, three wide-ranging assessments of the telecentre experience in Africa, Latin America and the Indian sub-continent reveal that none of the major donor-funded initiatives have managed to become self-sustaining, and most have not achieved their expected development outcomes (UNDP 2001: 23).

In international debates, these appear to be the only options. Poor rural communities cost more to service with networks and have less to spend on the services. Inducements to bring external operators through regulation or subsidy, and pooling of low-income users, seek to redress these disadvantages. The formula, in its most advanced form, is large-scale solutions to network extension and the local loop, and local enterprise solutions to service provision.

But will this be enough? The sheer scale of the problem and the rate of progress suggest it will not. The poorest 59 countries, with 40% of the global population have mobile teledensity of only 1.7, internet access of 1.3 and an effective teledensity of just 3.31 – and these do not even differentiate rural and urban areas (ITU 2003a p3, A4). The implica-

tions are serious. Recent research suggests that the rollout of infrastructure thus far in poorer countries has, by favouring wealthy and urban areas, led to a greater national divergence in incomes (Forestier et al 2002). The longer this imbalance persists, the more the income gap is likely to grow.

A major missing link is the extension of the network from the backbone (where it exists) into local towns, villages and streets where it can be accessed. Are there ways to reduce the cost of supplying access to rural communities while enhancing both the *ability* of communities to pay by mobilising unused resources, and the *willingness* to pay by more precisely matching the services on offer with the community's needs and thus increasing the development rewards?

### *1.2 New Approaches to Access for the Rural Poor*

The central component of the formula proposed here is community-driven solutions for *both* network extension *and* service provision (and indeed applications and content development), combined with a realistic business plan and an empowering, development oriented ethos. Is this possible? Is it possible to marry a participatory community development approach to the hard-nosed business of network and service development? Evidence indicates that it is.

The idea of community-driven enterprises, creating the structures within which individuals can be rewarded for their entrepreneurial and creative talents in solidarity with the community as a whole, draws directly from widely accepted development experience in all sectors, including in ICT application and content development. Active participation and community ownership are generally regarded in development practice as essential ingredients in sustainable actions to address poverty and its consequences.

However, a couple of factors make this currently more realistic.

First, the new wave of wireless and related technologies, deployed and implemented through a cooperative or community-driven approach to community resource mobilisation may unleash significant potential for building networks *outwards* from community resources and needs, instead of waiting for the commercial equation to tip in favour of attracting external telecom operators.

Second, there are indications that regulatory innovation may be forthcoming from developing country governments in ways that go beyond previous prescriptions, enabling local communities to build upon their past experiences, harness their own resources and expertise, and own and manage networks that will fulfil their requirements.

There are also powerful historical and current precedents. The cooperative rural telephone movement in the US brought telephony to virtually all of rural America, and cooperatives from Poland to Argentina are succeeding in the same goal today. Innovative partnerships in India, Peru and elsewhere, in which the community is in the driving seat, are achieving significant and large-scale success in bringing advanced ICT services to the rural poor.

New technologies and regulatory innovation, combined with long tried and tested approach-

es to development, may thus hold a solution for many poor rural communities. The 'last-mile' could become the 'first-mile' as the focus of expansion is no longer on inducing telecom giants to find their way into every remote village; but rather for such towns and villages to build their own networks and design their own services and connect these into regional and national backbones.

The efforts of local communities alone, however, cannot make this happen. The regulatory and legal environment, the investment and financing modalities, and government and international policymakers have thus far been slow or reluctant to recognise their potential. If the opportunity is not to be lost, positive action will be required.

### *1.3 Report Content*

This report outlines the possibilities and limitations of community owned and managed networks, services and applications.

**Section 2** considers the history and background of community ownership, in particular the cooperative movement, acknowledged as a potential contributor to the Millennium Development Goals, as well as more broadly for development activities. It describes a number of successful cases of community ownership of ICT networks in rural areas, in several continents, both in relatively 'pure' forms and in terms of hybrids including both private and public actors.

**Section 3** outlines the new wave of technologies having bearing on these initiatives. These include wireless networks over licensed and non-licensed spectrum drawing on the considerable literature that has sprung up in recent years. After exploring their potential for cost savings and implementation in developing countries, it extracts the specific characteristics that make them so interesting right now, using concrete examples of where they have been deployed primarily in development contexts.

**Section 4** covers in depth a number of important and comparative aspects of community ownership. It compares the community ownership and private investor approaches, noting differences as well as considerable overlap and complementarity. The section discusses some possible explanations for why the cooperative model, given its evident benefits, has not already been more widely taken up, and concludes by considering the circumstance in which it works best.

**The final section** concludes by highlighting the mutual benefits and significant potential of community ownership and the emerging technologies. It proposes actions to realise their potential, across different areas including regulatory and legal terrain, investment issues, and resources and capacity building.

**Six case studies** completed as part of the research, and a **FAQ** (Frequently Asked Questions), are contained in the Annexes.

## 2. Community Ownership: Theory and Practice

What is meant by 'community ownership' in the context of ICT for development?

First, in the language of community development and empowerment, the concept of 'ownership' and of 'taking ownership' refers to a process of internalisation of responsibility for a development process and its outcomes, and therefore a willingness to invest considerable effort and resources. Ownership is generally regarded as a prerequisite for sustainability of a community development action (Batchelor *et al* 2003). In this case, the use of the term 'ownership' refers more to the fact that the action is tailored to a community's needs through a participatory process that the community has some degree of control over, rather than to holding legal title.

Second, in a related but distinct sense, community ownership may refer to a determining degree of decision-making power, for at least some dimensions of a local initiative. The community can ensure that key parameters are focused on its needs as determined by the community itself. Such influence may be exerted in design, deployment, terms of implementation and ongoing management, and may be underpinned by law, by contract, or by part-ownership.

Third, it may refer to full or majority legal ownership of an initiative, typically in the form of a non-profit enterprise or cooperative.

Of course these three are related and will always be found in some combination. What they have in common is a *direct and ongoing* influence of the community, a factor that this paper argues *has significant potential to enhance ICT network deployment, access and service-provision among low-income rural communities.*

A review of community ownership in general and its relationship to development is a necessary starting point. This contextualises the experiences in telecommunication and ICTs that follow, especially since ICT for development has its roots in the very different world of large-scale infrastructure technology. From the case studies, a number of different types of community owned initiatives are identified and described, with particular highlights elaborated in text boxes. Following this, the specific benefits of community ownership in ICTs are summarised.

### *2.1 Community Ownership and Development*

Community owned enterprises are not new. In industrial society they date back over two hundred and fifty years and have a long and varied history. The question here is whether their relevance is sustained within a globalised context and more specifically in the context of telecommunication and ICTs.

In practice, community ownership can be mapped along a continuum. Formal community ownership of enterprises may include for instance:

- Local government ownership, implemented as a service for local people and organisations;
- Non-profit enterprises in which a majority of shareholders are people, organisations

or firms within the community served. Such shareholders may include only a small minority of the total catchment community, and the voting power of individual shareholders may vary greatly;

- User cooperatives, in which the users are also shareholders, in general each having the same level of voting power;
- Community cooperatives, in which all members of for instance a village, irrespective of whether they are actual or potential users, may be members, and in which all have equal voting rights;[1]
- Worker cooperatives, in which the workers are also the enterprise's owners and managers;
- A community owned element in the context of a larger consortium that might include public and private interests, and non-profit and for-profit components.

In terms of management and member participation, a number of approaches are also adopted. While these all involve a certain degree of community control, formal ownership may not be required:

- Management can be similar to that of conventional firms, for instance with a board of directors appointed by elected officials, and hired professional staff;
- Advisory committees and mechanisms can be in place to ensure that the voice of the community is at least acknowledged and heard;
- Effective community control can be exerted without ownership *per se*, through a legal mandate to decide with the owners (public or private) on key parameters of the initiative, such as tariffs, services, reach, etc.
- Management can be elected, by means of direct and equal participation of all the community members;
- Community members can directly participate in the activities of the enterprise, through voluntary or non-voluntary work.

Community-driven initiatives and cooperatives have emerged in all sectors and in all regions of the world. The formal cooperative model and the empowerment model of ownership suggest a spread of capabilities, though in practice they often coexist as components of a single model.

### The Cooperative Model of Ownership

The cooperative model has seen great success. Agricultural cooperatives have proliferated in many rural societies, evolving into major industries in many developed countries.[2] In less developed countries, notably in Latin America, cooperatives have been one of the main vehicles for building and maintaining local water and electricity infrastructures and services in rural areas.

Different phases in cooperative development are identified in a recent ILO report (Birchall 2003: Chapter 1). The most recent emerged during the 1970s, at which time a hierarchically organised cooperative movement enjoyed significant, but top-down, government sup-

port and infrastructure in many countries, serving also as a key delivery vehicle for government services. Although these benefited middle-level rural populations, there was a widespread feeling that cooperatives were failing to reach the poor. As reregulation and privatisation weakened much of their supporting infrastructure, a new more autonomous and member-driven paradigm came to the fore in the 1980s. In line with this, the new cooperatives began to build upwards from members' and community needs and reinvigorated their structures, recognising self-sufficiency and long-term sustainability as key goals. For external aid, the emphasis was on human resource development, supportive legislation, fair taxation, and so forth. Any subsidies would be transparent, usually temporary and goal-directed. The key was to return control of the cooperatives to members, recalling the founding principles of autonomous, democratic and open organisation.

In 2003 UN Secretary General Kofi Annan acknowledging the role of cooperatives in poverty reduction and in supporting the Millennium Development Goals:[3]

> The adoption of those goals expressed the resolve of the international community to free all people from the abject and dehumanizing conditions of extreme poverty and hunger. As models of self-help and solidarity, cooperatives understand better than most that, while such high-level political support is welcome and necessary, progress does not happen by itself, but rather through sustained individual and collective action.

Annan noted that the UN General Assembly in 2001 adopted guidelines to help governments to create legislative and policy environments conducive to the establishment of cooperatives, and to help cooperatives themselves advocate and negotiate these very changes.[4] The UN Committee for the Promotion and Advancement of Cooperatives (COPAS), convenes the UN Secretariat, a number of its agencies and major NGOs to exchange information, undertake research and promote cooperative in their practice.[5] The FAO and ILO are particularly active. Such cooperatives exist across all sectors but are particularly relevant to domestic infrastructure such as electricity and water.

**The Empowerment Model of Ownership**

Often less formally concerned with legal title than the cooperative model, the empowerment model focuses on the self-determination and development of marginalised and disadvantaged communities.

During the late 1970s and early 1980s development thinking underwent a profound transformation in response to a perceived widespread failure of imposed top-down development solutions. Participatory approaches came to the fore, in which the active involvement of local populations, the 'target-beneficiaries', at all stages from conception, to design, to deployment and evaluation, became an essential feature of most development activity. The lesson took root and still holds true across development activities, from the World Bank[6] and UNDP through to bilateral programmes and donor NGOs. The aim is in large part to instil a sense of ownership within the community, a factor understood as a central feature of long-term sustainability. A review in 2000 of the concept of ownership in aid structures concluded that more or better ownership by local stakeholders is crucial to the relevance, effectiveness, efficiency, impact, and sustainability of development activities, and is something that all should aspire to and design for (Molund 2000).

The empowerment model of development – which also influenced the formal cooperative model – is particularly relevant for poor communities and those facing multi-dimensional disadvantage or exclusion. It promotes capacity building and solidarity, linking together different components of experience and possible solutions. Though often applied in small-scale projects among specific disadvantaged groups and villages, it can also generate the basis of a wider development-oriented social movement.

Although they traced distinct historical trajectories, cooperative and empowerment models often coexist in the same entity. The *pure cooperative* originated as a members' participatory democracy focused on broader development needs. The trend today is to return to this model. Initiatives focusing on empowering marginalised communities very often adopt a cooperative structure, particularly as they grow in scope and activities.

**Box 1: Rural telecom cooperatives in the US**

Rural telephony cooperatives first appeared in the US following the publication of a manual explaining to farmers how they could develop their own telephone systems on a cooperative basis. At its highpoint, in 1927, there were 6,000 rural telephone cooperatives across the country. However, by World War II, it was clear that rural telephone systems had reached an impasse. The old systems had deteriorated, rates were low, and capital was inadequate to upgrade the networks. As a result, fewer farmers had telephones in 1940 than in 1920.

In 1949, the Rural Electrification Administration, an entity of the US Department of Agriculture, began making long-term, low interest loans available to rural telephone systems. The loans sparked a new era of growth for rural telephony, which continues today.

There are currently more than 1,000 telecommunication cooperatives in the US providing both basic and advanced services, including broadband internet access, cable television and mobile telephony. A recent survey of the 560 member companies of the National Telecommunications Cooperative Association (NTCA) found that nearly 60% are providing wireless service to their customers. Of those providers, nearly two-thirds (64%) offer broadband, while others offer services such as mobile voice (42%), data (29%), and paging (27%).

### *2.2 The Experience of Community Ownership in ICTs*

The full range of community ownership models has in fact been applied within the area of ICTs, some having accumulated long and successful histories. These can broadly be grouped into three areas:

- **Services and Content:** Designing, developing and running community-based ICT/internet content and applications, ranging from community web-pages and e-commerce to telecentres;
- **Local Network Infrastructures:** The construction of rural and urban telephony networks, in wealthy, middle-income developing countries and transition economies, in community or sometimes local-authority ownership; and
- **Hybrid forms:** Some of the key principles of community ownership are combined with commercial or public forms of ownership and provision.

Below we briefly consider the experience and track record of past but also more recent examples of these three forms of community ownership.

**Community Ownership and ICT Projects**

Throughout the 1990s, while tumultuous change gripped telecommunication networks, numerous more modest projects were supported on the ground by UN agencies such as the FAO (exploring a variety of media for development)[7] and UNDP (for example SDNP support for internet and store & forward e-mail based networking),[8] international development institutions such as IDRC, and bilateral agencies such as DFID and SIDA. These were directed towards enhancing ICT access on the ground to communities, with a view to supplying content and applications tailored to their needs such as health, education, access to markets, and public service delivery. For the most part, they were driven from the outset by a community development approach that stressed the importance of local ownership, although some of the early telecentres experience was strongly influenced by a more hierarchical and technical model.

**Box 2: Cooperatives in Poland (Case Study 1)**

The WIST and Tyczyn rural telephony cooperatives became the first such enterprises in Eastern Europe when they were launched in October 1991 and June 1992 respectively. Changes in Poland for the first time allowed new operators to compete with the national carrier, TPSA, to address a teledensity of only 2.4 in rural areas.

Since then they have overcome many obstacles and have achieved steady growth to over 9,000 lines each by November 2004. While many of their private-investor led counterparts failed and were taken over by TPSA, WIST and Tyczyn have invested in the latest technologies and offer cheaper and better service to their users.

Both are democratically run by the members. Our research has confirmed that they have acted as catalysts for development in these areas, by become involved in a wider range of activities such as tourism promotion, and through encouraging similar enterprises for natural gas and water treatment.

Very active support by the local authorities and mayors was vital in the initial stages, as well as the existence of village telephony committees. Ongoing technical support from the US-based NTCA, and in the initial stages by USAID, was also crucial. Later, USAID, the EU and other donors appeared to shy away from supporting the wider application of the model, as attention shifted to a privatization approach and to the urban sector.

See http://www.ntca.org/ka/ka-2.cfm?Folder_ID=324

A typical, and prominent example is near Pondicherry, in southern India. The Swaminathan Foundation undertook a participatory development approach to constructing a hybrid wired and wireless network, including PCs and telephones in ten villages. The bottom-up pro-poor, pro-women approach provides a range of services, and includes the use of volunteers to collect and input local information into an intranet that is distributed across the network using the local language and including interfaces for illiterate users. Studies of the experiment all stress the key role played by a strong sense of ownership, that applications

were developed in response to expressed local demand, and that the local population participates fully in all stages of development and use.[9]

In Chile during the mid-1990s, the FAO's Communication for Development group pioneered a participatory approach to the development of internet-based information and communication networks among organisations of small-scale producers. The organisations were provided with data on crops, market timing, prices, market conditions, weather, etc., as well as full access to the internet so that users could to find other information relevant to their lives and communities. However, the most important aspect of the initiative was its attention to local information needs and provision of assistance to farm organisation personnel to help them develop the skills necessary to analyse information needs and disseminate locally relevant information. The methodology emerged from previous development communication experiences using small format video, print media and rural radio and it was probably the most user oriented approach to designing internet services in the developing world at the time (Ilboudo & del Castello 2003).

**Box 3: The Pinamar telephone cooperative (Case Study 2)**

From the moment it was conceived in Pinamar, Argentina in 1962, TELPIN has been considered as a community cooperative mixing strong social obligations with a business policy as efficient as a private enterprise. It is managed by a Management Council, integrated by a president, a vice-president, a secretary, an under secretary, a treasurer; five senior counsellors, and four deputy counsellors. Each member is a shareholder, but the difference between the cooperative and a corporation is that each member represents one vote, independently of his or her involvement in the cooperative or the money he or she contributes.

Although all the households in Pinamar are TELPIN´s shareholders, their participation is not direct: the cooperative organises an annual general meeting at which members of the management council are elected. Except for one year, there has always been a single slate of candidates. Whenever there is dissent, the policy is to incorporate it to the slate and to reach a consensus within the council. The members of the management council are individuals considered to be representative of the whole community.

The resulting commitment to the community has been fundamental to TELPIN's success: inspiring continuous efforts to provide managerial efficiency and better, cheaper services. The Cooperative has special payment plans for users with financial difficulties. Moreover, in months when the Cooperative's balance is particularly plentiful, a discount is granted to all users. For a monthly payment of $10 pesos (US$3) associates receive a telephone line with unlimited local calls. In the winter months there are special discounts, and seasonal workers pay seven pesos per month, which is less than the cost of bus fare to travel in the area to search for work.

In 1999 Telefónica, one of the two national telecom companies, employed twenty-eight people to call on each residence in an effort to sell its own long-distance service. By the end of two weeks, only one user had agreed to switch.

These are by no means isolated examples. In May 2003 the International Institute for Communication and Development (IICD) convened a workshop to examine a broad range of experiences of ownership and partnership in ICT development projects. Discussion covered different types of ownership and how high levels of local ownership can be fostered. The workshop report concluded:

> In summary, we need to transform the situation where many ICT-enabled development activities are initially formulated and owned by external agencies, often with a few local stakeholders, and where a priority is to transfer or mainstream ownership. Instead, clusters of local actors and communities could be mobilised and encouraged to drive and own the processes in which ICT activities are designed and created, from the start (Ballantyne 2003).

Another recent study, this time on ICT applications to address poverty in rural India, concurred, "Successful ICT projects are characterized by local ownership and the participation of the community" (Cecchini and Scott 2003). The conclusion that community ownership is critical to success of local ICTs projects, just as it is to non ICT projects, is now widely accepted by those who work in ICT for development.

Demand for ICT applications and services must come from the community, which must be intimately involved in identification of communication needs. The design of solutions must be based on community capacities and requirements. Tariff levels must be affordable to the community, something that only the community can assess. Further, ongoing updating, maintenance and evolution, and ultimately sustainability, must become an integral part of community activities. As the authors of a study of a telecentre in Paraguay wrote: "If the principal beneficiaries are not involved from the beginning and do not have a sense of ownership, it is unlikely that the initiative will be sustainable" (Aranda and Fontaine 2001). An evaluation of the Gyandoot network, which brought rural internet to villages in Madhya Pradesh, India, observed the decision that the project "would be community owned to encourage the increased involvement of the community in maintaining and further developing the network" (Prakash cited in James 2004: 94).

Can the same arguments be made for network infrastructure deployment?

**Box 4: An Irrigation & Communication Technology Network (Case Study 3)**

Ten years after privatisation and five years after the sector was fully liberalised in Peru, there is still a virtual monopoly in fixed line telephony, with a single company providing almost 97% of 2.34 million lines. At 7% Peru has one of the lowest fixed-line teledensity rates in Latin America.

One community owned network that is helping to connect rural Peru is in the Chancay-Huaral valley, a largely coastal agricultural region north of Lima. Owned by the district's irrigation commission, an organisation that represents all the farmers in the valley, the network uses WiFi technology to link thirteen communities in the valley.

Initially conceived as a project to provide specialised agricultural information, to facilitate communication among organisations in the community, and to provide internet access, the community reoriented it to serve their most pressing communication need – telephony. As of early 2005 VoIP telephony is used to link the communities and to make international calls, the latter being especially popular because of the high rate of migration from the region. Ironically, while community members can speak with family members in the US and Europe for only a few cents a minute, regulatory hurdles have prevented them from interconnecting with the national grid in order to make a call to a government office in Lima. While the easiest way to resolve the interconnection problem might be to sell the network to the national operator, Telefónica, the idea has been rejected as it would not provide the kind of service the community wants.

### Rural Telephony Cooperatives

A few countries with diverse circumstances have generated very considerable experiences of large-scale deployment of rural telephony cooperatives across national territories.

One of the largest and most successful examples historically took place on a national scale in the US (see Box 1) and was successful in establishing thousands of rural telephone cooperatives. At its high point in 1927, there were some 6,000 cooperative telephone associations in the country. While many have since been sold or absorbed, rural telecommunications would not have developed in the US without these cooperatives and there are still nearly 1,000 of them providing telephony and broadband access for rural communities today. They are membership-owned, democratic in structure, and often engage in broader community development activities. They receive continued financial assistance from the government, and are supported by their national association, the NTCA.

#### Box 5: A Community owned Wifi/VoIP Network in Laos

One of the clearest cases of a cooperatively owned community network using new technologies is under development in Laos, animated by bottom-up development principles rather than a traditional network approach.

The Jhai Foundation has been working for some years in the Hin Heup district, comprising five small villages within a radius of a few kilometres. The total population is 425 people. Several years ago the villagers asked their telecom providers when they could expect to receive service: the response was …never. With the support of the Jhai Foundation, a WiFi and VoIP based technical solution has been designed and tested, and a detailed business plan prepared by the villagers themselves. Based on a mix of voluntary and paid labour, on the use of community facilities and resources, on services selected by the community, and on tariff levels the villagers themselves judged to be affordable, the plan demonstrates that the service is financially feasible. As well as internet use, it includes local, national and international calls and allows for the interconnection fee at the nearest connected village, about 9.5 kilometres away.

Although initially installed and paid for by the Foundation, all operational, maintenance and full infrastructure replacement costs will be covered, based on a conservative estimate of tariffs and use. The figures indicate for this kind of situation, villages of a few hundred people. Rather, the solution requires the concerted support of the village community. The promoters have recently been obliged to relocate the project to another village in Laos, where it is expected to be operational within a number of months.

See http://www.jhai.org/jhai_remoteIT.htm

Two sizeable rural cooperatives in Poland, WIST and Tyczyn, set up in the early 1990s, were inspired by the US experience (see Box 2). Here too, ownership follows the cooperative model. Recent research, confirmed by our case study, shows that they provide a higher quality service at lower cost than their commercial competitors. In addition, they offer a range of additional services and benefits to the community and are credited with having invigorated local community organisation.

In Argentina rural telephone cooperatives also service a significant proportion of the rural population. (see Box 3) Until 1989 when it was privatised, telephone services were

monopoly managed by the state telephone company, ENTel. ENTel was not interested in serving rural areas, which it saw as a complicated and unprofitable undertaking, and authorised non-profit organisations to provide telephone service in their local areas. When ENTel was privatised in 1989, the three hundred and fifty cooperatives that had been set up retained their rights. Together the cooperatives manage some 600,000 telephone lines, around 8% of the national total, and they are growing at a much faster rate than Telecom and Telefónica, the two national operators. In addition to basic telephony, many of Argentina's cooperatives offer dialup and ADSL internet access. Various wireless technologies, including WiFi and corDECT are being used to service users in remote areas. The coops are well-organised on the national level through two associations, which are preparing to launch a nationwide low-cost mobile network in 2006.

Although there are significant variations between these examples, they have all firmly maintained the cooperative principles of deeply democratic structures, local ownership, and a focus on providing service for the community. They have resisted efforts either to commercialise or to restructure in a manner that would remove control from the community while nominally preserving a non-profit structure. Technology and services in all of them have also evolved and investment has been a priority. Broadband is now a focus, and a number are already experimenting with wireless solutions.

The Chancay-Huaral network in Peru (Box 4) offers a good example of a community owned network utilising WiFi but stymied in part by government regulatory obstacles. The network links thirteen valley communities and can connect internationally – but ironically is denied access to national telephony services. Finally, a network built on WiFi points to future directions in rural Laos. (Box 5)

These examples illustrate that the 'pure' cooperative principles can indeed be successfully pursued in rural infrastructure development, in the right circumstances, and in various forms.

**Box 6: The Akshaya Initiative (Case Study 5)**

Kerala State government supports a programme that now extends to over 600 information kiosks, offering a range of ICT services beyond telephony, such as bill payment, registration of complaints at police stations, and birth and death registration. The state provides the connectivity, and is now testing WiFi technology for its rural kiosks.

Kiosks are run by individual entrepreneurs and it is widely held up as a case of enterprise succeeding in poor areas. What is less well known is that the locally elected village bodies, the Panchayati Raj Institutions (PRIs), have a major legally-sanctioned role in governing these. In addition to a state policy that all franchisees must train at least one member of every family in the use of ICTs, the PRIs have a strong voice in selecting and overseeing the franchisee. The community role is critical to setting affordable tariffs for the poor, ensuring that profits are proportionate to the role played by the franchisee, in selecting the range of services available, and in channelling excess to community purposes. Such rights to participate in effect give the community most of the benefits of ownership by ensuring a clear and firm pro-poor mandate, and they underpin the huge success of this programme, said to be the largest in India.

### Hybrid Forms: Public, Private, Community

Thus a few countries have adopted or encouraged the cooperative model in rural network infrastructure, though generally not in the least developed countries and poorest communities. There are several reasons for this, including restrictive legal and regulatory frameworks, the difficulty of accumulating sufficient investment capital and lack of available expertise. Nevertheless, important components of the model are evident across a range of current attempts to address ICT infrastructure and access issues. Many of these hybrids employ the new generation of technology combinations.

The innumerable informal WiFi networks springing up in Indonesia, sometimes connecting rural areas, embody a critical empowering element.[10] They rely on and promote a symbiotic relationship between students eager to learn and write about WiFi networks and their deployment, and local communities and entrepreneurs (usually acting outside the regulatory framework) who use these published materials to build the networks for their own use. As a result, and perhaps partly because they operate outside the formal system, many such networks have gained a strong sense of ownership among their users.

The n-Logue project (Case Study 6) uses a low-cost wireless local loop technology developed in India called corDECT. The technology can provide access over a 10 kms line-of-sight distance, extendable to 25 kms. Because the technology developers at the Indian Institute of Technology in Madras initially found little interest among mainstream telecoms players, a trust was set up along the social enterprise model. N-Logue proliferates, now to hundreds of villages across seven Indian states, by means of a franchise extended to entrepreneurs and to local government. Franchisees, often already providing other services, are given training and access to loans, and open what is effectively an internet café and phone booth service to the village. The combination of social enterprise and franchise has thus extended access not simply to poor people in areas with existing infrastructure, but also the reach of the infrastructure itself into poor areas. It has also moved into the provision and development of ICT content and applications for rural users, in one important instance in collaboration with a local NGO. The initiative still faces many (including newly imposed) regulatory hurdles to the provision of telephony and opposition from both incumbent and private licensed suppliers, but it has nevertheless built a solid basis for expansion.

The Akshaya experience (Box 6), also in India, is an even more complex hybrid. In this case, there is very significant community control exerted in the context of a state government programme that offers franchises to private entrepreneurs and local entities.

Yet another hybrid model – but one that went wrong precisely because the community component was left out – comes from Cajamarca in northern Peru (Case Study 4). There a model was designed in which the infrastructure would belong to the municipal government or a community organisation, but be managed by an administrator as a micro-enterprise. The administrator was to be chosen by the organisation or institution that, following a public tender, would own the infrastructure. A support committee, comprising members from local organisations and institutions (government, private sector and civil society) were to oversee and contribute to the work of both the legal owner and the administrator.

**Box 7: Nine advantages of community telecom cooperatives in Argentina (Case Study 2)**

1. They are the only telecommunications providers with an entirely Argentine capital base (local communities' capital). The members of FECOTEL, which represents 250 of Argentina's telecom cooperatives, manage around US$3 billion of community assets. The initial capital is from member contributions. Profits are not exported, but used in the community to enhance services and reduce costs
2. They are social centres. They provide local content and enhance community activities.
3. They are a source of employment for skilled and unskilled labour (3,500 people work in CTCs in Argentina).
4. They provide training in the diverse uses of ICTs.
5. The successive economic crises suffered by Argentina were not used as excuses to fire employees.
6. They are solidarity economy enterprises; therefore, their economic surplus is invested in other community projects, contributing to the local and regional economy.
7. They provide high-quality advanced telecom services, including low-cost internet access.
8. Local capital does not migrate to foreign countries. CTCs encourage local economic development and improved standards of living in the community.
9. They are agents of democratization and social appropriation of telecommunication infrastructures.

The project was funded by Peru's universal access fund, FITEL, which at the last minute decided that the infrastructure would belong to Gilat to Home (GTH), a rural telecom operator with operations in many parts of the country. The resulting model was far more complicated and inefficient. "In practice the administrators were bound by the standard contracts that GTH has with all its concessionaries and in which issues such as the contribution to local development, citizen participation, location of the concession in spaces chosen by the community, etc., do not appear" (from Cajamarca, Case Study 4).

### *2.3 Advantages of Community Ownership in ICTs*

Applying the accumulated experience of the cooperative sector and participative development approaches in general to ICT network and service provision, a number of advantages specific to the model of community ownership and control can be identified. Not every case embodies all of these, varying by goals, circumstances, nature of the services provided, and so forth. But each example exhibits at least a few.[11]

#### Mobilising Resources

There is strong evidence that community owned ICT initiatives have the capacity to mobilise resources at low or no cost, through for instance voluntary labour, access to rights of way and the use of public commons, shared use of community facilities, and in-kind payment for services.

The Polish rural telephony cooperative, following the US model, benefited from significant self-help efforts, including stringing lines, undertaking household wiring, and various construction from erecting poles to refurbishing offices and equipment facilities (NTCA 2003 p37). Likewise, in Laos (see Box 5) the use of voluntary or self-help labour and community facilities is critical to the business plan. The community owned wireless network will be utilising public and community building and there is also a significant role for voluntary labour envisaged. While the Telpin cooperative (Box 3) in Argentina is somewhat atypical because a significant proportion of its members are relatively wealthy, seasonal residents with summer homes in the community, the spirit is the same and the cooperative benefits from the volunteer technical and management expertise of the summer residents.

Although professional staff comprise a critical component of any infrastructure provision and maintenance, local resources can be especially useful during the initial stages. Further, in terms of the economics of network provision, a community's in-kind contribution can mean that a rural network of no interest to an external investor is feasible for the community themselves to undertake.

**Demands a Lower Return on Investment**

Community owned enterprises are willing to supply services for which the net direct return on investment is slight or non-existent, since the goal is to maximise the benefits to the community through the availability and use of the service by the community. Experience of rural telephony networks has shown, however, that they can also be highly profitable.

The Polish case is instructive since both external investment-led and cooperative local networks were developed side-by-side. The cooperatives raised about 30% of their financing through local shares and hook-up charges, another 30% from the local government, and 40% from national banks. In contrast, commercial companies raised 60% of their investment through a joint venture capital fund but had to generate a 20% minimum return for investors. As a result many went out of business and were subsequently consolidated into larger concerns (Case Study 1; NTCA 2003, p10, 18).

**Services and Applications are Based on Needs**

The services and tariffs developed are tailored to the means and needs of the community, being designed directly from them. Most of the case studies included in this report show this. For example, in Argentina the cooperatives provide a high quality service and access to advanced digital services such as ADSL at a low cost. However, more importantly and more unusual is that they do this for *all* community members. Not only do they reject the concept of 'cherry picking', in which an operator concentrates on only the most lucrative of services and customers, but Telpin and other cooperatives offer special discounts and even free service for poor seasonal workers, schools and others.

In Huaral, Peru, the network's emphasis on telephony is a response to community demand articulated by the owners (the irrigation commissions). The Akshaya case also demonstrates the value of firm community influence in ensuring the focus stays firmly on the needs of all members of the community, even when direct ownership is with a local entrepreneur. The cooperatives in Poland, too, have benefited significantly from their additional services by being able to directly assess the needs of their rural communities.

**Surplus is Reinvested in the Enterprise and New Services**

Generated surplus is kept within the community and applied to further ICT-related or development activities. Such surpluses can be very considerable, as is shown in Argentina, Poland and elsewhere.

In almost every example, the community owned network moved on to offer additional ICT services, often at low or no cost, drawing on the surplus of the core business. Argentina's cooperatives, for example, have banded together to launch a national low-cost mobile service. In Poland, low cost training and ICT access were delivered as additional services, but considerable investment was also devoted to installing the most modern equipment, delivering a service far superior to its competitors.

It is worth noting that national or dominant telecoms companies may also benefit from the emergence of community owned networks. They are relieved of the burden of building and operating networks in what they perceive as marginal or non-economic areas. Further, they also boost their own income, by collecting revenues for the completion of national and international calls for traffic originated by cooperative subscribers, and from their own subscribers originating calls to the local network.

**The Enterprise can Contribute to Further Development Activities**

Through the experience of building and running the community enterprise, the community develops skills and organisational capacities that it can then apply to other economic and social uses, encouraging a process of community empowerment. Both WIST and Tyczyn have acted as major stimuli to activities in other sectors. Conclusions from the 2003 review are worth quoting at length:

> As a direct result of the telecommunications cooperative success, these communities undertook to establish wastewater treatment plants, village natural gas systems, and recreation facilities. For example, in Trzebownisko Gmina (the WIST service area), a new public swimming facility has been built, which is fully equipped with competitive swimming, two-story water slide, warm-water pool, instruction and conference rooms, snack bar, message centre, and a two-story atrium furnished with tropical plants and fountain. In the Tyczyn service area, the telecommunications cooperative experience gave rise to the development of an array of other community owned businesses.
>
> The Polish case also proves the notion that cooperative development invigorates civic life. For example in 1994 Kazimierz Jaworski, Manager of the Tyczyn Cooperative, was re-elected mayor of the region. Tyczyn had a voter turnout of 45%, compared to the national average of 30%. Mr. Jaworski attributed this higher level of involvement to the influence of the cooperative, which has helped people understand and appreciate the power of the vote (NTCA 2003 p38-39).

For the past six years the Telpin cooperative in Argentina has provided free access and computers for all public schools and libraries in its community. It has also invested considerable resources to develop a teacher training program that has been adopted.

Of course, there are also specific challenges involved in promoting a cooperative or community owned approach. They are not the only option in many situations, and certain conditions are

more likely to be conducive to them than others. Critically, they must be developed according to local circumstances. There is no one-size-fits-all. Further on we consider the circumstances in which they are most likely to take root and generate significant benefits.

## 3. Innovative Technology Combinations: Developments and Opportunities

Technologies can play a decisive role in determining how networks can be used, whether they will be centralised or decentralised, who can own them, who can set them up, and whether they can be adapted to the specific needs of individuals and communities. Certain technological developments and choices can decentralise networks and afford local communities a role in shaping the services and applications they make possible. Conversely, other choices and configurations may leave entire communities completely outside of the networks.

An example of a technology that enabled the extension and appropriation of the telecom network by rural communities is the Rural Automatic Exchange (RAX) developed in the mid-1980s by India's Centre for Development of Telematics (CdoT). Prior to the introduction of these low-capacity low-cost exchanges, rural telephony was not economically viable in India. Initially opposed by government and business alike, RAXs are now used in 40,000 rural exchanges and the 20 million telephone lines they make available are widely recognised as a major contributing factor to India's development. Another CdoT innovation enabled India's 600,000 STD/PCO phone booths, providing telephone service for millions of people in some of the poorest and remotest communities while creating employment for one million people. Other technological innovations, applied at different layers of the telecom infrastructure, enabled the unbundling of telecommunication services (e.g. local network provision and long distance).

The claim here is that emerging technologies, that we have already seen played a key role in the success of n-Logue, may become a far more important factor in the future and significantly enhance the potential for the applicability of the community driven model both in terms of the extent to which it becomes generally feasible and of the types of environment in which they can be deployed.

### *3.1 Wireless Networks*

A variety of land-based wireless technologies have emerged in recent years that offer the possibility of dramatically changing the nature of telecommunication networks, not only connecting many rural and marginalised communities for the first time, but also empowering them to tailor the networks, applications and services to their specific needs. Chief among these is the family of technologies known as WiFi, built around 802.11(x) standards and WiMax and related 802.16(x) standards. Other proven wireless technologies, such as corDECT, a wireless system specifically designed for rural use, also hold promise.

WiFi, a wireless networking platform based on the use of spectrum that is unlicensed in many countries,[12] (the 2.4 GHz and 5 GHz range) and on equipment based on the IEEE 802.11 standards, was first developed to enable wireless local area networks within buildings, thus avoiding the cost of running cable and offering greater flexibility (any laptop

within range could connect to the network). Shortly after the first WiFi local area networks appeared, the technology was taken outdoors, first by computer enthusiasts but soon afterwards by business and many local governments, extending connectivity to public 'hotspots' and eventually enabling network connections to be maintained across several kilometres. In many industrialised countries municipal governments have taken a lead role in innovative projects to provide wireless coverage, often in partnership with business, academics and community organisations. But the usefulness of wireless technologies is not limited to urban areas.

In a rural context, especially areas with difficult terrain, the cost advantages can be significant. Even a basic point-to-multipoint wireless network (using 802.11b with an omni-directional antenna at the node and directional antennae at the user side) can provide a village with a 1-2 kilometre radius with VoIP telephony and broadband data access. With directional antennas at both ends, individual users can be reached up to a 20 km distance. Any number of these networks can be seamlessly interconnected, with each addition extending the range and utility of the entire network. Longer distances, to plug the local network into a regional or national grid, can be achieved through a series of point-to-point 'backhaul' antennae, each capable of covering tens of kilometres, by microwave, or internationally with VSAT. Equipment using the new 802.16 *WiMAX* standard, which will be commercially available in late 2005 and can operate in a wide range of frequencies from 2 to 66 GHz, will be able to provide broadband access (up to 120 Mbps) carrying data, voice and video for communities within a radius of 50 kilometres. WiFi and WiMAX can be used together to create a network in which WiFi is used to provide local connectivity and WiMAX links the communities together and to the internet backbone.

WiFi has been deployed in many developing countries. A recent survey found that almost every African country has at least some experience with WiFi (Neto 2004). In Bhutan, trials have demonstrated the capacity of WiFi to provide services in rural areas with difficult terrain and weather conditions. The network in the Huaral valley of Peru links thirteen communities with 802.11g technology. [13]

Certain limitations of WiFi have also been identified. Quality of service over a sustained period can limit VoIP services, and interference can grow as larger numbers of users simultaneously make demands on the available spectrum. However, significant progress has been made to tackle these and they are unlikely to pose a long-term obstacle to their growing use.

There are a number of alternatives to WiFi and the selection of the technology will often depend on factors such as geography, population density and services required. Designed at the Indian Institute of Technology, *corDECT* was designed to provide cost-effective, *simultaneous* high-quality voice and data connectivity for rural areas. The technology offers a better range than currently available WiFi options (up to 35 km radius using a relay base station). At 70 kbits per second data transmission rates are much slower than 802.11b's 11Mbps, but sufficient to enable video conferencing. However, the system provides each connection with two lines, one for Internet and the other a fully PSTN compatible voice line for a total cost of around $300 per line, including a standard telephone and ready to add an optional computer for internet access. CorDECT's advantages include low cost, robust performance and full connectivity to the PSTN without the quality of service problems that plague VoIP.

It is also a proven technology, with installations in Iran, Egypt, Russia, South Africa, Nigeria, Tunisia and Brazil. It is currently used by at least five of Argentina's telecom cooperatives, while others are in the process of acquiring it. Unlike WiFi, corDECT operates in the 1880 - 1935 MHz frequency range, which requires a licence in most countries.

For a voice-only network, GSM is an increasingly affordable alternative, even for small rural networks. A study commissioned by SIDA argues that a viable rural GSM network covering an area of up to 4,000 square kilometres with a population of 200,000 can be established by a 'micro operator' for $250 to $300 per subscriber (Engvall & Hesselmark 2004).

### *3.2 Wireless Technologies and Reconfigured Networks*

As with the RAX, the new wireless technologies have characteristics giving them the potential to reconfigure networks and to put relevant services and applications in the hands of rural communities. These include:

1. Low cost and flat cost curves that are changing the economics and investment requirements of rural networks;
2. Open standards and architecture making them readily scaleable with expansion paths that can adjust to suit needs and network density. As new networks appear in a given region they can seamlessly join existing ones. As network density increases 'mesh networks' are created, improving service and reliability for all users;
3. They are increasingly simple to configure, operate, maintain, and adapt, thus reducing costs enabling rural networks to be operated largely with locally-available expertise;
4. Their adaptability means that the networks they support are also highly adaptable in terms of the services and applications they are able to offer, meeting user needs and capabilities and readily connecting to a wide variety of other networks and terminals;
5. They can avoid regulatory and bureaucratic hurdles that have previously encumbered the emergence of locally-owned networks.

**Flat Cost Curves and Low Cost**

While the actual cost of setting up WiFi or corDECT networks can vary widely depending on factors such as terrain and population density, a recent World Bank report notes that "the costs of wireless technology have been declining, and in many cases (such as in areas with low subscriber density) it is now cheaper than wireline. As a result these services will increasingly substitute for one another. Moreover, the much flatter cost curves of wireless technology indicate that size does not confer significant cost advantages" (World Bank 2004:40). This is supported by the results of a recent study of Micro Telephone Operators using GSM technology in underserved rural areas that concluded that they could provide service at a lower cost than national operators (Engvall & Hesselmark 2004). With wireless technologies, national scale networks do not offer significant economic advantages over locally-owned networks. In fact, one of the major advantages of many wireless technologies is that they are amenable to efficient deploy-

ment among a very small number of users, precisely what is required in many rural areas. They are not only less expensive per user, but networks can be practically set up with fewer users.

Calculating the cost advantages of a wireless rural network is further complicated by the limited number of real world experiences available. While corDECT has demonstrated considerable cost savings in real world rural situations, most rural WiFi deployments have been experimental pilot projects and it is difficult to separate the cost of the network from the cost of the experiment. One recent estimate (Best 2003) is that voice and high-bandwidth service could be provided in rural and dispersed areas, covering hundreds of kilometres, at costs of about US$300 per subscriber (not including the cost of the end-user terminal). This is compared with the $20,000 to $40,000 per kilometre cost of laying conventional fibre and copper wire, which even in urban areas results in a per subscriber cost of US$1,000.

A project in the Chancay-Huaral valley of Peru established a WiFi network of community access points for twelve villages previously without telephone service and located within a 15 kilometre radius of the town of Huaral. Each village now has a small telecentre with 3-5 computers providing voice, video conferencing and email connectivity between the villages, connectivity to the internet, and an interface to the national telephone network. The total cost of the network equipment (transmitters, routers, towers, antennae, cables and VoIP equipment was US$33,600 (US$2,800 per access point). Computers, printers and other equipment for the telecentres cost another US$25,000.[14]

With 802.16 compliant equipment, due on the market in 2005, larger wireless networks will be economically viable. With 802.11 networks providing village level coverage and a single 802.16 base station, targeted to cost around $20,000 plus antennas, up to 120 Mbps can be inexpensively shared among hundreds of villages within a 50 km. radius and covering more than 7,000 square kilometres.

Clearly the wireless connectivity can be provided inexpensively, however the cost of user terminals is significantly more expensive – typically requiring a computer rather than a standard telephone. Telecentres have successfully sought to reduce the per user cost of infrastructure by sharing it among many users. However, new developments are also reducing the cost of terminals intended for individual use. The cost of WiFi enabled PDAs is declining rapidly and are commercially available for as little as US$250 for a basic model capable of exchanging data and US$350 for one that can double as a wireless VoIP handset.[15] Dedicated 802.11 enabled VoIP handsets have recently come on the market at prices similar to PDAs, but are likely to drop quickly. An additional advantage of PDAs and portable handsets is that they require much less power than computers. When electricity is not available, their batteries can be charged with photovoltaic or similar means.

**Open Standards and Architecture**

Both WiFi and WiMAX benefit from being based on IEEE open standards, which from the outset eliminates a perennial problem in developing countries of being locked into a specific vendor's proprietary equipment and software. Most of the equipment required for WiFi networks is mass produced and relatively inexpensive.

The open standards option also means that adjacent and overlapping networks are compatible with each other. As a result, network development is readily scaleable and has expansion paths that can adjust to suit needs and increased network density. As new networks appear in a given region, they can seamlessly join existing ones and as network density increases, 'mesh networks' can be created, improving service and reliability for all users. The traditional model of network development in which networks expand from the cities into rural areas can be turned on its head, with rural networks established where they are needed and gradually expanding and interconnecting with each other and the cities.

Furthermore, because they are IP-based, they are readily compatible with existing networks and with any new networks or applications that are likely to emerge in the future. In Huaral, Peru, for example, the local WiFi network not only seamlessly connects to the Internet but the same VoIP used for communication within the network also enable telephone calls to be routed nationally via a PSTN gateway.

**Reduced maintenance and Increased Simplicity**

Reduced maintenance requirements are one of the main attractions of any wireless solution. A typical landline telephone network has one employee for every 200 lines, whereas a mature GSM network only has one worker for every 2,000 subscribers (Hesselmark & Engvall 2004). The reason for this is largely because of reduced maintenance needs since there is no equipment to maintain beyond the radio base stations.

WiFi based wireless solutions have an additional advantage in that their equipment and protocols (WiFi, IP) are in common use, even in developing countries and expertise is widely available. WiFi networks not only have ready access to required expertise, but can also make a contribution to the community by training and employing local people to maintain the technology. The case of Indonesia, where not only WiFi networks but also much of the country's internet infrastructure was built by students underscores the simplicity of the networks and availability of expertise.

As wireless networking systems become more prevalent, the software behind them is becoming even simpler to use. One example is the free software recently released by the Champaign-Urbana Community Wireless Network that is described as "an open source, turnkey wireless networking solution that exceeds the functionality of many proprietary systems."

> To set up a network, all end-users need to do is burn a CD with CUWiN's software (which will be available for free at http://www.cuwireless.net), put the CD into an old desktop computer equipped with a supported wireless card, and turn the computer on. Once the computer boots from the CD, the rest of the set-up is completely automated: from loading the networking operating system and software, sending out beacons to nearby nodes, negotiating network connectivity, and assimilating into the network — all the complicated technical set-up is taken care of automatically. Unlike most broadband systems, CUWiN's software builds a local intranet as well as providing for Internet-connectivity — thus, a town that uses CUWiN's system is also creating a community-wide local area network over which streaming audio and video, voice services, etc., can all be sent (cited from the CUWiN website – http://www.cuwireless.net/news/200502-01-release.html).

**Adaptability**

Wireless networks, especially those based on WiFi and WiMAX, are adaptable in terms of the services and applications they are able to support. While it remains true that voice is the *killer app* in rural areas, it is not the only one. Wireless networks can carry acceptable voice (albeit with certain quality of service concerns) but they can also carry anything the internet has to offer. At the user end, connectivity can be made using any number of devices, including computers, PDAs and wireless VoIP handsets.

**Overcoming Regulatory Hurdles**

To a certain extent, WiFi solutions avoid regulatory hurdles by using radio spectrum in bands that do not require licensing in many parts of the world. However, there are considerable national variations on this and virtually all countries require special permission for the higher power radios that would be most useful in rural areas. Nevertheless, even when licensing is required, it is usually easier to obtain in these frequencies. Furthermore, the deployment of such networks and their precise functionality and service use is more difficult to detect and monitor, and hence less likely to be the subject of detailed scrutiny and regulation.

### *3.3 Technology Combinations*

Various technologies can be joined together in innovative combinations that make use of and extend existing infrastructure, expertise and strengths in the community. One example of this is the 'drive-by' networks developed by First Mile Solutions,[16] a US-based company. The 'local' node is a WiFi equipped bus that connects with computers and hand-held devices located in schools, kiosks, businesses, local government buildings, etc., as it travels along its daily route, shuttling email and voicemail between communities as well as passengers. At the end of the day, the bus connects with a VSAT or other broadband connection to exchange messages with the rest of the world. Building the local network on top of an existing transportation infrastructure greatly reduces costs. In a country with an extensive bus network, users can be reached at less that $0.04 each. National email coverage could be provided in India, for example, for as little as US$ 15 million. A similar project in South Africa, the Wizzy Digital Courier,[17] has developed software that complements these mobile networks by providing delayed access to webpages as well as email and voicemail. Even local and community radio stations have been used to give indirect but effective community access to email and webpage content.[18]

## 4. Community Ownership and Alternatives

As illustrated above, community ownership has already been applied in diverse contexts, and to good effect. It is argued, however, that the case for community ownership is considerably bolstered and the benefits magnified, when the model is combined with technology innovations described in the previous section. It can viably be deployed in a wider variety of contexts at much lower cost.

Some of these benefits apply equally apply to a local investor-led approach. Thus the following section explores the various circumstances in which one or another model, or a hybrid, might be more appropriate. A provisional verdict is offered concerning contexts

for which the community ownership works best. Following this, an explanation of why the community ownership model is not more widely applied is considered, which also gives us an idea of some of the obstacles to be overcome. Finally, several characteristics most conducive to the community ownership model are sketched out.

### *4.1 Comparison and Compatibility with a Private Enterprise Model.*

Would a private entrepreneurial model equally or more rapidly address rural and low-income demand, through its capacity to mobilise local sources of capital and enterprise?

A 2003 ILO study offers a *prima facie* case that participatory cooperative ownership in general may be better for poverty reduction. The study examined enterprises in some depth across a range of sectors, and concluded with the following:

> These case studies have shown just how widely the cooperative form can be applied, and how it can succeed in helping the poorest and most vulnerable people to become organized. They show that, provided the method of development is participatory, the cooperative form is replicable. Where there are […] for-profit alternatives the cases demonstrate that the cooperative form is – for the aim of poverty reduction – superior. Where there are no alternatives, it shows that even a relatively weak form of cooperation is better than nothing (Birchall 2003 p62).

But is there empirical evidence that this applies to extending ICT network infrastructure and services to poor communities?

**Private Entrepreneurial Models**

The last decade has seen a number of private enterprise based attempts to launch a rapidly replicable model for broadening access to telecommunication services by harnessing local entrepreneurs, often by means of a franchise (see e.g. ITU 2003a Ch 6). The Akshaya model, as we have seen, incorporates a strong community decision-making influence into the enterprise and its market activities, and thus should be considered as a hybrid. But others fashion themselves more closely upon the market-driven private enterprise model.

One example is the well-known Grameen Phone Village Programme in Bangladesh. Although linked to the non-profit Grameen organisation,[19] it can be classified as a private enterprise driven model, which obtains finance through the provision of micro-credit facilities and that generates demand by pooling mobile phone use of low-income users. A local entrepreneur (the selection of whom is strongly biased towards poor women) purchases the handset with credit and sells on telephony services at affordable rates. Grameen Phone is itself a major mobile phone operator and provides the airtime at cost. It thus extends access to telephony to poorer groups within communities, and enhances the marginal viability of the mobile network by pooling use. But the commercial viability of the network as a whole is based mainly on the demand of conventional customers, and the programme does not extend the area of network coverage *per se* (although there are plans afoot to do this).

How widely replicable is this experience?

In Nigeria, an attempt is being made to reproduce the Grameen model, funded by World Bank/*info*Dev's African Connection (ITU 2003a p62). However, the project has encountered problems. Intense competition from informal airtime resellers, a limited availability of micro-credit facilities and the absence of a supportive wholesaler may significantly limit the potential of the model. As the ITU report notes:

> The Grameen model may be relatively uniquely adapted to its original setting in Bangladesh, where Grameen Bank has a nationwide micro-finance and rural branch network. Moreover, Grameen Bank also has an ownership stake in both the Bangladeshi GSM network provider and the virtual operator managing the village phone programme (ITU 2003a: Box 3.3 p62).

At an even earlier stage of development is a feasibility study for a new business model that would bring mobile phone costs down very significantly. Funded by SIDA, it examines the case in Tanzania for locally-owned GSM networks, using a private-enterprise franchisee model with restricted roaming capabilities and low local tariffs (Engvall and Hesselmark 2004). A further phase of the Nigerian project raises another interesting possibility. The intention is to extend the effective range of the mobile phone network through the use of technical enhancements, such as an external antenna and solar powered panel that can support a signal up to 35 km away. Thus poor and remote villages, that would not otherwise justify network investment, might be able to piggyback on the services of their better endowed neighbours without facing the same level of competition. This example will test the limits of extending existing mobile network access to poor communities using enhancement technologies, in combination with the individual entrepreneur model for which the key goal is to generate a profit. "The pilot will focus on identifying this niche, sizing it, summarizing the business model and providing advice on the conditions for successful exploitation" (ITU ibid).

The effort acknowledges both its limitations, and the obstacles it faces. Like the Grameen model and the Tanzanian feasibility study, it aspires only to basic cellular telephony services. Although new technologies such as second generation SMS, WAP and 2.5 GPRS are technically available, they are expensive to deploy. Where they are already available – South Africa has GPRS for some time – only a tiny percentage of customers avail themselves of it, deterred in large part by the high cost.

It is also worth noting (notwithstanding the possibility of stretching it somewhat) that over 50% of sub-Saharan users are beyond the range of a mobile phone signal (ITU 2004). Critical to the extension of the provision of mobile-payphones[20] and other types of access based on cellular technologies is the extension of coverage through such mechanisms as the inclusion of rural roll-out and/or payphone obligations and contributions to universal service, access and/or rural telecom funds for mobile operators into licenses and policies as well as access to the incentives and subsidies that such a policy provides.

Beyond the evolving nature of the technical solutions, and our fragile level of knowledge, one particular lesson is suggested: *There is no certainty that a model that functions well in one area is readily replicable in another,* and our knowledge of the dynamics of local development is still at an early stage. Furthermore, the most appropriate option may vary when the goal is to go beyond providing access to telephony to include a focus on development services, capacity development and e-literacy as part of a broader process

of rural development and transformation enabled by ICT The lesson is relevant to both enterprise-based and cooperative models and it is impossible at this stage to make definitive general statements about the applicability of either. For the moment we must assume that every situation is different and that a unique combination, perhaps a hybrid, may have to be tailored to each.

### Comparing Community Owned and Investor-Led Models

Having said this, however, is there empirical evidence that *in certain circumstances* a community owned model has advantages over a private enterprise one? In only a few cases can a direct comparison be drawn, for which both models coexist within similar conditions. These are Poland and Argentina.

In Poland, the two cooperative local networks, WYST and Tyczyn, emerged alongside a large number of private-investment local networks, such that their relative success is directly comparable. As mentioned, many of the local investor-owned networks found that they could not offer the level of return demanded by their investors and were forced to sell, sometimes at a loss, to the national telecoms provider. According to a comprehensive review in 2003:

> Unlike investor owned companies, [the cooperatives] were able to build out their systems, pay off their loans rapidly, and prosper while many investor-owned systems – dependent on outside capital and profit, rather than service as their motivation – have been less successful or failed. A critical element in the success was their community ownership (NTCA 2003 p14).

The cooperatives also offer their customers lower tariffs and a wider range of services such as PC access and fax, which turned out to be profitable. Today, the two cooperatives have over 18,600 clients, the largest non-public systems in Poland. Indeed, had a national association and support mechanisms such as corporate tax exemption been put in place, it seems likely that the cooperative model would have extended far deeper into rural Poland. As it was, TPSA seems to have been the main beneficiary of the poor performance of some private-investment networks. The investor-driven model, apparently found itself at the margins of viability, while the cooperative model thrived.

Less surprisingly, the cooperatives also outperformed the public incumbent operators, and grew by means of extending their networks into unserved areas and attracting TPSA customers from underserved areas, within the constraints of their licenses. Many defecting users were attracted by the fact that both cooperatives offered immediate repairs, while TPSA could take weeks or months to respond.

Finally, included in the benefits was that new relationships emerged among the different counties (*Gminas*) served by the cooperatives, subsequently blossoming into development infrastructure collaboration including wastewater treatment, household national gas treatment, a dairy cooperative and credit union development Although an investor-led initiative would also enhance the local enterprise environment through the provision of services, it could not generate these secondary spin-offs based on community interaction and empowerment.

**A Provisional Verdict**

Overall, there is thus some direct evidence from the literature and the Case Studies that:

- A community owned and participative approach is to be favoured where poverty reduction is the main goal;
- In mid-income rural communities, the cooperative model works better in terms of the quality and cost of service to users, but may also significantly contribute to the overall rural development in ways that investor-led initiatives cannot.

Beyond this, the specific characteristics of the community ownership as outlined in Section 2.3, as compared with a private investor-led approach, suggest a number of reasonable hypotheses in the context of the emerging technologies:

- It requires a lower level of capital investment, since it can mobilise local resources;
- The return on investment is lower since the portion raised locally shoulders its own risks, and a proportion of other funding aims at yielding a development, rather than a financial return;
- It can focus more directly on the needs of the poor, through their direct participation in service selection, tariffs and so forth, and will therefore merit the expenditure of a larger proportion of their income;

Although these hypotheses have yet to be rigorously tested, this report offers sufficient evidence to justify further work.

### *4.2 Resistance to the Community-Driven Model*

Despite significant, varied and positive experience of community owned ICT and telephony enterprises, only rarely have they become the norm, accepted alongside or even displacing government or private provision of telecommunication.

Why is this? Why does this institutional model of service provision, with a track record of success, attract little attention among governments, international agencies, and investors?

Part of the problem may lie with an inadvertent consequence of the dominant paradigm in telecommunication emerging during the 1990s, which translated in practice into the privatisation of the incumbent and the introduction of competition through the licensing of two or more operators, with the aim of driving tariffs down and responding to user needs. It also focused on attracting external investment, mainly from existing international operators. However, the model left little room for cooperatives (or other entities) operating at local level and in rural areas, where the perceived economics of service deployment effectively precludes competition and hence, in practice, the provision of any service at all. While it succeeded in attracting a huge amount of capital, it also led to the sidelining of local and small-scale solutions. This is not to suggest local network development will fare any better under the previously dominant model of a single monopoly operator – although it was in precisely such an environment that they flourished in the US. And the mere *prospect* of liberalisation could compound the problem in that incumbent public telecommunication operators, and governments supporting them, have often regarded any new

start-ups, at local or other level, as a threat to their continuing dominance. Either way, local approaches to network development have been discouraged.

The failure of a very often incomplete liberalisation to reach many rural areas resulted in a second round of regulation for 'underserved' areas that eluded provision under the initial liberalisation model. But even here, thinking has been largely informed by attempts to render these areas profitable for existing major operators, through lowest subsidy auctions and other uses of universal service funds. The idea of encouraging or enabling the creation of local operators was seldom given serious consideration. An exception here is South Africa, but in this instance calls to encourage cooperatives were specifically ignored.

Among multilateral agencies, there has also surprisingly little interest until recently. The FAO and ILO are the two main UN agencies with a strong interest in cooperatives in principle, but they have very limited involvement in ICTs and almost none at the network end. The ITU, the agency with central responsibility for ICTs and telecommunication, showed little interest even in its development division although recent reports (ITU 2003c, page 55 and 2003d, page 58) have highlighted examples of community-owned cooperatives. In the case of UNDP, as with other donors, the focus was on community-based tele-centres/multi-purpose/multi-media centres and/or networks. The position has evolved to include an exploration of the cooperative model in the context of pro-poor access. And the World Bank, another major player in telecommunication, has similarly shown little interest in cooperatives, even in the context of poverty reduction (Birchall 2003 p17-20).

This may not have been indicative of a bias against the principles of community ownership *per se*. Most people involved in the telecommunication sector nationally and internationally come not from a development background, but from an engineering, technical or financial one. The specific development potential of cooperatives would not necessarily occur to them. Furthermore, the deployment of telecommunication has traditionally been seen as a top-down infrastructure-based service, whether in public or private hands. The concept of a bottom-up approach is largely alien to the sector. Although such thinking is less and less valid in the context of the internet and more so in the case of wireless technologies, changing ingrained cultures takes time.

The result was that no clear champion emerged for the cooperative model in telecommunication. International investors, multi-lateral organisations and donors, powerful governments, governments in the south, incumbent operators – none saw a clear interest in it for themselves, preoccupied as they were with a shift in thinking about the most appropriate model – one that went from a public utility paradigm to that of private sector led provision and competition.

The Polish experience (Case Study 1) offers evidence of these factors at work. An explicit goal of the NTCA was to set up a national association of such cooperatives along the model of the NTCA itself in the US. The 2003 report on their efforts concluded:

> With mission support and sufficient funding, NTCA may have been able to roll out the cooperative model on a national scale… USAID/Poland's focus on privatization of TPSA meant that they were not open to the bottom up approaches that NTCA had successfully demonstrated. USAID declined to support a NTCA proposal to create a national association of private oper-

> ators that could have provided an organizational basis for training, technical assistance and advocacy on behalf of small and rural telecommunication systems (NTCA 2003 p11).

To NTCA it appeared that the USAID, the EU and other major donors to the Polish government were less than enthusiastic supporters of extending the cooperative model not only because they assumed it would be more effective to focus on privatisation and external investment but also because their own firms were competing to enter the Polish telecommunications market.

However, resistance to the local cooperative model may be on the wane. There is growing recognition that innovative solutions, pushing beyond the pure private sector led approaches, are needed to address many rural areas and poorer communities in both developing and industrialised countries. [21]

In developed countries, there are signs of a change in attitude. A recommendation in 2001 of a US Senate Committee may be indicative of this. It stated, concluding with some healthy self-interest:

> The Committee recommends that AID support the development of community owned telecommunications in its efforts to promote economic growth, private sector development, and greater agricultural productivity. As government telephone monopolies are privatized in developing countries it is particularly important that rural areas have access to telecommunications. The Committee urges AID to rely on the expertise of the U.S. telephone cooperatives that have expertise in this area (US Senate 2001).

A recent consultant's report to the Development Sector of the ITU also listed among its conclusions: "*Community owned telecommunication / ICT cooperatives*: At a local level, in smaller communities, cooperatives can be the ideal solution to the telecommunication/ICT needs in that community. Local investors can be the catalyst to start and manage a coop" (ITU, 2003a, p55). If such change is coming, then it is important that the circumstances in which community ownership can work best, on its own and in combination with others model, be understood.

### *4.3 Fertile Ground for Community Ownership*

The research identifies a number of local conditions that are optimal for deployment of a community owned initiative.

1. **The presence of active civil society groups concerned with community development**

   The community ownership model thrives in the context of a high level of local civil society organisation. In Laos, the original promoter of telecommunications was a parent-teacher group. In Poland, it was village telephony groups which, under a previous regulatory regime, had already organised themselves (although under that regime they would subsequently have been taken over by the monopoly suppliers and lost their autonomy). The cooperatives, supported by newly elected mayors, took the step of aggregating these together into a larger group.

   Local organisation is critical not only to determining needs (see the next point 2., below) but to encouraging widespread support for and mobilisation around the con-

cept. Even poor communities can make significant in-kind contributions reducing the initial and ongoing costs considerably. Countries lacking such a tradition, in which civil society has been fragmented or suppressed, are thus less likely to adopt the idea successfully, at least in the absence of specific measures to address this. There is some general evidence from the development sector to support this (Birchall 2003 p66), and the emphases there has thus been on building existing community networks and organisations, and on enhancing local capacities.

2. **Expressed need for services by the community**

   Community-driven networks work best where they build upwards from a recognised demand for specific applications, as distinct from a general desire to build a network. This contrasts with the infrastructure roll-out mode which generally proceeds on quantitative indicators such as demographics.

   This expression of need will usually come from existing groups organised within the community. In Poland, demand from the village telephony groups was initially very specific and related to developing economic activities and enabling social interactions. Similarly in Laos, the demand for a network had arisen directly as a result of other development activities of the villagers, which gave rise to a demand for specific services including both telephony and internet access. The Indian case studies are different since they operate on a 'franchise' or other form of replication. But the mechanisms adopted, whether through open calls for interest or working with local NGOs, prioritise the existence of expressed local need although unavoidably it is at one remove.

3. **Local leadership capabilities**

   As in many other areas of development, local leadership is a vital ingredient in generating a sense of ownership and in successfully steering a project through the many stages of development.

   Such leadership can come from grassroots NGOs such as the Dhan Foundation in the Akshaya case; from local self-help groups as in Laos; or from locally elected officials, especially in times of significant change such as in Poland where the mayor played a key role. In this last, the difficulty of identifying local champions elsewhere was probably one of the reasons that the model failed to take root in other areas.

4. **Local political support**

   Community ownership of networks in most places where it exists is breaking new ground, previously untested within existing rules, regulation and practices. The support of local political leaders can prove decisive in negotiating with national authorities regarding the regulatory and interconnection aspects. Matters for negotiation may include interconnection fees, regulatory exceptions and changes, corporate tax exemptions, and a huge variety of other matters. Sometimes minor bureaucratic issues can cause severe delays.

   The Akshaya experience in India was an initiative of the government of Kerala, a factor that has been critical to success through its ability to influence national government and institutions. In Poland too, the commitment of local government was central in negotiating a better deal in relation to the regulatory issues.

These are not all necessarily prerequisites. A successful launch in the absence of any of these characteristics would, if it were to succeed at all, require significantly more resources and external assistance. Yet they can also be reinforced where they are already partially present. Local political support can be encouraged by study visits to others areas where successful implementation has taken place (as in the Polish cases). An ICT needs assessment can be initiated by external bodies, though it would require the active participation of the community to be effective, as in the Hin Heup district in Laos. Developing local leadership capabilities, and building up the local social fabric, is a key component of many empowerment efforts, although it is acknowledged that it can take time.

Thus each situation must be assessed in terms of the external support that might be required, in nature and extent, and in relation to the likelihood of success and the benefits accruing.

## 5. Conclusions and Proposals

In making the case for local network development, the potential contribution of both an investor-driven approach – preferably by local SMEs – and of the community ownership approach are acknowledged. Our main focus, however, is on the latter since we believe it has greater potential for development, both because it can render services more affordable among poor communities, and because of the additional development benefits it can generate or catalyse.

Our research indicates that several factors enhance the timeliness of the community ownership model. Emerging innovative technologies strongly reinforce the strengths of community ownership. It can feasibly be applied in a much wider set of circumstances. But an enabling environment will be critical to fully exploring this approach in relation to addressing low-income rural users.

### *5.1 A Case of Mutual Advantage*

Innovative wireless technology combined with community ownership can yield a powerful partnership with the potential, in the right circumstances, for rapid deployment and replication.

Many features of the new wave of technologies can enhance the prospects for community owned networks, a possibility they share to some extent with privately-owned local networks. These include:

- A lower requirement for initial investment favours any small-scale locally-based operation;
- The capacity to build out the network and services incrementally, beginning with a small number of customers, is similarly of value to all small enterprises;
- The relatively low level of technical expertise required to construct and maintain networks using these technologies is especially attractive to community owned networks that wish to deploy and develop, local skills as much as possible;

- Potentially lower levels of bureaucracy encountered, in principle (though not always in practice), in solutions using non-licensed spectrum.

Together, these factors considerably reduce the challenge for the community in financing, building and maintaining networks, as compared to the use of traditional fixed line technology.

The evidence is there on the ground. The rapid and largely unplanned, even illegal, growth in WiFi networks is testimony to the how easy it is to get such networks up and running, although providing services to only a limited range of customers. Similarly, community WiFi networks have spontaneously sprung up in many cities of the developed world.

But the community owned enterprise, as distinct from a private commercial concern, also brings its specific advantages to infrastructure and service network development as outlined:

- The capacity to harness community resources can simplify the process of positioning antennae and other equipment, and utilise voluntary labour and expertise;
- The use of public buildings such as schools, local government, libraries and others, may offer good public access to services;
- Local financing can, in the right circumstances, be obtained more readily from subscriber/members on the basis of future services since the user has a stake in the enterprise, and the minimum return required for local investors is lower than in the case of a commercial investor;
- With the emergence of more sophisticated content-driven services, the direct link to local needs is more likely to yield viable and sustainable services, in turn generating further income.

It is also worth noting that conventional telecoms service providers may significantly underestimate the revenue generation potential of rural and poorer populations. Several studies have shown that poor people in rural areas are willing to pay significantly more for services than their comparatively low income would suggest, because of the potentially higher benefits achieved.

Thus innovative network technologies may boost the prospects of deploying the community owned model; but the community owned model in turn enhances the affordability and accessibility of these technologies and amplifies the benefits through the community.

Section 3 demonstrated an already widespread interest in technologies and their potential. Much less attention has been devoted to the type of enabling environment and business models that might be most suited to realising that potential in different circumstances.

### *5.2 An Enabling Environment for Community Ownership*

Reaping the benefits of community ownership of networks requires an enabling environment. An enabling environment for competitive investment in ICTs has been a major thrust in national and international policy for some time. However, where this approach

is acknowledged to be inadequate, in particular in relation to the needs of the rural poor, an enabling environment is equally essential to facilitating approaches tailored to the needs of these communities.

A particular challenge to up-scaling and replicating successful local level initiatives is to develop methodologies and mechanisms to recreate the local innovative and entrepreneurial environment essential to galvanising local resources and energies. (Gerster and Zimmermann 2005) Central policy-driven replication can work only where this challenge is met. The following, comprising components of an enabling environment for community-driven networks, take this need into account with strong capacity building and other support. Designed to turn the logic of network expansion on its head, they promote infrastructure and access from the ground–up, from the edges in.

These proposals include the elimination of unnecessary, often unintended, obstacles, as well as actions to actively support a more favourable climate, under the following headings:

a) **A national policy** that identifies the need for action in specific areas, acknowledges the benefits of community ownership, and supports a coherent set of actions to create an environment suited to them;

b) **A regulatory environment** that allows the deployment of the most appropriate and cost-effective technologies with minimum hindrance, and that governs interactions with others (e.g. for interconnection) in a manner that promotes network growth in poor rural communities and recognises their value;

c) Innovative measures **to support financing and investment**, both local and external in cooperatives and community-driven networks, recognising the social and development value of these ventures to the communities, as well as their lack of appeal to private investors;

d) Positive actions **to build the capacities of communities** to initiate their own network and service enterprises, and to maintain and expand them; and to encourage and enable strong pro-poor community-driven governance of other network and services providing in their areas

### *1. A National Policy in Support of ICT Access for Poor Communities*

The needs of poor communities in relation to ICTs justify a specific national policy strand to address them.

Mainstream ICT infrastructure policies have focused mainly on gradually extending outwards from major centres whether based on exclusive licenses or competitive suppliers or awarding of minimum cost subsidies. Thus far, they have stopped far short of exploring the full range of options that can fulfil the needs of poor rural communities or leverage the community's own involvement in these efforts. Supporting public access has usually limited to efforts to pool demand in for instance telecentres. Universal service funds and obligations are traditionally intended to focus on the needs of rural and under-served communities. While still evolving, by themselves, they appear to be incapable thus far of

addressing the scale of the challenge in terms of the volume of funds needed but also the business models and regulatory approaches available. South Africa's *Underserviced Area Licenses* are also innovative but have not yet delivered on their good intentions. These could constitute a component of a more coherent national policy towards serving these communities, and creating an enabling environment.

We believe a central feature of such a policy would be support for community owned networks and services. In this regard the following could be undertaken:

a) **Identification of Areas of Need, or 'ICT Development Zones':** Research could relatively easily identify areas that are currently underserved due to market failure or other reasons, based on a mixture of qualitative and quantitative indicators. Issues of income and need, as well as cost, could be included and such areas need not be delineated solely by geographical boundaries. The goal is not only to ensure the widespread availability of ICTs, but to use them as a catalyst to stimulate broader development actions and investment.

A proposal has been made to take this further (APC 2005), and to designate specific 'ICT Development Zones' for special assistance, a recognition that current trajectories of network provision are unlikely to reach them in the foreseeable future. A special regulatory and support environment could be created within these to facilitate experimentation, including with community-driven approaches, and to enable new lines of financing and concessions.

An approach that often followed for licensing as well as in the context of universal access funds is "strategic zoning' or packaging of the selected targets, regions and territories, to achieve maximum competitive interest as well as regional equity".[22] In various instances, however companies getting the licenses have preferred to pay the fine rather than invest in apparently unprofitable regions. In such instances as well, bidding could be made open to regional networks of community-based actors.

b) **Legal Structure:** A suitable legal and institutional structure for community ownership, if such does not exist, is important and creating it should be an immediate policy goal. It should recognise both the limited liability of a conventional company, as well as the ethos and requirements of a non-profit development entity.

c) **Tax Exemptions:** Exemption from taxes, such as corporate tax, might be appropriate to enable maximum reinvestment into the community.

d) **A National Support Unit:** The creation of a **national support unit** of some kind, preferably already working with cooperative and community development interests, might be a useful instrument to explore and design a policy and its elements, to act as a catalyst for local innovation and enterprise and an intermediary with state institutions, and to deliver support, training, capacity building and other needs.

The National Telecommunications Cooperative Association in the USA (www.ntca.org) is a good example of a member-driven support organisation, offering an array of services, including a government affairs programme and advocacy support; legal representation and assistance; educational services; an assortment of publications and public relations tools; and member meetings and events. As seen in the case of the Polish cooperatives (Case

Study 1) they also offer assistance overseas, and their experience might be relevant to such a national support unit. However, the unit proposed here would initially require government and/or donor support and a statutory basis since its first task would be to provide an impetus to the sector.

### *2. Regulating for Local and Community Networks*

There are signs that the regulatory environment in some developing countries is becoming more fluid and open to ideas. Some regulatory changes have been announced that could ease the way for local solutions. Kenya has announced decisive moves towards a technology neutral licensing framework (Kirui 2004) and decided to allow VoIP, although there is as yet nothing specific about local or community-based networks. South Africa began the process of issuing local licenses in 2003 to underserved areas, although they ignored lobbying to encourage the emergence of the cooperative model (Gillwald 2002). The government recently announced that from February 2005 VANs and private networks will be free to carry voice and resell their excess capacity, both of which would drive down wholesale costs to local network retailers. VoIP is also to be legalised (Vecchiatto and Weidermann 2004).

However, much more will be needed if a positive environment is to be created generally for local network development and more specifically for community ownership.

a) **Technology neutral licenses.** Local licenses should not specify the technology to be used in delivering particular services, and incentives could even be offered to encourage innovative solutions. Open source software for network management might also be worth encouraging, and is now becoming more available for wireless networks. The network designed and tested for the Laos villages is built entirely upon open source technologies.

b) **Special License conditions:** Exclusive service licenses could be awarded to unserved or underserved rural communities without the need for a competitive process. In a competitive situation, preferential treatment could be offered to community owned enterprises to acknowledge their community input and development impact.

c) **License-exempt spectrum should be just that.** Many countries have not yet fully exempted the agreed WiFi spectrum, 2.4 GHz and 5 GHz, from licenses and fees, and a range of cost and bureaucratic barriers exist (Neto 2004). A more positive environment would support progress in implementing license-exempt wireless networks. The ITU could have a role to play here by taking a firmer position and issuing clearer guidelines for the regulation of license-exempt bands (Neto 2004).

d) **Favourable Interconnection Pricing:** Regulation to support minimal connection fees for non-profit community owned networks to gain access to national and international connections and bandwidth could significantly reduce outgoing costs. Furthermore, the use of asymmetrical interconnection tariffs to complete calls, favouring rural operators (Dymond & Oestmann 2002 ITU, Chapter 3, 2003d) and in this instance the community owned network would help to facilitate investment and sustainability of rural networks (Gillwald 2002). The national backbone or incumbent telecom operator would benefit from interconnection fees paid out, representing new revenue. But payment to the local network for completing external calls

should be set at a rate that reflects what the dominant carrier would have had to pay to achieve the connection had they built the network themselves, i.e. the community contribution to the local network should be fully acknowledged.

e) **The Use of Universal Service Funds:** Universal Service Funds should be open to providing funding to innovative financing mechanisms for community owned networks. The focus should not just be on connectivity but also on applications and services, including content development, with a strong community-driven component should also be included.

f) **An 'Open Access' approach to Backbone Provision.** Building locally-owned networks has its complementary counterpart on the side of backbone infrastructure. The potential of an 'open access' or 'common carrier' approach to building national, regional and international backbone infrastructure is currently being explored in the African context, to be constructed and managed for instance by partnerships (*info*Dev 2005, DFID 2004a). Many metropolitan areas have pioneered the notion of building broadband backbone networks and making them available to a variety of service providers to link to customers. Essentially, the 'public good' characteristic of a telecommunication network is emphasised, and the terms of its availability are geared to ensure the maximum exploitation of that public good.

With 'open access', local operators are offered access to bandwidth with transparent and reasonable pricing, creating the conditions for a flourishing of different models of local network and service development (Sprigman and Lurie 2004). This would greatly favour the emergence of local operators. Community owned networks, however, could be offered preferential access rates to acknowledge their development impact and the community contribution.

The above proposals implicitly address a situation in which existing telecom operators fail to provide the 'last mile', or indeed reasonable access to the backbone network. However, we have seen instances in India where the publicly-owned operator is willing to offer a subsidised connection, up to broadband level, for local use. This can in effect solve the access issue, at least temporarily. We have also seen that regulatory obstacles at national level can hinder local or state level efforts. In this context, national policy must look to a permanent solution to access, as well as to eliminating such hindrances and inconsistencies between state/local and national policies.

However, given reasonable access by public or other means, the focus then turns to the supply of appropriate services and content and supporting community ownership and participation at that level.

g) **Local regulation for Community Participation:** The Akshaya model in India may be seen as a case of 'local regulation'. Entrepreneurs wishing to take advantage of the state-sponsored franchise, including a broadband connection, are required according to local regulations to ceded major decision power to the community, for instance to determine priority services, to set affordable tariffs, and to ensure some return to the community as a whole. The principle is that the public investment (in this case the subsidised broadband connection) justifies conditions on the franchisee that will maximise the return in terms of development or poverty alleviation.

### *3. Financing and Investment*

The WSIS *Task Force on Financing Mechanisms* report (TFFM 2004) describes a range of existing mechanisms for funding ICT network and service development. However, they are not specifically tailored to the requirements and circumstances of community ownership. In principle some of these could provide finance to community owned networks. Donors and IDBs may be interested in their development potential, and at national level Universal Service Funds have already been mentioned as an obvious source. The WSIS may yet yield a new financing mechanism, though it seems unlikely at this point. In any case, a national level mechanism would still be needed to adapt financing from these sources. The peculiarities of communities-owned networks include their non profit status, a dedication to local development rather than profit generation, and their use of community resources.

There already exists a set of mechanisms for local infrastructure development, though they have not yet been applied to ICTs and the focus is generally on supporting private sector initiatives (DFID 2004b). For instance the Private Infrastructure Development Group (PIDG) brings together a group of donors (DFID, SECO, SIDA and DGIS) to mobilise private sector investment in infrastructure and basic services with a view to addressing poverty. Its initiatives include the Emerging Africa Infrastructure Funds (EAIF) that can support private sector telecommunication investment with long-term loans; the Infrastructure Development Company (InfraCo) that helps governments generate an entrepreneurial approach to local investment infrastructure and is piloting a project in two Asian and two African countries; and the Mini-Infrastructure Apex Programme (MIAP) which funds pre-feasibility studies for small scale local infrastructure providers such as community electricity providers.

These might have generated valuable experience in local infrastructure projects, but also, suitably modified, they could represent potential sources of funding for local community owned ICT initiatives.

**a) Institutional Mechanisms for Low-Cost Loans**

The creation of an institutional mechanism for low-cost loans was central to funding cooperative networks elsewhere, and is critical to supporting community owned networks beyond a pilot stage. Their non-profit status can play a role in opening doors to new institutional sources of funding. Such a mechanism is needed at national as well as international level (the latter perhaps modelled on those above). A mechanism to provide guarantees for loans would also ease the process.

**b) Encouraging Local Resources and Investment**

Cooperatives frequently raise investment funds from their members, in advance of services being provided for instance in the form of connection fees or tariffs. Local development organisations may also be encouraged to invest, on very reasonable terms. However, a suitable legal and institutional context must be present, and obstacles around taxation and other issues removed.

Means should also be developed to facilitate the use of local public resources, owed by municipalities or local government, by community owned networks. The support of local government generally can be a significant factor in a successful initiative.

### *4. Resources and Capacity Building*

Capacity building in the community, and technical assistance, are critical factors in the early stages of communities moving from an idea to the reality of developing a community owned initiative. In addition to financing related issues mentioned above, training and capacity building is likely to be needed in several domains.

**a) Training and Capacity Building**

*Management skills* – from obtaining finance to setting tariffs, to promotion and marketing, to negotiating with other operators, to enterprise management – are essential and often in scarce supply. Such training programmes have been developed and implemented by NTCA and others though they would have to be considerably revised to suit national and local circumstances.

*Lobbying and advocacy* in relation to regulatory and policy changes at regional, national and international level are essential activities that require considerable expertise. Existing training toolkits in relation to ICT policy lobbying in general illustrate the possibilities and might be explored (e.g. APC 2004).

*Designing, building and maintaining a network*, and services, requires specialised technical abilities even where the new wave of relatively small-scale and simple wireless and IP technologies are utilised. Training toolkits have been developed in these areas. The case of wireless networks in Indonesia demonstrates the extent to which informal networks between students and technical experts, and communities and entrepreneurs, can be utilised to support such activities. These kinds of experiences could be explored with a view to building resources to be used by communities.

*Assessing needs and developing services and applications* is also an area where specialist skills are essential. Yet the experience suggests that very strong community participation in such activities will enhance the prospects for success.

**b) Networking on Experience and Expertise**

The value of experience elsewhere, notwithstanding the fact that a direct transfer of experience is impossible, is demonstrated in the Polish cooperatives. They acknowledge that the role of study visits and exchanges, supported by the NTCA, were vital ingredients in the success of the enterprise, part of a concerted effort to transfer positive experience from the US suitable modified for the Polish environment. Thus study and familiarisation visits can be a significant catalyst to generating local support and enhancing the leadership.

Yet there are few examples from which lessons can be drawn for a development context in Africa or Asia. Here the emphasis could be in building networks as experience is gained, exchanging the lessons as the initiatives develop.

The use of open source software, generally more suited to development contexts, offers a fruitful context for wider networking and exchanges. A global network of open source enthusiasts already exists that can assist when problems emerge, and a network specifically focused on community owned networks and related technological needs could readily be put in place.

Community owned networks and services could require significant levels of capacity-building support for an extended period. Most initiatives whether in infrastructure (such as Poland) or services and applications have relied to some extent on external expertise especially in the early stages. Some have also engaged in study visits. The National Support Unit would be well placed to provide such support, but also to develop support networks among emerging community-driven networks and services in areas from technical training, to open source, to lobbying and funding.

Indeed, a credible case can be made for a global level support activity or component here too. An emphasis on pro-poor ICTs for development is emerging in several international contexts, including in the WSIS and in donor/research/NGO debates. Ideas of pooling donor resources, of peer-to-peer learning, of local capacity building for ICTs and sharing regulatory and financing expertise, and of South-South collaboration, suggest the value of, and a possible role for, a global level informal or formal consortium to move these ideas forward.[23]

Community-driven networks and services fit well with the logic of this, and could become a main plank of any global level pro-poor consortium.

---

[1] The International Cooperative Association offers the following definition of a cooperative: An autonomous association of persons united voluntarily to meet their common economic, social and cultural needs and aspirations through a jointly owned and democratically controlled enterprise (ICA 1995).

[2] The Mondragon Cooperative in Spain is among the largest, with a workforce of over 65,000.

[3] http://www.un.org/News/Press/docs/2003/sgsm8762.doc.htm

[4] http://www.copacgva.org/guidelines.htm

[5] http://www.copacgva.org/index.html

[6] For World Bank information, resources on, and definition of, 'community-driven development' (CCD) see:
http://lnweb18.worldbank.org/ESSD/sdvext.nsf/09ByDocName/BasicConceptsPrinciplesWhatisCDD. For a conceptual consideration of community-owned infrastructure option in the case of traditional utilities, see World Bank (2004) *Reforming Infrastructure: Privatization, Regulation, and Competition.* For the case of successful rural electricity cooperatives in Bangladesh, see "Rural Electrification: setting an example"
http://www.nepalnews.com.np/contents/englishweekly/spotlight/2003/nov/nov07/national10.htm
and World Bank
http://web.worldbank.org/WBSITE/EXTERNAL/NEWS/0,,contentMDK:20051857~menuPK:34460~pagePK:34370~piPK:34424~theSitePK:4607,00.html

[7] http://www.fao.org/sd/kn1_en.htm

[8] http://www3.undp.org/ or http://www.sdnp.undp.org

[9] See for instance http://www.mssrf.org/special_programmes/ivrp/ivrpmain.htm

[10] See http://web.idrc.ca/en/ev-45872-201-1-DO_TOPIC.html and
http://sandbox.bellanet.org/~onno/ for more material.

[11] A summary of benefits of telecommunication cooperative is in NTCA et al (2001)

[12] Licence requirements vary from country to country. For example, in North America and Europe low-power use of the 2.4 and 5 GHz band is usually unrestricted but more than 50% of African countries require licences even for low-power use. (Neto 2004). While the USA allows unlicensed devices operating at up to 800 mW, Peru and Chile set the limit at 100 mW (Galperin 2004).

[13] ITU's Trends in Telecommunication Reform: Promoting Universal Access to ICTs (2003d), has a detailed discussion of the use of wireless technologies to achieve universal access in rural areas of developing countries.

[14] A case study of Huaral is being prepared for the final draft of this report.

[15] These handsets are designed for use in WiFi hotspots, i.e. within 100 metes of a WiFi access point. To be useful in a rural network they would be equipped with external antennae. Designs for antennae made out of Pringle potato chip containers, woks, and other widely available articles and costing under $10 are widely available – see, for example, http://www.usbwifi.orcon.net.nz/

[16] http://www.firstmilesolutions.com/solutions.html

[17] http://wizzy.org.za/

[18] See the numerous case studies in Girard 2003.

[19] e.g. see http://poverty.worldbank.org/library/view/14648; "Grameen Telecom (GTC) is a non-profit organization that owns 35% of the shares of GrameenPhone Ltd. (GP), a private sector, urban cellular telephone company that was awarded a nation-wide cellular license in November 1996. GTC buys airtime in bulk from GrameenPhone and passes on most of the savings to its Village Phone (VP) operators, making use of Grameen Bank's extensive network (1,140 branches spread over 39,346 villages) and its loan collection system to collect revenue from the VP operators." http://www.telecommons.com/villagephone/gbfamily.html

[20] For a range of models that include the use of individual entrepreneurs (e.g. India, Uganda, Nepal, Cambodia), mandated in some mobile licenses (e.g. South Africa), chosen by some rural operators as least-cost solution (e.g. Chile), or a separate business managing a network of small entrepreneurs (e.g. Uganda, Bangladesh), see Oestmann 2003

[21] e.g. in the UK, in the first research of its kind, the national Community Broadband Network uncovered broadband projects run by a mix of social enterprises, small private companies, voluntary groups and public sector organisations, almost all using low-cost wireless technology to deliver their services to over 550 towns and villages around the UK. See http://www.broadband-uk.coop/ . And in May 2003, during a debate on broadband in Parliament, the then Minister of State for Energy, e-Commerce and Postal Services, Stephen Timms, said, "Local residents have taken the initiative by adopting a social enterprise model, and have registered as a co-operative that other residents can join and help to develop. They have mutualised the public sector investment, and other communities could benefit from looking carefully at that example." Cited in "Lewisham Wireless Broadband Project: Draft Feasibility Study Proposal http://dek.spc.org/x/text/LewishamWirelessProjectv4.0.doc

[22] See Uganda Communication Commission (2005)

[23] The current proposal for a Global Alliance for ICT Policy and Development is one manifestation of this (see http://www.unicttaskforce.org). But there are others.

## References


Accenture, Markle, UNDP (2001) *Developing a Development Dynamic: Final Report of the Digital Opportunities Initiative*. July. http://www.opt-init.org/

Aranda, Sergio and Mary Fontaine (2001) 'The Amic@s in the Municipality of Asuncion, Paraguay,' in *Telecentres: Case studies and key issues.* Colin Latchem and David Walker (Editors), Commonwealth of Learning, Vancouver. http://www.col.org/telecentres/

Association for Progressive Communication (APC) (2004) *Capacity Building and Training Tools.* http://www.apc.org/

Association for Progressive Communication APC (2005) 'A New Policy Framework for ICT: Draft for Discussion.' February. http://www.choike.org/nuevo_eng/informes/2804.html

Ballantyne, Peter (2003) *Ownership and Partnership: Keys to Sustaining ICT-enabled Development Activities*, IICD, Netherlands. http://www.iicd.org/iicd/articles/IICDnews.import2286

Batchelor, S.; Norrish, P.; Scott, N.; Webb, M. (2003) *Sustainable ICT Case Histories: Detailed case studies on ICT project successes and sustainability.* Big World / Department for International Development (DFID), UK. http://www.eldis.org/static/DOC11680.htm

Benkler, Y. (2002) 'Some Economics of Wireless Communications', *Harvard Journal of Law and Technology*, Volume 16, No 1, Autumn. http://jolt.law.harvard.edu/articles/pdf/v16/16HarvJLTech025.pdf

Best, Michael L. (2003) The Wireless Revolution and Universal Access. *Trends in Telecommunication 2003*. Chapter 7. Geneva: ITU.

Birchall, Johnston (2003) *Poverty Reduction through Self-help: Rediscovering the Cooperative Advantage.* Geneva: International Labour Organisation (ILO). http://www.ilo.org/dyn/empent/docs/F1406653842/poverty%20-%20coops%20birchall%20090103.pdf

Blattman, C.; Jensen, R. and Roman, R. (2002) *Assessing the Need and Potential of Community Networking for Developing Countries: A Case Study from India*. http://edevelopment.media.mit.edu/SARI/papers/CommunityNetworking.pdf

Capacity building for community wireless connectivity in Africa (partnership) http://www.apc.org/wireless/

Cecchini, Simone and Christopher Scott (2003) *Can Information and Communications Technology Applications Contribute to Poverty Reduction? Lessons from Rural India*. April. http://www.developmentgateway.org/download/181634/cecchini_scott_ICT.pdf

Department for International Development (DFID) (2004a) *Africa ICT Infrastructure Investment Options*, Balancing Act. http://www.afridigital.net

Department for International Development (DFID) (2004b) *Public Private Partnerships in Infrastructure: A Brief Overview of DFID Programmes of Support*. October.

Dymond, Andrew & Sonja Oestmann (2002) Rural Telecommunications Development in a Liberalising Environment: An Update on Universal Access Funds http://rru.worldbank.org/Documents/PapersLinks/Update_Universal_Access_Funds.pdf

Engvall, Anders and Olof Hesselmark (2004) *Profitable Universal Access Providers.* October, Stockholm: SIDA. http://www.scanbi-invest.com

Forestier, Emmanuel, Jeremy Grace and Charles Kenny (2002) 'Can information and communication technologies be pro-poor?', *Telecommunication Policy*, 26. p.639 available through http://www.digitale-chancen.de/transfer/downloads/MD468.pdf

Galperin, Hernan (2004 draft) 'Wireless Networks and Rural Development: Opportunities for Latin America'. Prepared delivered at the Latin American Studies Association Conference, Las Vegas, NV, October 7-9. http://www-rcf.usc.edu/~hernang/lasa04paper.pdf

Gerster, Richard and Sonja Zimmermann (2005) Up-Scaling Pro-Poor ICT Policies and Practices: A Review of Experience with Emphasis on Low Income Countries in Asia and Africa http://www.gersterconsulting.ch/docs/Upscaling_ProPoor_ICTPolicies_Practices.pdf

Gillwald, Alison (2004) *Real reform, good governance and affordable access: national keys to unlocking global participation and networking,* LINK Centre, Witwatersrand University, Johannesburg, South Africa. See ITIC Paper at http://www.ssrc.org/programs/itic/itic_publications/

Gillwald, Allison (2002 ) *Underserviced Area Licenses in South Africa: Steps to Achieving Viable Operators.* LINK Policy Research Papers, No 3, Johannesburg. http://link.wits.ac.za/papers/usal.pdf

Girard, Bruce (Editor) (2003) *The One to Watch: Radio, New ICTs and Interactivity.* Rome: FAO. http://www.comunica.org/1-2-watch

Gurstein, Michael (2003) *Effective Use: A Community Informatics strategy beyond the digital divide.* http://www.firstmonday.org/issues/issue8_12/gurstein/

Gurstein, Michael et. al. (2005) Sustainabilty and Community ICTs, *The Journal of Community Informatics*, Vol. 1, No. 2. http://www.ci-journal.net/docs/JoCI_Vol1_Issue2_2005.pdf

Howard, Leslie (2001) 'The Daimler Chrysler Distance Learning Support Centre in Maseru, Lesotho' in *Telecentres: Case studies and key issues.* Colin Latchem and David Walker (Editors), Commonwealth of Learning, Vancouver. http://www.col.org/telecentres/

Ilboudo, Jean-Pierre and Riccardo del Castello (2003) 'Linking Rural Radio to New ICTs in Africa: Bridging the rural digital divide' in *The One to Watch Radio, New ICTs and Interactivity,* FAO. http://www.fao.org/documents/show_cdr.asp?url_file=/DOCREP/006/Y4721E/Y4721E00.HTM

*info*Dev (2005) *Leveraging New Technologies and Open Access models* http://www.infodev.org/section/programs/enabling_access/open_access

International Cooperative Association (ICA) (1995) *Statement on the Cooperative Identity, Report to the 31st Congress Manchester, in Review of International Cooperation*, 88.3.

International Development Research Centre *Pro-Poor Pro-Market ICT Policy and Regulation (PPPM) Project* http://www.idrc.ca/en/ev-73385-201-1-DO_TOPIC.html

International Telecommunication Union (ITU) (2003a) *Investing in Telecommunications and ICTs in Developing Markets: Shifting the Paradigm* (report by Eric Nelson). December, Geneva: ITU. http://www.itu.int/ITU-D/finance/work-cost-tariffs/publications/Shifting.html

International Telecommunication Union (ITU) (2003b) *World Telecommunication Development Report: Access Indicators for the Information Society,* Geneva: ITU. http://www.itu.int/ITU-D/ict/publications/wtdr_03/

International Telecommunication Union (ITU) (2003c) *Trends in Telecommunication Reform 2003: Promoting Universal Access to ICTs* http://www.itu.int/itudoc/itu-d/trends03/84495.pdf

International Telecommunication Union (ITU) (2003d) *Birth of Broadband* http://www.itu.int/osg/spu/publications/sales/birthofbroadband/

International Telecommunication Union (ITU) (2003e) *Assessment of Telecommunication and ICT Infrastructure in Africa* http://www.itu.int/ITU-D/afr/events/arusha-ITU-NEPAD/Documents/doc7(elotu-english).pdf

International Telecommunication Union (ITU) (2004) *African Telecommunication Indicators.* Geneva: ITU. http://www.itu.int/newsarchive/press_releases/2004/04.html

James, Jeffrey (2004) *Information Technology and Development: A new paradigm for delivering the Internet to rural areas in developing countries.* Oxfordshire: Routledge.

Kirui, Sammy (2004) *Post Exclusivity Regulatory Strategy*, Statement of the Director General of the Kenyan Communication Commission.

McIntyre, Robert J. (2005) "Credit Cooperatives and Energy Efficiency in Locally Financed Economic Development (Policy, Finance, Ownership Alternatives) UNU/WIDER http://www.wider.unu.edu/conference/conference-2005-3/conference-2005-3-papers/McIntyre.pdf

McKemey, Dr. Kevin (Gamos), Dr. Nigel Scott (Gamos), Professor David Souter (University of Strathclyde, former CEO of CTO), Dr. Thomas Afullo (ex University of Botswana), Mr. Richard Kibombo (Makerere Institute of Social Research), Dr. O. Sakyi-Dawson (University of Ghana) 2003 Innovative Demand Models for Telecommunications Services: Final Technical Report http://www.telafrica.org/pdfs/FinalReport.pdf

Molund, Stefan (2000). *Ownership in Focus?* Studies in Evaluation 00/5. Stockholm: SIDA.

National Telecommunications Cooperative Association (NTCA), *et al* (2001) *Telecommunications and Integrated Rural Development in South Africa: Cooperatives as a Mechanism for Supporting Sustainable Economic Development.* Unpublished

National Rural Electric Cooperative Association (2003) *The cooperative promise: A community and economic development guidebook for electric cooperatives* http://www.co-opmonth.org/download_files/Cooperative_Promise_Guide.pdf

Neto, Maria Isabel (2004) *Wireless Networks for the Developing World: The Regulation and Use of License-Exempt Radio Bands in Africa*, June 2004, MIT. http://itc.mit.edu/itel/students/papers/neto_thesis.pdf

Nishimoto & Lal (2005) *Development Divides and Digital Bridges: Why ICT is key for addressing the MDGs* Commonwealth Finance Ministers Reference Report 2005

OECD (2002) Strategies and Regulatory Issues for Community Broadband Networks DSTI/ICCP/TISP(2002)12 by Sangjin Lee. Powerpoint presentation at http://www.positivelybroadband.org/library/downloads/Index_8f_Public%20Sector%20Broadband%20Procurement%20Study_OECD.pdf

Oestmann, Sonja (2003) Mobile Operators: their Contribution to Universal Service and Public Access Intelecon Research & Consultancy Ltd. http://www.inteleconresearch.com/pdf/mobile%20&%20us%20-%20for%20rru.pdf

Shanmugavelan, Murali and Kitty Warnock for Panos (2004) Completing the Revolution: The Challenge of Rural Telephony in Africa http://www.panos.org.uk/resources/reportdownload.asp?type=report&id=1069

Skurnik, Samuli (2002), 'Role of Cooperative Entrepreneurship and Firms in Organising Economic Activities – Past, Present and Future', Finnish Journal of Business Economics 51, 1: 103-124 http://www.pellervo.fi/finncoop/material/LTA1_02Skurnik.pdf

Sprigman, Chris, and Peter Lurie (2004), 'Broadband Marxism', *Foreign Policy*, March/April. http://www.networkideas.org/news/apr2004/news21_Broadband_Marxism.htm

Task Force on Financing Mechanisms (TFFM) (2004) *Financing ICTD for Development: A Review of trends and an analysis of gaps and Promising Practices.* December. http://www.itu.int/wsis/tffm/final-report.doc

Uganda Communications Commission (2005) *Funding And Implementing Universal Access Innovation And Experience From Uganda* Fountain Publishers/IDRC 2005 http://www.idrc.ca/acacia/ev-87215-201-1-DO_TOPIC.html

United Nations Report of the Secretary General (2005) *In larger Freedom: towards development, security and human rights for all* http://www.un.org/largerfreedom/report-largerfreedom.pdf

Millennium Project (2005) Report to the UN Secretary General *Investing in Development: A Practical Plan to Achieve the Millennium Development Goals* http://www.unmillenniumproject.org/reports/index.htm

United Nations Development Programme (UNDP/APDIP) (2005) Regional Human Development *Report Promoting ICT for Human Development in Asia: Realizing the Millennium Development Goals* http://www.apdip.net/projects/rhdr/RHDR-Report.pdf

United Nations Development Programme (UNDP) (2001) *Making New Technologies Work for Human Development* http://hdr.undp.org/reports/global/2001/en/

United Nations Development Programme (UNDP) (2001) *Information communications technology for development, Essentials*, Evaluation Office, no. 5. New York: UNDP. http://www.undp.org/eo/documents/essentials_5.PDF

United States Senate (2001) *Foreign Operations, Export Financing, and Related Programs Appropriation Bill*, Senate Rpt.106-291. http://thomas.loc.gov/cgi-bin/cpquery/0?&&dbname=cp106&&&r_n=sr291.106&&sel=DOC&

Vecchiatto, Paul, and Rodney Weidemann (2004) 'VOIP to be legal at last'. *IT Web*, 2 September. http://www.itweb.co.za/sections/telecoms/2004/0409021643.asp?S=Internet&A=INT&O=FRGN

World Bank (2005) *Financing Information and Communication Infrastructure Needs in the Developing World: Public and Private Roles*, draft for discussion. http://info.worldbank.org/ict/

World Bank (2004) *Reforming Infrastructure: Privatization, Regulation, and Competition*. http://econ.worldbank.org/prr/reforming_infrastructure/text-36236/

World Bank (2005) *Connecting Sub-Saharan Africa: A World Bank Group Strategy for ICT Sector Development.* January, Global Information and Communication Technologies Department.

Annexes to the report

# Community-based Networks and Innovative Technologies: New models to serve and empower the poor

# Case Study 1
# The Cooperative Model: The Cases of WIST and Tyczyn in Poland

National Telecommunications Cooperative Association

## Report Summary

In 1989, telephone density in rural areas of Poland was about 2.4 phones per 100. This situation hindered economic development and was a serious obstacle to democratic transformations. In 1990, national democratic elections gave rise to a set of mostly young, energetic local leaders, motivated to respond to community needs. The National Telecommunications Cooperative Association (NTCA) encouraged the Polish government to enable *village telephone committees* to set rural telephone systems. Up to 30% of the funding was provided by donors, with village committees securing the remaining 70% both in cash and in-kind contributions.

Thus, with funding from USAID, two telecommunications cooperatives were established in southeastern Poland. Village telephone committees and local mayors formed the *WIST* and *Tyczyn Telecommunications Cooperatives*, near the Ukrainian border. With financing from Nortel for central DMS-10 rural switches, they organised self-help construction of lines, buildings and other facilities.

WIST and Tyczyn have since added new services, including Internet access, plan to introduce broadband for remote areas and cable TV, and have evolved into very successful enterprises offering better and cheaper services than their investor-led local counterparts. They developed the first telephone books in Poland, including emergency numbers and yellow pages, and provide access to emergency services such as police and ambulance. Their telecommunications services enhance the functioning of public institutions such as mayors' offices, churches, schools and social clubs. The cooperatives support significant business development, helping to attract new and growing enterprises that require high-quality communications. Businesses customers of the telephone cooperatives operate more efficiently and are able to communicate readily with employees, suppliers and customers. Most important, they have supported and acted as a catalyst for non-telecommunications development in their respective communities, including the launch of several highly successful cooperative enterprises, and the creation of a local authority association to promote local development.

While WIST and Tyczyn have much in common, WIST is geographically more extensive and suburban, Tyczyn more compact and rural. Leadership generally comes from local mayors and a pool of activists involved with the founding of the cooperatives. Tyczyn is led by a four-times elected mayor while WIST leadership tends to come more from its original and on-going manager. In general, WIST is committed to the cooperative way of running its business, while Tyczyn places more emphasis on cooperative methodologies as part of broad-based community development.

Key factors in their success included the context of democratic reforms, the high level of demand, the willingness and capacity (though modest) of the local population to pay for service, the presence of vital technical assistance, the success of local authorities in securing limited initial funds, the existence of local telephony committees, and a somewhat benign and flexible policy environment.

Obstacles included the limited experience with the concept or practice of local rural telephony, the difficulty in identifying and deploying external support volunteers, anti-competitive policies of the main provider, and an initial lack of motivation from the community. The absence of tax incentives, and the reluctance both of the Polish government and external donors to promote the model more widely – focused as they were on commercial approaches – were significant in limiting the extension of the model which might otherwise have gained wide popularity. Nevertheless the prospects for both cooperatives are extremely positive, and steady expansion is likely to continue.

The main lessons emerging are that the cooperative approach does help to solve development problems, but services must be affordable, and the community must be able to afford them; a favourable legal environment is essential for the cooperative business model to gain a foothold; and training and capacity building is needed for officials, politicians as well as local promoters whose appreciation of the concept, potential benefits and policy, technical and legal issues surrounding telecom cooperatives is essential. Finally, the Polish example does not offer a universal solution, and each situation must be examined in its own right.

**Summary Features: Information as of end of November, 2004:**

| Characteristics | WIST | Tyczyn |
|---|---|---|
| Form of business | Legal cooperative under 1982 law | Same |
| Access lines | 9,100 | 9,500 |
| Members | 8,279 | 6,749 |
| Voting | One member/one vote | Same |
| Form of governance | 1 representative per 1,000 or one per village if less than 1,000. 70 membership groups who have a representative each at annual meetings. | 1 representative per 1,000 or one per village if less than 1,000. 28 membership groups with a representative each. |
| General Assembly | Meets annually. Elects Board of Directors every 3 years. | Meets annually. Elects Board of Directors every 5 years |
| Attendance at annual meetings | About 90 percent of elected representatives | Nearly all representatives |
| Elections | 16-17 candidates nominated from floor at annual meetings | 15 to 20 candidates also nominated from floor |
| Board of Directors | 13 directors of which 2 are women | 11 directors who are all male; chairman is mayor of local *gmina* |
| Membership meetings | 1,000 members involved in local communities through winter meetings (about 1 in 8 members) | 1,014 members at local communities voted for representatives (about 1 in 6 members) |
| Audit committee | Only committee on board | Same |
| Frequency of meetings | Quarterly | Same |
| Number of employees | 37 (outsourcing technical services) | 50 (20 of which are technical staff) |
| Hook up fee | 50zl per access line | 50zl during "sales" and usually 300zl |
| Membership | 10 shares @ 20zl = 200zl | 900zl for residents; 5,000zl for businesses |
| Membership education | At winter meetings of representational groups; no publications | Similar |
| Collection system | Mostly door to door (only 200 bills posted in) | Similar |
| Local costs of calls within cooperative (other set by interconnection agreement) | Free calls for first 40 impulses for members only | All local calls free with cooperative membership |
| Taxes (no tax advantage for cooperatives) | 19% income tax | Same |
| Profitable | With 4 years | Same |

# 1. Summary description[1]

## *1.1. Services Offered*

WIST and Tyczyn are legal cooperatives registered under a 1982 law. They offer an array of services to their respective communities that are better and cheaper than those of commercial competitors, i.e. private telecom companies or the national operator Telekomunikacja Polska (TP S.A.). They offer both basic and advanced services.

Tables below indicate services and charges as of the year 2003, with figures for WIST and Tyczyn (figures for basic services only).

Table 1 – **The Tyczyn Cooperative Basic services and rates**

| Service | Zloty | US $ |
|---|---|---|
| Cooperative membership | 200* | 64 |
| Member Fee for Basic Service (monthly) | 20 | 6.4 |
| Non-Member Fee for Basic Service (monthly) | 37 | 12 |
| Additional Line of Service (monthly) | 10 | 3.2 |
| Reconnection | 20 | 6.4 |
| Itemised Billing (monthly) | 3** | 1 |
| Local Traffic (per pulse) | 0.29 | 0.09 |
| Long Distance Traffic (per pulse) | 0.29 | 0.09 |
| International Traffic (per pulse) | 0.29 | 0.09 |
| Repairs and maintenance | free | |

* 361 with hook-up fee; ** anticipated changes in legislation will remove any fees for itemised billing

WIST provides telecommunications services to 933 businesses, including a large regional dairy cooperative, a major sausage plant and the agricultural cooperative bank. It also serves a new regional airport in Rzeszow. WIST clients include food service firms, furniture manufactures, restaurants, shops, home improvement companies, a radio station, a large dance hall, the new swimming complex and many public sector organizations.

The Tyczyn cooperative serves about 445 private businesses including 20 cooperatives. Most of its clients are village based supply and marketing cooperatives. However, there are also several large entities including a bottling plant and an agricultural bank cooperative. Among Tyczyn customers are construction companies, metal and pumping industries and restaurants.

Table 2 – **The WIST Cooperative: Advanced services and rates**

| Service | Zloty | US $ |
|---|---|---|
| **Dial-Up Internet:** | | |
| - Basic: 50 hrs (monthly) | 30 | 9.6 |
| - Standard: 80 hrs (monthly) | 40 | 12.8 |
| - ISDN Connection: Unlimited Usage (monthly) | 100 | 32 |
| **Digital Subscriber Line (DSL) Broadband:** | | |
| - Installation | 100* | 32 |
| - Basic: 128 kbit/s (monthly) | 65 | 20.8 |
| - Standard: 256 kbit/s (monthly) | 120 | 38.4 |
| - Business: 512 kbit/s (monthly) | 250 | 80 |

* for Basic and Standard packages; 500 zl for the Business package.

Table 3 – **The Tyczyn Cooperative Basic services and rates**

| Service | Zloty | US $ |
|---|---|---|
| Cooperative membership | 900* | 288 |
| Member Fee for Basic Service (monthly) | 36 | 11.5 |
| Non-Member Fee for Basic Service (monthly) | 30 | 9.6 |
| Additional Line of Service (monthly) | 1** | |
| Repairs and maintenance | Free | |

* + 10 zl. subscription fee; ** for members and their families; 50 zl. for others

### *1.2 Structures and Participation*

The cooperatives, with the technical assistance of the NTCA, adopted management structures similar to those of U.S. rural telecommunication companies. Bylaws provide for a cooperative structure that consists of an Assembly of Representatives, a Board of Directors, and a three person Management Team and a Manager.

WIST and Tyczyn are fully democratically controlled, with one member, one vote. The Assembly of Representatives wields ultimate control of governance and holds hotly contested democratic elections for the Board of Directors. Local member assemblies in turn elect the members of the Assembly of Representatives, to speak and act for them at annual meetings.

The emergence of such democratic structures is all the more remarkable since local governments contributed up to 30% of the system costs and, at one cooperative, business membership is substantially higher than local residents.

### *1.3 Contribution to the Community*

WIST is firmly committed to the cooperative way of doing business, and maintains a strong community ethos. It makes major contributions to its community, including grants to local sports and other clubs, provides low rent space in its building to the local credit union, and invests in restoration of a historic building in the community.

Beyond providing telephone service, the Tyczyn cooperative has spurred the creation of a regional development association of *gminas* (a county level of local government) within its service area. This association has developed a grassroots organisation similar to the cooperatives, to provide wastewater treatment and establish a large drinking water bottling plant and delivery enterprise employing about 400, which also produces and delivers fruit juices and bread. This community development programme aims to bring jobs to this low income, subsistence-farming area with a rate of unemployment of about 40 percent (2003). The "Ourselves for Ourselves" strategy is based on the involvement and motivation of local communities.

### *1.4 Basic Characteristics and Teledensity*

The demographic and geographic profiles of the two differ significantly.

WIST is more extensive geographically and mostly suburban, whereas Tyczyn is more compact and rural. The area served by WIST includes some 6,000 residents, stretching along a major highway running north-south and neighbouring Rzeszow, centre of the region. The area of Tyczyn has a population of 40,000 (with half of the population served by the cooperative). The Tyczyn service area has no major towns, is completely rural and is located southeast of Rzeszow.

However, at the time of the launch of WIST and Tyczyn, they had in common very poor telecommunication services.

In 1992, Polish rural residents had fewer than 2.4 phones per 100. There were 41,324 public telephones, of which less than 4.5% operated 24-hours a day. About 7,000 of the 55,000 villages had no telephone service at all. Teledensity in rural areas was four times lower than in urban areas. Most telephone installations were to be found only in mayoral premises and post offices, comprised obsolete manual systems and provided access during limited hours.

All telephone service in Poland was delivered by the Telekomunikacja Polska S.A. (TP S.A.), the state-owned and operated monopoly, which was unable to reach underserved rural areas. TP S.A. controlled all telex, postal and telephone services, including telephone service provided by the village committees. Compared to those offered later by WIST and Tyczyn, its services were more expensive and less efficient.

Telecommunications service in WIST and Tyczyn was characterised by poor reception, limited infrastructure resulting in network overloads in high usage periods, and broken

or failed connections. There was limited choice in the selection of products and services, and little price flexibility. Moreover, because of the lack of "gateway" switches, international calls had to be patched through Sweden.

## 2. Origins and launch of the Coopertives

In 1989, rural telephone expansion became a high priority. A national initiative was launched to support self-help efforts by village residents to obtain telephone service. The target group was underserved, rural communities throughout Poland. Hundreds of telephone committees were formed and could access financial support from the Balazs Social Trust Fund (launched by the Minister for Rural Life Quality, Artur Balazs) specifically established to support rural telephony. The goal was to provide telephone service to 20,000 rural residents.

The Fund provided telephone committees with financial support from 1989 to 1991. Funding was controlled directly by the office of the Prime Minister, and came from the sale of agricultural commodities donated by the European Union and Canada. When the availability of funding was announced publicly, hundreds of villages from throughout rural Poland applied. The village committees were required to raise 70% of the costs (in-kind and cash) for central switches, cables, house wiring and handsets. Rural residents were well used to paying high fees for telephone service (for example, US$500 to US$1,000 for line installation); in villages, residents were accustomed to paying for line extension to the home, internal wiring and the premises equipment. It was thus possible to raise significant start up costs through membership and hook-up fees.

By September 1990, about 1,500 applications had been submitted, and about 20%, or 300, were funded.

In two rural communities, north and south of the regional capital of Rzeszow, located in Southeastern Poland near the Ukrainian border, dozens of village telephone committees appeared and initiated the setting up of two telephone cooperatives: Spóldzielnia Telekomunikacyjna WIST and Okregowa Spóldzielnia Telefoniczna w Tyczynie (Tyczyn). WIST and Tyczyn were formed through uniting village level telephone committees and local governments; they led the way in this first wave of competition, and secured the first licenses. Based on an assessment of local capacity, commitment and prospects of success, NTCA selected WIST and Tyczyn as beneficiaries of technical assistance for telephony cooperative development.

### *2.1 Role of the community: Ownership, Financing, and Control*

Both WIST and Tyczyn were created through the leadership of locally elected mayors in the service area of the *gminas*. They provided the impetus to the cooperatives through dozens of village level telephone committees that had been formed to provide in-kind and cash contributions in order to obtain telephone service from TP S.A. The self-help model of telephone committees providing cash and in-kind services helped the cooperatives to quickly build out their systems.

Moreover, local leaders of Rzeszow's rural areas were not keen on the idea that the telephone systems they were building would revert to TP S.A. They wanted instead the

systems to be locally owned, to capture local investment and benefit local subscribers. They were familiar with agricultural cooperatives and saw the advantages of owning their own telephone systems, rather than turning their self-help efforts over to the monopoly. Furthermore local governments had the authority to tax and in order to develop the core systems, including switches and initial lines.

### *2.2 Sourcing Technical, Managerial and Legal Expertise*

NTCA received a grant of under US$ 1 million from USAID, over a period of six years, to provide technical assistance. With this relatively modest figure, training was offered at several levels.

Key Polish telecommunications policy makers and implementers in the Ministry of Telecommunications and TP S.A. were trained in the operation and advantages of a multi-provider system, especially on issues of interconnection, revenue sharing and anti-competitive practices. Later, training was provided to the managers of the cooperatives. Twenty volunteers from NTCA members provided practical expertise especially in management, organizational and technical issues. Many of these volunteers had a lifetime of experience in telephone cooperatives and were involved in the initial start-up of their systems. A site survey was performed, and assistance in design, construction, operations and developing technical training manuals was provided.

In addition to on-site trainings, community and telecom officials could observe an effective cooperative model work during their visits to the United States – no such models existed in Europe in the telecoms sector. NTCA assistance also helped to create cooperative arrangements between rural communities in Poland and USA, and high-quality equipment necessary for operation was obtained from Nortel (a US manufacturer, which donated some initial equipment to WIST in accordance with its strategy to enter Polish market).

### *2.3 Sourcing Initial Investment*

With the cooperatives legally up and running, WIST secured initial capital through loans from the *European Fund for the Development of Rural Areas* and the *Bank Gospodarki Zywnosciowej* (one of the largest banks in Poland), needed for its basic system in *Laka* to finance a central switch, four concentrators and four lines. It also secured credit from the cooperative bank for expansion to four additional *gminas*. WIST was able to obtain a foreign currency guarantee with the U.S. Export-Import Bank held by the First Chicago International to purchase the Nortel DMS 10 central switch.

### *2.4 Regulatory Issues*

WIST and Tyczyn were pioneers in negotiating key operational and industry issues, not the least of which was interconnection and revenue sharing arrangements with TP S.A. This was a precedent in the framework of Polish legislation.

Soon after training, legislative changes were enacted that made local ownership possible. With the passage of the Telecommunications Act of 1990, TP S.A. was privatized, its monopoly over local service provision was ended and local service competition by local, private operators was authorized. TP S.A. maintained its monopoly over long distance and international calls, but competition in the form of a duopoly was introduced for local service.

In other words, one competitive telecommunications carrier was now permitted to compete with TP S.A. in the provision of local telephone service in each local market.

The local market was defined as the local county or *gmina*. Government policy was to authorize new service providers for small, defined localities and by 1995, 23 new licensees had been issued. As a result, telephone service was extended to the least developed and underserved parts of TP S.A. territories: small towns and villages.

Table 4 – **WIST Start-up Investment Costs - Year One**

| | **US $** |
|---|---|
| DMS 10 Mainframe Central Switch (Nortel) | 270,000 |
| Delivery and Installation of Switch (POLMAiK) | 11,066 |
| Property Lease | 3,927 |
| Additional Nortel Equipment (Panels for DMS 10) | 380,000 |
| Additional Equipment and Services (concentrators, optical cables, power supply units, renovations) | 544,000 |
| | **1,208,99** |

The Telecommunications Act also separated TP S.A. from the postal service and set out basic rules for telecommunications operations (for example, tariffs, types of equipment, fees and licenses). It also established the right of operators other than TP S.A. to offer telecommunication services and to interconnect with TP S.A. A Government Plenipotentiary for Rural Telecommunications was appointed and placed in the Ministry of Telecommunications to provide on-going support to rural telecommunications. Being supportive of the local telephony idea from the beginning, the Polish government later placed no obstacles in the way of local telephone cooperatives.

### *2.5 Choice of the Cooperative Business Model*

The familiarity of the local community with the cooperative model was a factor in its selection. The agricultural region of Rzeszow already had a history of independent, member controlled cooperatives before World War Two. During consultations with technical advisors these leaders agreed to promote rural telephone service through telephone cooperatives.

It was thus already clear that a cooperative could successfully exist and compete with a TP S.A. monopoly, as long as it provided a superior quality and broad range of services. These goals could be achieved only using modern digital equipment and employing modern technologies. Of course, in order for the cooperatives to become financially sustainable, services had to be affordable to the local population. Cooperative activists were confident that residents of *gminas* could pay their proportion of the installation costs and member fees because they were used to pay high fees for telephone services to TP S.A.

### *2.6 Management Structure and Community Participation*

The cooperatives' Board of Directors is responsible for regular planning of business activities. At annual meetings, it presents to members the accomplishments of the previous year, and plans for the next year are discussed and approved. The Board controls activities of the cooperative and performs the following duties:

1. Appoints and dismisses the management board and its chairman;
2. Supervises the cooperative;
3. Approves actions concerning property, and membership in other organizations;
4. Makes organizational changes in the cooperative;
5. Processes member complaints;
6. Sets wages of employees.

A three person Management Team appointed by the board = implements all activities not reserved for the Board or Assembly. It prepares business plans, manages cooperative operations, secures loans and credits, prepares annual reports, and liaises with local authorities and others.

But the decision making process within the two cooperatives is deeply democratic.

Membership, and hence the right to vote, is open to all subscribers, though not all avail themselves of it (Tyczyn charges more for business members than for residents, but each have the same voting right). In each cooperative, about 1,000 members participate at least twice annually in numerous local assemblies (70 for WYST and 28 for Tyczyn). These elect representatives to the cooperative's annual Representative Assembly meetings, which in turn take major decisions and elects board members nominated from the floor

The Representative Assembly is thus the highest level of governance. The Assembly determines development priorities, accepts or rejects annual reports, votes in the Board of Directors and decides on the distribution, if any, of surplus or how to cover losses.

Table 5 – **WIST: Fixed Assets**

| | Fixed assets, $US | Increase over previous year |
|---|---|---|
| 1994 | 765,696 | |
| 1995 | 1,080,596 | 41% |
| 1996 | 1,463,461 | 35% |
| 1997 | 1,724,869 | 18% |
| 1998 | 1,890,430 | 10% |
| 1999 | 1,888,902 | 0% |
| 2000 | 2,096,669 | 11% |
| 2001 | 2,628,915 | 25% |
| 2002 | 2,687,817 | 2% |
| 2003 | 3,839,262 | 43% |

## 3. Ongoing evolution

### *3.1 Evolution of the Business Model*

Both Tyczyn and WIST showed substantial growth during their first decade, many subscribers switching from TP S.A. to the cooperatives. Subscribers can freely choose their service provider - (there are no regulations requiring them to subscribe to a specific provider) The cooperatives offered better and cheaper service so subscribers migrated to them.

The best data is available for WIST, though the figures for Tyczin are comparable. The fol-

lowing tables and figures track substantial growth in fixed assets, workforce, and labour productivity in WIST.

Fixed assets grew steadily during the early years of operation, with at least 10 percent growth each year from 1994 to 1998. WIST achieved an annual average growth in fixed assets over the nine years of a substantial 20.55%. In 2003, it made a substantial investment in a new building, giving it two large well equipped buildings, enhancing productivity and offering good working conditions

Since it began operating, the WIST Cooperative achieved steady revenue growth, added subscriber lines every year, and built up its force. Staff turnover is low. WIST has successfully increased the number of its employees from 10 to 37. Marginal rate of return for each new employee rose from $23,640 to $46,000 between 1999 and 2004. During this period, WIST continued to build out its local network and reached an employee to subscriber line ratio (246:1) far better than the national average (159:1). Now, WIST is in a period of rapid and sustained growth, with no sign of productivity loss in the near future.

The table below demonstrates changes in the number of subscribers and employees for WIST over the period from 1992 to 2004, showing also the number of TP S.A. subscribers in the WIST catchment area.

Table 6 – **WIST: Employees, Subscriber lines, and Revenue**

| | Employees | Subscriber lines | Revenue ($US) |
|---|---|---|---|
| 1994 | 10 | 2185 | 259,253 |
| 1995 | 11 | 2228 | 321,313 |
| 1996 | 13 | 2997 | 358,507 |
| 1997 | 15.5 | 4000 | 468,510 |
| 1998 | 21.75 | 4482 | 612,100 |
| 1999 | 27 | 5564 | 638,259 |
| 2000 | 30 | 6308 | 883,371 |
| 2001 | 31 | 7008 | 1,110,299 |
| 2002 | N/A | 7928 | 1,435,196 |
| 2003 | 34 | 8300 | 1,688,959 |
| 2004 | 37 | 9100 | 1,701,815 |

Table 7 – **WIST: Subscribers, New, Total and TP.S.A**

| Year | New subscribers | Total subscribers | TP S.A. subscribers |
|---|---|---|---|
| 1992 | 160 | 770 | - |
| 1993 | 954 | 1820 | 96 |
| 1994 | 365 | 2185 | 115 |
| 1995 | 43 | 2228 | 113 |
| 1996 | 1520 | 2997 | 864 |
| 1997 | 1040 | 4000 | 864 |
| 1998 | 482 | 4482 | 860 |
| 1999 | 1082 | 5564 | 770 |
| 2000 | 744 | 6308 | 456 |
| 2001 | 700 | 7008 | 245 |
| 2002 | 920 | 7928 | 153 |
| 2003 | N/A | N/A | N/A |
| 2004 | 440 | 9100 | 112 |

Table 8 – **WIST Sources of Revenue (Jan - October 2004)**

| Source | Zloty | US Dollars |
|---|---|---|
| Member fees | 1,632,527.13 | 522,542.44 |
| Sales of Telecom services | 15,095.35 | 4,831.75 |
| Sales of Internet services | 653,012.70 | 209,018 |
| Local Traffic | 492,360.84 | 157,595.81 |
| Long Distance Traffic | 1,311,423.79 | 419,763.07 |
| International Traffic | 259,579.29 | 83,086.646 |
| Regional Traffic | 825,679.30 | 264,285.03 |
| Other Revenue | 127,135.02 | 40,693.623 |
| Total revenue | 5,316,813.42* | 1,701,815.9 |

*zl.6.4 million project to the end of 2004

Tyczyn's performance was somewhat similar.

Both cooperatives deploy traditionalwire-based technologies and despite worldwide progress in wireless deployment, feel that VoIP and WiFi would not be popular in their communities in the immediate future. WIST and Tyczyn believe further improvement is needed before el they can guarantee high quality of service, while still offering a cheaper service. Given major recent wire-based investments to their existing networks, both plan to expand their cable networks rather than build up satellite or other coverage.

### *3.2 Sustainability*

WIST receives its revenue from a variety of sources:

Operating income of WIST increased steadily from 1994 through 200312% to 38% increase over the prior year, with the exception of a marked hold up to a 4% growth rate in 1999. In general, operating income increased an average of 24% from 1994 through 2003, and an average annual rate of 28% from 2000 through 2003.

Despite strong sales, however, margins were strikingly modest, changing year to year within the $18,000 to $48,000 range. During the period from 1999 to 2003 WIST was really able to generate liquid funds. However, degree of financial leverage, and solvency of WIST, is remarkably low, indicating a very high degree of flexibility for capital expansion. Profitability indicators are quite low. WIST leadership indicated an objective of keeping margins low, and member value high, and in this the cooperative has succeeded. Since WIST is not publicly traded, there is no reason to maintain high margins, and the tax regime seems to encourage sheltering of revenue.

### *3.3 Satisfying Ongoing Finance*

Both cooperatives received external financing at initial stages of their development. Having achieved self-sustaining growth from member fees and sale of services, WIST and Tyczyn can now attract external financing in the form of bank credits. From the beginning of business and through the year 2004, WIST has received total credits of some €3.6 million (about US$US4.8). All credits were obtained through the Polish banks, mostly in national currency, and all credits are routinely fully paid off. The credit situation at Tyczyn is similar.

The cooperatives were also supported through EU's Phare Programmes and in 2002,

Tyczyn received €50,000 (US$67,000) for transmission equipment. As Poland has joined the European Union, local businesses can apply for money from the European structural development funds. WIST intends to apply for €300,000 (US$400,000) from the fund in August, 2005. Under current regulations, Tyczyn is not qualified to receive financing from the structural funds.

Table 9 –**WIST Growth in Operating Income**

| | Operating Income, Euro | Increase over previous year Euro | Percent Increase over previous year |
|---|---|---|---|
| 1994 | 259,253 | | |
| 1995 | 321,313 | 62,060 | 24 |
| 1996 | 358,507 | 37,194 | 12 |
| 1997 | 468,510 | 110,003 | 31 |
| 1998 | 612,100 | 143,590 | 31 |
| 1999 | 638,259 | 26,159 | 4 |
| 2000 | 883,371 | 245,112 | 38 |
| 2001 | 1,110,299 | 226,928 | 26 |
| 2002 | 1,435,196 | 324,897 | 29 |
| 2003 | 1,688,958 | 253,762 | 18 |

Neither cooperative has published business plans, but they have relied on NTCA and local consultants in the development of each phase of the business. They prepare "working plans" that are project specific, such as for upgrading their systems with Internet and introducing broad band services. Each cooperative has invested in major facilities (e.g., the headquarters building for WIST cost €75,000/ US$100,000) and new equipment, including the purchase of 11 DMS 10 Nortel switches from TP S.A. as well as smaller Israeli and Polish switches used for clusters of clients like the regional international airport.

### *3.4 Ancillary Community Development Activities.*

The success of Tyczyn inspired the creation of the regional development association, which brings new jobs and helps local entrepreneurs adjust to new economic conditions following Poland's membership in the EU. The association is designing and implementing pilot projects for sustainable development, with an emphasis on organic and sustainable farming that is environmentally sensitive.

The most successful community enterprise now, in addition to the telecommunications cooperative, is the earlier-mentioned regional drinking water plant, built through volunteer labour and serving 70,000 families. This central facility, along with its fleet of delivery trucks and ICT resources, is intended as the basis for processing of additional organic crops, such as jams, potatoes and meats. The goal is to interlink the business functions of these enterprises with Internet.

Both cooperatives also sponsor community events such as sports and polka contests. In 2003, WIST donated €6,300 (US$8,400) to the local community. In addition, computers replaced after planned renovations at the cooperative's office have been given to local Internet cafés. Tyczyn also makes its contribution to local development, for instance offering local schools free use of Internet services provided by the cooperative.

Telecommunication services are a major feature of the promotional materials used by the local mayors to attracting investments like the regional international airport.

### 3.5 Regulatory Developments

U.S. cooperative methodologies were successfully adapted to Polish conditions, resulting in by-laws and management and governance structures that reflect democratic values (despite an obsolete Polish cooperative law that gives most power to management, not owners). The Postal and Telecommunications Act of 1990 was successfully modified to create the new post of Plenipotentiary for Rural Telecommunications. But this was a limited achievement as the office has had high turnover, hampering advocacy for rural interests within the Ministry of Telecommunications.

In 1995, Polish telecommunications policy changed from serving individual *gminas* to serving broader areas. Through public tenders, independent telephone companies were invited to submit proposals to provide service to a particular set of *gminas* and *voivodships* (provinces), including Lódź, Poznań, Kraków and Katowice. This change led to a more consistent assignment of territories, but encouraged applications from major outside investor groups instead of local entrepreneurs. By 2003, 43 independent companies were formed and held 90 territorial concessions. Except for WIST and Tyczyn, all the companies are investor owned.

### 3.6 Cooperation between WIST and Tyczyn

WIST and Tyczyn shared their own experiences and sound business practices to overcome common obstacles in their work. At the beginning TP S.A.'s reluctance to cooperate was the main obstacle for the cooperatives. They advocated common solutions to pressing issues, such as restrictive regulations regarding sharing TP S.A. equipment and lines; obtaining financing; and difficulties in connecting their exchanges to the public telephone network.

Both have adopted similar positions on how to deal with the "point of connection" issue with TP S.A. in Rzeszow. Each cooperative lent construction equipment to the other. Tyczyn technicians helped WIST in all phases of installing the DMS 10 that had been purchased from TP S.A., (disassembly, transportation, assembly, and connection to the network and testing). Currently, the two cooperatives share billing services and produce joint telephone books.

### 3.7 Content Development

The telephone book jointly produced by WIST and Tyczyn includes subscribers of both cooperatives. It is the first book of that kind in Poland, has important local numbers (emergency etc.) and lists major events. This is a major and powerful communication tool for both members and community. Yellow pages are included.

## 4. Analysis and conclusions

### 4.1 The Benefits to the Community

A well-developed telecom infrastructure is critical for local economic development and

WIST and Tyczyn have brought this to their communities. . Households, businesses and public institutions now receive high-quality, low-cost telephone service, something TP S.A. had never been able to provide. In addition, both cooperatives work to empower and strengthen their communities in a variety of other ways.

In Tyczyn area, with 40% unemployment, the cooperative plays a vital role in supporting business development, and is a critical factor in attracting investments. Beyond providing telephone service, it resulted in a formal community planning organization to promote the region as a tourist location, organises collaborative activities within the community, and applies for national and international grants and commercial investments. It initiated a regional development association of gminas within its service area. Encouraged by Tyczyn's success, the association has developed grassroots structures similar to the cooperative's, has built a facility for wastewater treatment and established a large drinking water bottling plant and delivery enterprise, employing about 400, which also produces and delivers fruit juices and bread. Ten percent of bakery production is donated to local soup kitchens.

Unemployment in WIST area is much lower at about 12%, but the cooperative significantly adds to the area's attraction as a place to live and to locate business. It assisted the formation of a credit union and makes ongoing contribution to community development activities.

The two cooperatives were the first successful community owned enterprises in their villages. The cooperative approach demonstrates to the community the significant contributions that even low-income households and small businesses can make toward their own development. Participants can directly help themselves by stringing lines, wiring households and accomplishing various construction activities from erecting poles to renovating offices and equipment facilities.

While it is difficult to measure the economic impact of WIST and Tyczyn, leaders in both communities attribute their ability to mobilize their communities and to attract investment for business development directly to quality telecommunications services. The cooperative nature of the telecommunications enterprises, coming at an early time in Poland's post-Soviet history, proved to be liberating and stimulating to the communities. Other cooperative enterprises sprang up in Tyczyn specifically modelled on the telecommunications cooperative experience. In the WIST service area there developed a beneficial cooperative spirit among local government, citizens, and enterprises that has supported growth and improvement in the quality of life to this day.

### *4.2 Key Success Factors, and Obstacles Encountered*

A number of factors stand out as central to the success of both WIST and Tyczyn cooperatives:

1. The timeliness of these initiates was a critical factor. An initial impetus was given by the initiation of democratic reforms in rural areas and the enormous pent-up demand for quality telephone service.
2. Technical assistance and training, especially from the NTCA both in Poland and in

the US, were essential for the success of the cooperatives. Assistance in negotiating interconnection agreements proved particularly important. Before building their initial systems, cooperative leaders had no experience in establishing interconnection and revenue sharing arrangements with TP S.A. that are so critical to profitability and sustainability.

3. The availability of initial funds, and legal authorization of local mayors to secure those funds through grants, taxation and loans were vital.
4. Organising the local communities through village telephone committees was central to engaging and involving the people. It generated considerable value in terms of donated time and effort, motivating members and other investors of time and money in the enterprises.
5. Thanks to democratic reforms achieved, a favourable multi-provider policy environment was created in the region. This, combined with strong political leadership by local officials, helped raise capital, mobilize self-help labour and services, and overcome obstacles. These were key factors that triggered the cooperatives' success.

The main obstacles encountered were as follows:

The rural telecom sector in Poland had limited experience and no established principles or methodologies for development. Largely due to the lack of a cohesive, enabling legal and regulatory structure for telecommunications, there was a failure to achieve desired goals. Moreover, while the Office of Plenipotentiary for Rural Telecommunications had been created in 1992, it had been unable to make satisfactory progress towards fulfilling its mandate, in part because of the lack of expertise. Overcoming these obstacles required thorough training and practical experience in the course of the cooperatives' activities.

1. Identification and deployment of volunteers was not easy. Matching skills to needs on a volunteer basis was difficult (e.g., those with requisite skills were often unavailable during operative timeframes), and many volunteers had little international experience. However, good management and volunteer oversight largely mitigated these issues.
2. Anti-competitive practices of TP S.A. were very difficult to overcome. Among other things, the monopoly refused to execute a mutually negotiated agreement for leasing its existing lines and equipment to WIST, and to issue terms for a pole attachment agreement. The matter was finally resolved after WIST attached its lines to TP S.A.'s poles, TP S.A. sued for their removal and the court ruled in favour of the cooperative.
3. The community initially displayed a reluctance to participate. At first, they were simply unaware of the benefits that membership in a telephone cooperative would bring and concerted community education activities were conducted. These, combined with the pent-up demand for service that the local monopoly had failed for years to provide, eventually persuaded the communities to actively engage.
4. The absence of tax incentives is a serious obstacle for the cooperative model in Poland. However, the potential does exist for communities to purchase less successful small independent systems and convert them into municipal or cooperative ownership. A cooperative of local *gminas* might offer a successful approach to this.

5. It proved impossible to convince senior Polish government officials to create a rural telecommunications revolving fund to replace the Balazs Social Trust Fund, which would have given a major boost to the replication of the model. The EU and other major donors were reluctant to provide funding for rural telecommunications, because their focus and priorities were driven by commercial interests. At that time international firms were strongly competing to enter the potentially large Polish telecommunications market, and this competition emphasized the more financially rewarding urban sector. As a result, only WIST and Tyczyn were created and the cooperative model was not spread into the rest of the Poland.

### *4.3 Prospects for the Future*

The cooperatives are expected to grow through the expansion of profitable services, such as Internet access and broadband service, as by steadily increasing the subscriber base. WIST plans to increase its membership to 10,000 access lines from 9,100 (2003) by 2006. Its main growth strategy is to enlarge its service area by encouraging neighbouring *gminas* to join together by shifting services from TP S.A. In terms of more advanced services, WIST plans to provide service to inaccessible areas, introduce cable TV, install additional public telephones, and modernize its system, e.g. build a fibre optic network. Tyczyn plans to grow to 20,000 access lines in ten years (roughly doubling from the 2003 level of 9,500 lines), and to provide strong Internet coverage within three years.

In addition, growth is underway through geographic expansion into poorly served areas where TP S.A. is the provider. Given sunk costs in basic equipment, it is likely that the cooperatives will continue to provide substantial cost savings and value to their members. There seem to be no major competitive threats to their continued success, and the fact that TP S.A. and the Polish government have refrained from actively hindering the development of local telephone cooperatives is helpful. The last interconnection agreement of 2000 on sharing of revenues is more financially supportive of independent systems. TP S.A. has become more investor-oriented under ownership of France Telecom, focusing on higher profit areas such as major towns and urban centres and continuing to provide poor or deteriorating services to rural areas. This leaves a large market for independent rural providers such as Tyczyn and WIST. Hence, the cooperatives have good prospects to achieve their goals for growth.

### *4.4 Lessons Learned.*

Several conclusions can be drawn from the activities and success of Polish telecommunications cooperatives.

1. The cooperative approach helps solve development problems. As a direct result, WIST and Tyczyn communities have launched new initiatives such as environment friendly production, recreation centres and socially important services. Unemployment in these regions has significantly decreased due to creation of new businesses and new jobs.
2. The services offered, initially basic telephony, must be affordable to residents and businesses in the communities. Put another way, the community must in the long term be in a position to support the cost of the services.

3. To establish thriving cooperatives, a favourable legal environment must be created. Official policy should support and promote cooperative business models in providing telecommunications services.
4. Public officials, local and national political leaders should be provided with training and on-site visits. Policy makers should be made cognizant of all the benefits of multi-provider system and cooperative models.
5. Cooperative employees, managers and other staff, should be assisted both in legislative and technical issues, such as interconnection and revenue sharing agreements, and in start-up and on-going management and technical problems.
6. The Polish cooperative experience does not offer a universal solution for every rural community. Changing telecommunications technology and varying business conditions mean that no single model of cooperative development works in all cases. In this case local conditions stipulated particular project design and implementation strategy. WIST and Tyczyn were formed under favourable conditions such as the existence of village telephone committees, strong local and national political leadership, facilitating legal environment, adequate financing and technical external assistance. In each development situation, it is critical to carefully assess the conditions, and to deploy resources and strategy that respond to these. Different models of cooperative/community-based telecommunications systems and resources should be explored, developed and implemented.

In addition to variants of U.S.-style cooperatives (as in Poland), other approaches are:

- Second-level cooperatives in which businesses and communities are member-owners;
- Community-based, single use (e.g., business-oriented) telecentres;
- Mixed-use community-based telecentres (e.g., that provide business-oriented services and whose resources are also available to address other community needs, such as health).

A few concluding words.

Finding the right people to devote their skills and energies to the enterprise is the single most important factor in the success of local telecommunication cooperatives. This principle applies to local economic development in general since motivated and active people, especially local residents interested in their own welfare, form the basis for success. “People are everything and money will be found”.

---

[1]This Report draws heavily on, and was inspired by, an NTCA Report of August 2003: Cooperative Development Case Studies: WIST and Tyczyn Telecommunications Cooperatives in Poland. See www.ntca.org

# Case Study 2:
# Community Telecommunication Cooperatives in Argentina: The case of TELPIN

Susana Finquelievich & Graciela Kisilevsky

LINKS

## Report Summary

Located in the south-east of the province of Buenos Aires, the city of Pinamar was conceived as a tourism development project. Between 1949 and 1953, groups of Italian immigrants settled in Pinamar. They carried with them a strong community conscience, as well as the European experience of cooperative organisations. As Pinamar developed into a fashionable seaside city, there was an urgent need for communication to support the growing tourism industry. In 1962, a group of 82 neighbors, created the Pinamar Telephone Cooperative (Cooperativa Telefónica de Pinamar, TELPIN Ltda.), one of the first telephone service cooperatives in Argentina. The cooperative's goal is to provide quality telecommunications services, without losing its community sense.

As of late 2004, TELPIN has approximately 18,000 lines installed and 720 digital links with the rest of the world.[1] Its internet service, TELPINet, was launched in 1998 and now TELPIN has 1,120 broadband connections and 3,500 area dial-up connections. 50 of the broadband connections are offered free of charge to Pinamar Schools, the public library, the volunteer fire department and other community institutions. Two hundred and twenty dial-up connections are also provided free to individuals with physical impairments. Revenue from telecommunication services, including the dramatic increase in national and international long-distance revenue during the tourist season, generate benefits which are invested in improved services or returned to shareholders/community members as discounts (e.g. TELPIN's subscribers do not pay subscription fees during the winter).

TELPIN is considered the most successful and innovative telecommunications cooperative in Argentina. A number of factors have been key to its success:

- the presence of local champions willing to offer their expertise and their knowledge;

- the balance of community and enterprise-oriented management styles and objectives and community participation in major management decisions, e.g. on investment in new technologies;
- the quality and responsibility of human resources and the emphasis on ongoing training of staff;
- the willingness to introduce technological and organisational innovations;
- the use of cutting edge technology;
- the quality and pricing of services;
- its superiour customer relations.

All of these elements earned them the support and commitment of the community, which is itself a key reason for TELPIN's sustainability.

The benefits to the community derived from TELPIN include: a complete range of telephone services at lower cost than that offered by the private sector, internet at affordable prices, full free telecommunication services for the community's institutions, innovative technology, and generation of local employment. The community owns and finances the cooperative, and controls its finances and investments.

## 1. The General Context

A telephone and internet cooperative is defined as an autonomous association of individuals who decide to join forces to resolve common economic, social, and cultural needs and aspirations through a jointly owned and democratically managed enterprise. In Argentina, community telecommunication cooperatives (CTCs) were first created in the 1960s by community members to fill in for the State monopoly that was unable to provide telephone service in remote areas. In 1989, the State telephone enterprise was privatised but the cooperatives continue to operate and to expand to new rural and low-income communities that do not interest the large private telephone enterprises.

Communities must be connected to telecommunication infrastructures in order to access information, knowledge, services, and economic opportunities for development. Hence, groups of neighbours in diverse communities decided to create autonomous, self-sustainable telephone cooperatives, where the members would have democratic control over the management, as well as an equitable economic participation. These cooperatives grew and introduced new technologies such as the internet to supply their members with new services at affordable costs.

> ... In many cases, mainly in small communities, if inhabitants don't have access to telecommunications through a cooperative, it's impossible to be communicated. The private sector will not invest in non profitable communities: it's the philosophy of the capitalist world (Source: Editorial Journal EN LINEA N°. 59 July / August 2004 - Authors' translation.)

In Argentina, there are two main Cooperatives Federations: FECOTEL (Federacion de Cooperativas de Telecomunicaciones Ltda.), and FECOSUR (Federación de Coperativas del

Servicio Telefónico de la Zona Sur). Between the two they represent 350 telecommunications cooperatives. FECOTEL, the largest, is 40 years old. The cooperative sector serves more than 2.5 million Argentinians - approximately 8% of the country's population - with 600.000 lines, bills approximately around US$100 million per year, and employs 3,500 individuals.

### *1.1 Legal Status of the Cooperatives*

Beginning in 1959 and continuing until privatisation in 1989, telephone services in Argentina were managed by ENTel, the state telephone monopoly, which provided service to profitable urban areas, and avoided the expense and complexities of thinly populated rural areas. A special regulation allowed the creation of telephone cooperatives, non-profit organizations qualified to provide telephone services in their areas, if the areas were declared non-profitable by ENTel. The first cooperative was born in San Genaro, Santa Fe, in 1959. In 1960, a State Decree authorized ENTel to build telephone exchanges for cooperatives, as the later required. The cooperatives retained their concessions when ENTel was finally privatized in 1989.

As with all cooperative enterprises, telecom coops are governed by national legislation that defines them as 'social enterprise enterprises' as distinct from traditional, market-oriented enterprises.

### *1.2 Funding*

Cooperatives main investment funds come primarily from their members or shareholders, including local enterprises interested in having local telecommunications services.

While some cooperatives borrow from national or provincial banks, representatives interviewed for this study reported that it was difficult for coops to get significant loans.

> It's difficult to have access to reasonable credits: banks always grant cooperatives soft credits, social credits, so these loans pass as philanthropic loans made to support good works in the community. (…) We have correct financial balances, and we are audited each three months by an international consultant, Deloitte, but even so we cannot depend on bank credits. – TELPIN´s Manager, Eng. Juan Santoianni

One of the problems affecting cooperatives is their tax status. During the military dictatorship from 1976 to 1983 the government took a number of measures against the cooperative movement. One of these was to eliminate the tax benefits that cooperatives had enjoyed as not-for-profit enterprises that reinvest surpluses rather than distribute them. The return of democracy was not accompanied by a return of the tax exempt status previously enjoyed by cooperatives, which remains one of the sector's central demands.

> Cooperatives don't care about profits, providing they don't lose money, but they do care about the services they provide the community. For private enterprises, the principal goal is to get economic benefits. At present, some cooperatives must create partnerships with commercial enterprises, in order to get funds, to ask for licenses, or because cooperatives don't have enough money to invest in innovations. This is a recent trend. Personally, I think it's dangerous, because it may distort the cooperative sense. – Ricardo Bacalor, MICROTROL Director, provider for cooperatives, October 2004. The translation is the authors'.

### *1.3 Ethical Considerations*

FECOTEL (2004) is strict regarding cooperatives' ethical behavior. Its associates must "always and in all their actions, respect the cooperative principles: open and voluntary membership; members democratic control of the organization; members economic participation; autonomy and independence; education, permanent training, and information; cooperation between cooperatives; and engagement towards the community".

Associate cooperatives are "to work in defense of the cooperative movement, and particularly, of the telecommunications cooperative movement, represented by FECOTEL; Cooperatives must observe cooperative values, based on mutual help, responsibility, democracy, equality, equity, and solidarity…. They must not act in the pursuit of hegemonic or dominant positions". Regarding the relations between cooperatives associated to FECOTEL, they are expected to "celebrate agreements between them, with the purposes to the construction of cooperative networks though the integration of entities belonging to the social economy, in order to improve and /or incorporate new services, and working toward the implementation of universal service". They must also "Promote cooperative practice, in order to achieve the best services at the lowest possible costs, avoiding unnecessary intermediations, and searching to incorporate the highest possible number of users to cooperative services".

### *1.4 Technological Update and Services Provided*

The degree to which CTC's make use of the latest technological innovations varies according to their particular community's needs and economic possibilities. Their autonomy, as well as – in most cases – their small size makes them flexible enough to adopt new technologies at a relatively fast pace. Many of them are now using IP data networks, and they are beginning to carry voice over IP, although traditional digital commutation centrals will be in service for many years[2]. They are also using wireless IP for low-populated areas or for rural areas yet not reached by copper wire networks.

Some cooperatives are using corDECT, a wireless local loop technology developed at the Indian Institute of Technology and based on the Digital Enhanced Cordless Telecommunications (DECT) standard. CorDECT was designed to provide cost-effective, simultaneous high-quality voice and data connectivity in rural areas. The cooperatives which use this new technology are: Batán, Bavio (Gral Mansilla), Del Oso (Chubut), Bolsón (Neuquén), Silvio Perico (Córdoba). Others from the north of Santa Fe are planning to introduce the tenology. (Source: interview with Mr. Mariano De Lew, Buenos Aires corDECT provider, interviewed in October 2004).

CTCs provide telephone and internet services, via dial-up and/or broadband (ADSL or WiFi) connections, as well as IP telephony, to their communities at significantly lower costs than the large private firms (Telefónica and Telecom). Most of them offer also free community services, such as courses on information and communication technologies (ICTs), free internet access for public schools, libraries, and the public facilities (police stations, hospitals, etc.).

According to authorities from the national broadcast regulator, COMFER, (Comité Federal de Radiodifusión), Argentina's proposed new broadcast legislation will permit coopera-

tives to supply cable TV. CTCs are keen to offer a package including cable TV, telephony and internet access for a monthly cost of US$16.

### *1.5 National Initiatives*

On the national level, some 300 electricity and telephone cooperatives have decided to join forces to provide mobile phone services from 2006 onwards[3]. The project will begin offering service in the province of Buenos Aires, Santa Fe's central and southern areas, and southern Cordoba. The exchange and a transmission network will be used for the cellular network as well as for local interconnections with all the served towns. The mobile service's business plan foresees low charges for local calls and for calls within the network. The potential market for the first phase is 200,000 lines. A planned national expansion estimates that the service could gain 1.100.000 users. (Source: EN LINEA N°. 59 July / August 2004).

### *1.6 The Near Future*

Argentina's community telecommunications cooperatives are enjoying the best of times in 2004. They provide 600,000 telephone lines, new broadcast legislation will reportedly allow them to offer cable television as well as broadcast services, they are about to launch a mobile telephone network, they are shareholders in Argentina's Nahuel 2 satellite, due to be launched in 2005, and, for the first time in many years the national government is a strong supporter of the cooperative movement. The combination of low-cost high-quality local service plus a high level of national coordination has made CTCs Argentina's third telecommunication provider.

## 2. A Community Telecom Cooperative by the Sea

### *2.1 Background and Context*

Located in the south-east of the province of Buenos Aires, Pinamar is located in an area known *Montes Grandes de Juancho*. Originally belonging to four *estancias* or ranches -"Martín García", "La Invernada", "El Rosario" and "Manantiales"-, the twenty-five kilometers of beaches and sand dunes were settled in 1907. In 1908, the Southern Railways (Ferrocarriles del Sud) built a small station, named Juancho, which would later receive the flow of tourists that arrived to the cold and windy seaside.

That year, the Belgian entrepreneurs Fernando Robette and Agustín Poli arrived in the area with the goal of building a beach town on the Atlantic coast, similar to their native town, Ostende. They bought the sandy land, and conceived a tourism development project that included hotels, beaches, a railway station, public buildings, avenues, lands for the cemetery, and a wide central avenue. In 1912 the Rambla Sur (South Avenue) was started, and the Thermas Hotel (now the Hotel Ostende) was built. Successive urbanization projects succeeded in creating a ring of small towns –Cariló, Ostende, Valeria del Mar, Montecarloand in reenforcing the sand dunes with pine plantations, generating the beach name: Pinamar, joing the words for pine and the sea.

Between 1949 and 1953, groups of Italian immigrants, hard-working settled in Pinamar. They carried with them a strong community conscience, as well as the European experience of cooperative organisations. In that period the community was organized, and local clubs and institutions, including a primary school and a public health unit, later transformed into a health cooperative (Cooperativa Unidad Sanitaria Pinamar Ltda.). In 1948, a group of neighbours began meeting, to consider the cooperative provision of public services; the next year, they created the Pinamar Water and Light Cooperative (CALP, http://www.calp.com.ar/Historia.htm ) which still serves the district with electricity, water and sanitation infrastructures and services.

In 1962, Mr. Enrique T. Susini [4], along with a group of 82 neighbors, created the Pinamar Telephone Cooperative (Cooperativa Telefónica de Pinamar, TELPIN Ltda.), one of the first telephone service cooperatives in the country.

On July 1, 1978, the Pinamar Urban Area -Municipio Urbano de Pinamar- was officially estalished. It now includes the towns of Montecarlo, Pinamar, Mar de Ostende, Ostende, Valeria del Mar, and Cariló, and has become a regional services centre linked mainly to the tourism industry. It covers a total area of 6,720 Hectares, and has a seafront of 21 kilometers, including an urbanized sector along 12 kilometers of the coast. According to the 2001 National Census, Pinamar has 20,666 permanent inhabitants, although it receives nearly a million visitors in the summer months. Thirty-nine percent of the inhabitants are economically active: of these, 64 percent have steady jobs, while the rest are unemployed or underemployed[5]. Twelve percent of the employed inhabitants work for the public sector, including the municipality and public schools. Regarding employment posts in the private sector, members of the local government suggested that they belong mainly to the hotels and restaurants sector. At 99 percent, the literacy rate is among the highest in the country[6].

### *2.2 Origins and Launch*

As Pinamar developed into a fashionable seaside city, there was an urgent need for communication to support the growing tourism industry. However, the town was too new, and the year-round population too small to be of interest to ENTEL. On November 14, 1962, TELPIN was created by Dr. Enrique T. Susini, together with a group of 82 Pinamar residents, most of them founders of the local community. A few months later, on January 1, 1963 TELPIN launched its telephone service, providing 92 lines to the same number of homes.

In 1980 the traditional telephone central was replaced by a Japanese digital exchange, the first to be installed in the country. This innovation allowed the cooperative to offer to its shareholders services (wake up call, voice mail, conferences, etc.) that only a decade later, and after the privatization of the Empresa Nacional de Telecomunicaciones (ENTEL), were provided in the rest of the country. In 1982, TELPIN started to send detailed phone bills to its shareholders, without additional costs. In 1984, it was the first company to offer international direct dialing. In 1993, TELPIN again upgraded its exchange, preparing the ground for the communication changes that are taking place.

> Since the 1980s, I have spent a few months each year in Pinamar. I noticed right away that the telephone worked much better than in Buenos Aires, and that it was extremely easy to get a phone line: when in Buenos Aires it took months of painstaking paperwork, in Pinamar it took only a couple of days. In those times in which it was incredibly difficult to get a phone line in Buenos Aires, and when the State telephone network worked so bad, businessmen used to come to Pinamar on week days, and make all their national and international phone calls here. It was much easier and cheaper. Of course, they also stayed the weekends, which was good for the general business! - Amelia Ozaeta, part-time Pinamar inhabitant, former restaurant owner)

As of late 2004, TELPIN has installed some 18,000 lines, as well as 720 digital links with the rest of the world[7]. Its internet service, TELPINet, was launched in 1998 and now TELPIN has 1120 broadband connections, and other 3.500 area dial-up connections. Fifty of the broadband connections are free, for Pinamar Schools, the public library, the fire department and other community institutions. Two hundred and twenty area dial-up connections are also free: they were granted to individuals with physical impairments, among other users.

The cooperative's goal is to earn a distinguished place as telecommunications services provider, without losing its community sense.

These and other services, as well as the consumption increase during the tourist season, generate benefits which return to the shareholders as discounts (e.g. TELPIN's subscribers do not pay subscription fees during the winter) or to the community in general (e.g. *Internet Educativa*, discussed later in this paper).

> Being a Cooperative, TELPIN invests its benefits in the community. For example, in the years in which the cooperative makes a surplus, users don't pay any minimum charge. We don't pay it either during the off-season months. Local calls are unlimited, which makes easy to use the Internet: you can be connected for as long as you want for a fixed monthly fee. - Amelia Ozaeta, part-time Pinamar inhabitant.

**TELPIN´S headquarters**

While Pinamar's cooperative is atypical as its development was supported by the seasonal revenues of an elite public –tourists– it is also true that the telephone service itself helped to attract upper and middle class tourists, giving Pinamar a *competitive advantage in telecommunications.* As highlighted in the case of the businessmen who traveled to Pinamar from Buenos Aires to make use of its superior phone service, the tourists that chose Pinamar needed good communications when they were away from home and business, and other tourist areas did not offer them.

Table 7 – **Growth in TELPIN's telephone lines 1981-2004**

| Year | No. telephone lines |
|---|---|
| 2004 | 18.000 |
| 1999/2000 | 17.710 |
| 1998/1999 | 15.900 |
| 1997/1998 | 14.782 |
| 1995/1996 | 11.185 |
| 1993/1994 | 9.500 |
| 1991/1992 | 6.383 |
| 1989/1990 | 5.031 |
| 1987/1988 | 4.630 |
| 1985/1986 | 4.040 |
| 1983/1984 | 2.895 |
| 1981/1982 | 2.033 |

Source: Pinamar's House in Buenos Aires and Cooperative TELPIN

### *2.3 Evolution of the Number of Users*

TELPIN has 18.000 lines users, having reached a point of market saturation in the city of Pinamar. Each telephone line represents one share. In the case of multiple phone lines in one place, such as hotels, the Cooperative considers multiple shares, but their owners are entitled to only one vote in the Cooperative's assemblies and meetings, following the rules established by the Argentine cooperatives.

As of November 2004, TELPIN had 1,120 broadband connections (50 of them are free, for Pinamar Schools, the public library, the fire department and other community institutions), and other 3,500 area dial-up connections (220 of them are free: they were granted to individuals with physical impairments, among other users).

### *2.4 Expansion Policies and New Market Strategies*

As mentioned earlier, in Argentina the National Telecommunications Enterprise - Empresa Nacional de Telecomunicaciones (ENTEL) – managed the whole country's telephone network, except for the areas served by cooperatives and small local enterprises. After its privatisation in 1990, the government divided the telephone network's administration: with the French Telecom operating in the northern half of the country, Telefónica de España in the southern half. The city of Buenos Aires, where much of Argentina's economic activity is concentrated, was also split in two, with telephone service in the northern neighbourhoods managed by Telecom, and the southern neighbourhoods, by Telefónica.

After privatization, telephone market showed substantial changes. Digitalisation increased from 13% in 1990 to 100% in 1999. In the same period, the number of lines grew by 250%, which resulted in an additional 5 million subscribers. In a much more competitive market, TELPIN kept its local monopoly in local services, as well as in long-distance services, and even the large enterprise Telefónica de Argentina could not take away its subscribers[8], even in the moment in which the State deregulated the telephone market. This fact can be explained mainly because the Cooperative had already provided its users with a service level and a loyalty-reward policy that was equal or superior to the one proposed by Telefonica. Besides, the special services offered by TELPIN –free local calls, important discounts in subscription fees during low season months, a user-oriented attention policy- helped to keep the subscribers in "their" cooperative.

> One of the main differences I perceive between TELPIN and Telefonica is the quality of the over-the-counter attention. Not only are TELPIN´s employees always kind and serviceable with the public: they are also clearly engaged with the Cooperative. You can feel that they are proud to work for the community. - Amelia Ozaeta, part-time Pinamar resident

The levels of pluriannual growth show that during the period 1990-1999, TELPIN's subscribers, far from migrating to other providers, increased 5031 to 17.710: a 352% growth rate, much higher than Telefónica and Telecom's growth rate in the rest of the country[9].

It should be pointed out that while different cooperatives have different tariffs, they are generally less expensive cheaper than private telecommunications enterprises. In TELPIN's case, members pay a monthly fee of approximately US$4, including taxes for unlimited local calls. National long distance calls of less than 110 kilometres cost less than US$0.01

per minute and over 110 kilometres cost US$0.024 per minute. One of the two large private companies, TELECOM, charges a basic monthly fee of US$5.80, 45% higher than TELPIN's, and *it charges for local calls*.

### *2.5 Evolution of the Business Model and the User Profile*

When TELPIN was created, it had to get a license from ENTel. The Cooperative was considered, from its conception onwards, as a community cooperative, with strong social duties. However, the business policy is to act as efficiently as a private enterprise. Its sources of revenue are the 18,000 associates' quotas, paid punctually every month plus the revenue from national and international long distance, which increases significantly during the tourist season and on weekends.

TELPIN is managed by a Management Council, integrated by a President (Eng. Jorge Shaw), a Vice-President, a Secretary, an under Secretary, a Treasurer; five senior Counselors, and four deputy Counselors. According to TELPIN's general manager, Juan Santoianni, the organization has adopted an entrepreneurial structure, with a general management and a number of area managers who manage given sectors rather than lines of products.

The champions' decisive role becomes evident in TELPIN. All the important initiatives were originated by a small group of enthusiasts like Santoianni, the General Manager, Claudia Gomez Costa, Director of TELPIN Educa, and the president of the cooperative, Dr. Eduardo Shaw.

TELPIN also invests significantly in ongoing training of its staff. Juan Santoianni explains:

> A telecommunications enterprise must be fully informed about the market tendencies, and training is a key issue in this matter. We must foresee where telecommunications are heading. The internet is gaining strength, and the next issue will be telecommunication services convergence, plus news services and contents (…) We don't believe that cooperativism goes against entrepreneurial best practices. I would say that a poor understanding of cooperativism is the one that accentuates only its solidarity role, without providing good, innovative, efficient services to the community. We're a telecommunications cooperative: We don't fund a soup kitchen, but we provide the best democratic communications services we can.

TELPIN has also been able to capitalise on its members' experience in a way that may not be available for other communities – as tourist centre that attracts many temporary residents from upper-middle and middle classes, a number of the cooperatives shareholders are themselves entrepreneurs or professionals and the cooperative has been able to incorporate their expertise and advice into its management.

> We've been lucky: some important entrepreneurs, who don't live in Pinamar the whole year, participate in the cooperative as ad-honorem counselors, engaged with the community. They contribute their know-how and their expertise. - Juan Santoianni, TELPIN general manager

The cooperative has special payment plans for poor users and those with financial difficulties. Foe example, seasonal workers pay only US$2.50 per month for a phone line with unlimited local calls, less than they would pay for bus transportation if they had to travel in the area to search for work. Additionally, for months when the cooperative's bal-

ance is particularly plentiful and in the winter, a discount is granted to all the users. TELPIN has also implemented a cross subsidies for certain services, subsidisingsubsidizing local calls with revenue from more lucrative national and international long service.

> Before we reached the saturation point (telephone lines in all permanent residents' homes), we had free public telephones, by placing telephones on a tag pole, with no cost use. Today the only ones that use these public phones (now paying) are the tourists. However, most of the tourists have telephones in the houses or apartments they rent. - Juan Santoianni, TELPIN General Manager

By 1999, Cariló was the only town in Pinamar which was not served by TELPIN, but by the Spanish enterprise Telefónica, which had 800 lines in the community. At the time, only Telefónica and Telecom were able to compete. TELPIN established a separate company which entered into an alliance with Telecom. The agreement between TELPIN and TELECOM establishes that the partners provide jointly offer long distance and local telephony services outside the Cooperative's original area. The new company now has 1,200 lines in Cariló and is extending its services to other communities in General Madariaga, and to the cities of San Clemente, Santa Teresita and Necochea, reaching 10.000 new clients.

The internet also plays an important role in the cooperative's financial sustainability. In 1998 the cooperative established a connection to the internet backbone and bought equipment enabling the simultaneous connection of 60 modems. For the first three months they offered members unlimited free dialup internet access after which they charged a monthly subscription. By the end of the free trial period the network had reached saturation level, and TELPIN had to buy more equipment. The cooperative's scheme differed from other ISPs, which usually use one modem for each 20 users, charging for each minute of connection. TELPIN had one modem each 5 users, and a low rate for unlimited access. As a result, the service quickly attained a critical mass of users and by 1998 was generating a surplus, even after counting the amortizations for the acquired equipment.

The cooperative's shareholders can have a second telephone line for a symbolic monthly cost of one peso, about US$0.33. Since local calls are free, the only cost they must pay to have unlimited dialup internet access is a monthly subscription fee, currently US$12 (including taxes). As of November 2004, TELPIN has 4620 broadband connections, including all the towns served by TELPIN. ADSL The cooperative's shareholders can have a second telephone line for a symbolic connections are offered at about US$24 for 256 kbps and US$36 for 512 kbps and webhosting costs US$7 per month.

TELPIN provides free internet access to all of Pinamar's schools, donated eight computers with free access in the public library, and supplied free equipment and access to the local voluntary firemen's quarters.

From 1990 onwards, TELPIN improved its management and explored the production of new goods and services:

> TELPIN was a bureaucratic organization: you came to ask for a service and you had to complete quadruplicate forms. There was a technological capacity to increase the services, but there was also an administrative incapacity to sell services as fast as they were required.

> During that time, all that was changed: we created the Systems Area, because there were no systems for small cooperatives; only for large enterprises, as Telecom. Systems were also valued in millions. Therefore, we developed our own technological solutions, which afterwards were also useful for other Coops. (…) For example, we have sold equipment for small telephone exchanges – previously supplied only by Siemens – to almost 80 small cooperatives. We have signed an agreement with Siemens: we produce the equipment; Siemens buys it, and commercialises it. - Juan Santoianni, TELPIN General Manager

Six smaller cooperatives have bought the whole of TELPIN's organisational, managerial, and administrative system:

> It's not just a system: it's a whole working philosophy. The system has been developed to work online, as following: for example, when you buy an extra service, as call-waiting, the service is connected to your line instantly, without any delays, without going through paperwork in different departments, nor checking if your payments are updated. You are proposed a payment plan, and you pay the first installment, adjusted to the user's economic possibilities. House owners that rent their houses for the summer can see online the telephone consumption made by their tenants, and be paid by them immediately. This does not only help our neighbors, but also our growth. - Juan Santoianni, TELPIN General Manager

### *2.6 The Community's Role*

TELPIN operates according to established principles and practices of the cooperative movement, ensuring transparency and enabling meaningful member participation. It is one of the largest businesses in the community, and it is owned, financed and overseen by the community.

TELPIN's ultimate authority is its annual General Assembly, open to all members of the cooperative. The General Assembly elects a volunteer Council, which oversees the operations of the cooperative. In practice the general assemblies are not controversial and on all but one occasion a single slate has been presented for endorsement. This is not to say that all members of the Council agree on all issues, rather it reflects the cooperative's policy of incorporating dissent within the Council. In practice a disproportionate number of the Council members are local entrepreneurs. However, according to TELPIN's General Manager this does not mean that the interests of the business community are over-represented as the Council is considered representative of the community and the presence of entrepreneurs on gives the cooperative access to necessary expertise that might otherwise be overly expensive or unavailable.

> Being a member of TELPIN's Council is considered a source of pride in town (…) We have been lucky to have access to some outstanding entrepreneurs' know-how. For them, making the cooperative work is a pleasure and a hobby, given that no Council member receives any kind of payment. - Juan Santoianni, Manager

The cooperative's transparency (monthly financial statements and periodical management reports are available to all members) ensure that its members can be aware of and express their opinions on management and direction of the enterprise. The resulting member/customer loyalty has been a key factor for the Cooperative's self-sustainability.

An anecdote illustrates the users' fidelity to TELPIN: In 1999, Telefónica asked the National Communications Commission (Comisión Nacional de Comunicaciones, CNC) to open up Pinamar area for long distance services competition. Telefónica mobilised seven vans, equipped with four employees each, to rake the area, calling on each house and apartment to sign people up to its own long distance services. At the end of two weeks, during which they tried to mislead people by claiming that TELPIN was not able to provide long-distance telephone service, they had managed to get only fifteen contracts. Fourteen of these returned to TELPIN when they learned that the cooperative did in fact offer long-distance service. Only one user kept his Telefónica line "to give it a try".

## 3. A Cooperative for Information Society Education

As already mentioned, TELPIN provides free internet access to Pinamar's public schools and libraries. However, the cooperative's most outstanding contribution to education is *Internet Educativa*[10] (Educational Internet). Launched in 1999 the programme provides ICT training for teachers, in addition to computers, connectivity and technical services. Orginally intended as a single introductory course on use of PC use in the classroom, the programme has added successive modules covering pedagogical practices, information management, website design and so on. The goal is to train teachers in the adequate use of ICTs in education, so the courses don't focus on the traditional tools (Word, Excel, etc.) but on tools and practices that allow both teachers and students to appropriate the new cyber territory, navigate through it, integrate virtual networks, and incorporate their own content. Educators are equipped with the basic tools that allow them to acquire the cultural capital they need in the information society, and in turn, make their own contributions to the new society.

> This is the only case in Latin America with these characteristics, and with teachers that have been continually trained over the past since six years. We're speaking of teachers who did not know how to turn a computer on, and who are now working in collaborative networks, and generating marvellous projects. (…) We have made significant achievements. For example, we're part of the Federal Network of Continuing Educational Training (Red Federal de Formación Docente Continua), which formally accredits the courses, an additional encouragement for teachers…. Now several provinces and cities in the country have invited us to study how to implement Internet Educativa there. - Claudia Gomez Costa, Director of TELPIN Educa.

At present, all of Pinamar District Schools have their own websites, built by their own teachers and students. Leaving aside esthetic or contents considerations, it is interesting to note the diverse identities reflected in each of the websites, and the excellent use of informatics tools: besides text, most of them use images, sound, and videos. In Pinamar, five kindergartens, eight primary schools, two Secondary schools, one physical Education Center, three education management institutions, and sixteen community organizations[11], are part of *Internet Educativa*. All of them are supplied with training, computers, internet connections, server and technical services.

TELPIN has not limited its educational actions to Pinamar: in the year 2000, it extended *Internet Educativa* to the nearby General Madariaga District, and in 2001, to the city of Trenque Lauquen, in the La Pampa Province. TELPIN's achievements eventually reached the National Ministry of Education, which decided to implement the Course: "Appropriate Use of the Internet in Education" for 1000 Trenque Lauquen teachers.

In August 2001, the course was chosen by the Fundación Equidad[12] to be implemented in the Province of Neuquén, Patagonia, within a school modernisation programme funded by the oil company Repsol-YPF. Two TELPIN training teams traveled to the course's headquarters: one of them San Cabao - Junín de los Andes - (southern area) and another to Manzano Amargo (northern area), training 49 teachers from 19 remote schools.[13] From September to December of the same year, Equidad and Repsol-YPF funded a course for urban areas. Teachers from 90 schools in the towns of Neuquén, Cutral-Có, Plaza Huincul, Rincón de los Sauces, Zapala and San Martín de los Andes, were trained.

In 2002, TELPIN Educa inaugurated its new headquarters in the "Manuel Belgrano" public library. A room with 20 networked computers serves both as a laboratory used by FUPIN[14] in its Technical Degree in Informatics, as well as by TELPIN Educa, for its courses. In May 2002, alter a year of research and development, TELPIN Educa launched its virtual platform for virtual learning, called "TELPIN Educa Virtual Educational Campus"[15] It's a virtual tool for on line training directed at teachers and professors all over the country.


The following year the experience was extended to the Provinces of Santa Cruz and Chubut. As of October 2004, more than 2000 teachers and professors in Buenos Aires, Neuquén, Chubut and Santa Cruz have been trained to use information and communication technologies for educational purposes.

## 4. Analysis and Conclusions

Community telecommunication cooperatives are accomplishing a social role unparalleled in Latin American countries[16], not only as service providers, but also as employment generators. In our research we have identified the following nine advantages of cooperatives:

1. They are the only telecommunications providers with an entirely Argentine capital base (local communities' capital). The members of FECOTEL, which represents 250 of Argentina's telecom cooperatives, manage around US$3 billion of community assets. The initial capital is from member contributions. Profits are not exported, but used in the community to enhance services and reduce costs

2. They are social centres. They provide local content and enhance community activities.
3. They are a source of employment for skilled and unskilled labour (3,500 people work in CTCs in Argentina).
4. They provide training in the diverse uses of ICTs.
5. The successive economic crises suffered by Argentina were not used as excuses to fire employees.
6. They are solidarity economy enterprises; therefore, their economic surplus is invested in other community projects, contributing to the local and regional economy.
7. They provide high-quality advanced telecom services, including low-cost internet access.
8. Local capital does not migrate to foreign countries. CTCs encourage local economic development and improved standards of living in the community.
9. They are agents of democratization and social appropriation of telecommunication infrastructures.

> "The cooperative movement has a very important characteristic: cooperatives belong to their cities, towns, communities, they are part of them, of their economy, their social life. Their elected councils must be careful with their actions and investments, because the community has direct control over them. In smaller communities inhabitants know each other; this implies a great deal of social control. The cooperative movement is doing a great work in Argentina. Some time ago, under the influences of past national governments, you could find some corruption, but at present it has been changed: cooperatives are undergoing an improvement process. (...) The telecommunications cooperatives movement is growing, while they are also providing other services to the communities: they're not just supplying data transmission, telephony, and television, but also electricity, water and sanitation, burial services, briefly, all the social services needed by communities. Somehow, some of these services will support the others. - Ricardo Bacalor, MICROTROL Director, supplier for telecom cooperatives, October 2004. Authors' translation.

Within these cooperatives, the case of TELPIN is paradigmatic: it is considered to be the most successful and innovative telecommunications cooperative in the country. Its creation had some auspicious circumstances, not easily replicable in other experiences: among its 80 initial associates there were some of the most successful entrepreneurs in the area; a local enterprise, Pinamar, S.A., made a substantial financial contribution when the cooperative was founded; and the nature of the local economy, related to tourist activities that demanded communications with the world, meant that residents were quick to understood and support the initiative.

However, these were not the only key factors contributing to its success: the main factors are the existence of passionate, lucid champions willing to offer their expertise and their knowledge to make TELPIN the most innovative cooperative in the country; the management, simultaneously community and enterprise-oriented, together with the constant updating and training of the management staff; the willingness to venture into technological and organizational innovations, and most of all, the quality and responsibility of the human resources.

**Box 1 – Some lessons learned**

Community Telecommunications Cooperatives are potential tools to democratise communications, since the community becomes the owner of its own communications infrastructure.

Commitment to the community is fundamental to the success of cooperatives. This implies continuous efforts to provide new technologies, managerial efficiency, better and less expensive services, and superior customer services.

In order to be replicable in other Argentina regions, or in developing countries, CTCs will require: adequate legislation that allows them to provide service to communities overlooked by other telecom operators and eventually to compete with them; a favorable tax status; a talented, preferably professional management, responsibly open to managerial and technological innovations.

The launching of CTCs requires the community to make serious financial contributions –not only the potential users, but also local enterprises– and from National or provincial Banks soft loans. Low-income communities may have difficulties in implementing CTCs, unless they can negotiate investments from Banks or international organizations.

The involvement of lucid and enthusiastic local champions is essential for the success of CTCs initiatives, not only for the first stages, but also for long-term sustainability.

Cooperatives can have better results, either when negotiating with governments or with private enterprises, if they can form national networks or federations.

Capacity building is essential for long-term accomplishment: constant training of the cooperatives' staff is a key factor for success.

Communities also need training to use the advantages of Information Society: CTCs can play a role as community educators.

TELPIN's success also stems from its use of cutting edge technology, the quality and pricing of its service, and its superiour customer services. All of these elements earned them the support and commitment of the community.

The benefits to the community derived from TELPIN are include: full telephone coverage at lower cost than that offered by the private sector, internet at affordable prices, full free telecommunication services for the community's institutions, innovative technology, and generation of local employment. The community owns and finances the cooperative, and controls its finances and investments. TELPIN investments in technology have the full community's support and the community's commitment to the cooperative has been a key reason for its sustainability.

Moreover, *TELPIN Educa*, has achieved significant results and made a remarkable social and cultural impact on the community, not only in Pinamar, but also in other regions in the country.

The main innovations involved in the general TELPIN initiative were mostly managerial and technological. From the managerial point of view, the fact of using the most expensive services, such as international telephone calls, to subsidize the most popular ones, such as local calls, the concept of managing the cooperative as an enterprise, while keeping its social values and the quality of the human resources involved ensured its sustainability

and continuity. From the technological point of view, the cooperative was a pioneer from the beginning, introducing technologies and services much earlier than the large, private telecommunications enterprises.

---

[1] Source: TELPI N, http://www.telpin.com.ar

[2] http://www.cicomra.org.ar/eventosycursos/Eca2003/Presentacion%20A%20Maccio.pdf

[3] http://www.lacapital.com.ar/2004/07/17/economia/noticia_117081.shtml

[4] Dr. Enrique Susini, together with a group of friends, had organized the first radio emission in Argentina. On August 26, 1920, an aria from Wagner's opera Parsifal was transmitted from the roof of the Colon Theater, in Buenos Aires. Dr. Susini and his friends thought that *"... this marvelous invention may be the most extraordinary vehicle for cultural dissemination"*. Dr. Susini, one of TELPIN founders, believed that the telephone had the same social role. The difference between both experiences is that the radio succumbed to commercial uses. However, Telpin has managed to keep its "successful social model" during its history, without renouncing to the social role of telephone and Internet services.

[5] Sources: 2001 National Census, and Department of Commerce, Municipality of Pinamar, 2000.

[6] Source: Ministry of Interior, Secretariat of municipal Affaire, consulted in September, 2004, http://www.mininterior.gov.ar/municipales/busqueda/amplia_info.asp?ID=BUE097

[7] Source: TELPIN, http://www.telpin.com.ar

[8] The large Spanish enterprise tried to attract users from Pinamar, through a two-week intensive publicity campaign, but it only convinced one user. Source: Mr. Juan Santoianni, TELPIN.

[9] Source: Schiavo et al., 2002

[10] www.telpin.com.ar /itelpineduca

[11] See http://www.telpin.com.ar/InternetEducativa/LP/SEP.htm, consulted in September 2004. In this page, there are links to the educational institutions websites.

[12] http://www.equidad.org/

[13] Read a personal account of the courses at http://www.telpin.com.ar/interneteducativa/PATAGONIA/

[14] FUPIN is the Foundation For Pinamar University, Fundación pro Universidad de Pinamar, http://www.telpin.com.ar/InternetEducativa/Instituciones/fupin/Index.htm. Its goal is to provide tertiary and technical education, with a view to create a University in the near future.

[15] http://cve.telpin.com.ar

[16] Bolivia is an exception: The Federation of Bolivian Telephone Cooperatives, FECOTEL, was launched in 1987 in Santa Cruz de la Sierra, http://www.comteco.com.bo/cooperativa/FecEstat.doc

## 5. References

Bridges.org (2001) "Comparison of E-Readiness Assessment Models, Final draft, v. 2.13, 14 March 2001, http://www.bridges.org/ereadiness/tools.html

Castells, Manuel, and Peter Hall (1994) *Metropolis of the World*. Blackwell, New York.

Edwards, Michael: *Enthusiasts, Tacticians and Skeptics: The World Bank, Civil Society and Social Capital*, http://www.worldbank.org/poverty/scapital/library/edwards.pdf

European Commission (1996) Green Paper on Innovation, 1996, COM(95) 688), http://europa.eu.int/en/record/green/gp9512/ind_inn.htm

FECOTEL. Testimonio del Estatuto Social Reformado de la Federación de Cooperativas de Telecomunicaciones de la Republica Argentina LTDA. (FECOTEL). Capitulo I. denominacion, domicilio, duracion y objeto. http://www.fecoteldatos.com.ar/estatuto.doc

Finquelievich, Susana (2003) *ICTs and Poverty Reduction in Latin America and the Caribbean*, ICA – IDRC.

Finquelievich, Susana (2004) *La Sociedad Civil en la Economía del Conocimiento: TICs y desarrollo socio-económico*, Instituto de investigaciones Gino Germani, Work in Progress Document (In press).

Gurstein Michael: *Community Innovation and Community Informatics Building National Innovation Capability from the Bottom Up*, December 2003. http://www.ciresearch.net/Innovation.doc

International e-Economy Benchmarking (2002) The World's Most Effective Policies for The E-Economy, Information Age Partnership, IAP, London, November 19th.

Jaime, Juan Cruz (2003) "Pinamar", Pinamar S.A., Pinamar, Argentina.

Kelly, Kevin: *New Rules for the New Economy*, WIRED, Issue 5.09 | Sep 1997, http://www.wired.com/wired/5.09/newrules.html

Lanvin, Bruno (2001) in *The Global Information Technology Report 2001-2002: Readiness for the Networked World*, Center for International Development at Harvard University, http://www.cid.harvard.edu/cr/gitrr_030202.html

Obendorf, Tricia (2000) Manuel Castells Leads Keynoters, in *Window of the World*, Issue 2, http://www.ul.ie/~icse2000/wow/issue2/manuel_castell_keynote.htm

Schiavo, Ester, Edgardo Zanchetti & Leandro Coppolecchio (2002) *Gobierno electrónico y modernización de la administración pública. Caso de estudio: municipio de Pinamar,* Argentina, Colección de Documentos, Institut Internacional de Governabilitat de Catalunya, http://www.iigov.org/documentos/?p=6_0093. Consulted on September 28, 2004.

Stiglitz, Joseph (2003) "Los felices 90", Taurus, Buenos Aires.

Tapper, Helena: *Understanding the Information Society Paradigm*, site consulted in 2004, http://www.valt.helsinki.fi/comm/argo/argonet9/TAPPER.HTM

# Case Studies 3 & 4:

# Rural Telecommunication Networks in Peru:

## • Irrigation and Communication Networks: Huaral

## • Micro initiatives for rural telecommunications: Cajamarca

Miguel Saravia, ITDG Peru

### 1. Peru: an introduction

Peru is located in the central and western part of South America on the coast of the Pacific Ocean. The country's territory covers more than 1.2 million km$^2$. The Andes Mountains cut through the country from north to south, configuring three natural regions: the coast, which is a narrow arid strip of land where 52% of the population live; the Andes, where 37% of the population live, and the rainforest that is part of the great Amazon territory and has only 11% of the population.

According to the National Institute of Statistics and Informatics, Peru has a population of 25.6 million, with a slight majority of women (50.4%) and a life expectancy of 69 years. Seventy-two percent of the population lives in urban areas and 28% in rural areas. Although most of the population speaks Spanish (80.3%), almost 20% speaks Quechua, Aymara or other native languages. Both its population and economy are highly centralized in the capital, Lima, home to 32% of the country's population and responsible for 44% of its GDP.[1]

Economic activity is dominated by the services and manufacturing sectors, in spite of having much potential in other areas like tourism, fishing and agriculture. It is estimated that the annual per capita income is US $2,500, which locates it among medium-low income nations, and approximately one half of the population survives below the poverty line, 17% in conditions of extreme poverty.

The poorest population is located in rural areas and in the marginal neighbourhoods around the city. At the national level, 49% of the population does not have sewage facilities, and more than a third of the population does not have drinkable water. Women are more affected by these poverty conditions.

Sixty-five percent of the economically active population is underemployed, mainly dedicated to activities related to agriculture or informal trade. There is a large amount of child labour, with at least 8% of the workforce being children between 6 and 14 years old.[2]

The political crisis of the last fourteen years has weakened local organizations, limiting their representativity and contributing to the absence of solid local leaders. The current political situation has allowed the beginning of a democratic transition process that is far still of being consolidated.

In 2003 Peru embarked on a reform of the state apparatus with the purpose of decentralizing the political and economic activities that clearly contribute to poverty and social inequality. As a result, the country is now divided in 25 regions that group similar environments cultures.

This decentralization process and the conditions of poverty provide the context that demands a better use of available resources in order to promote development. It is also necessary to consider the separation between the political class and the population that has been generating serious problems of governance.

In spite of this unstable social and political scenario, macro economic indicators have stayed within target ranges. In 2004 the inflation goals were met, the trade balance was positive with more than US$14 billion dollars in exports, and international reserves of more than US$10 billion dollars.[3]

Table 1 – **Fixed Telephony Indicator (1994 - September 2004)**[4]

| | Installed Lines | Lines in service (1) | % of Lines in service | Phone Density (2) |
|---|---|---|---|---|
| 1994 | 874,436 | 759,191 | 86.8% | 3.21 |
| 1999 | 2,000,689 | 1,609,884 | 80.5% | 6.26 |
| 2001 (3) | 2,027,355 | 1,570,956 | 77.5% | 5.92 |
| 2002 | 2,045,435 | 1,656,624 | 81.0% | 6.15 |
| 2003 | 2,249,508 | 1,839,165 | 81.8% | 6.72 |
| 2004-Sep | 2,339,761 | 1,990,513 | 85.1% | 7.20 |

Notes:
- all data is from December of each year, except the data of the year 2004 that is from September.
- The population for each year was estimated based on the data published by INEI for June of each year, assuming a monthly constant rate of growth.
(1) It only includes subscriber lines.
(2) Lines in services for each 100 habitants. Considering the estimations of population of INEI.
(3) From the year 2001 it has include the new operators of fixed telephony.

Source: Telefónica del Perú S.A., AT&T Perú S.A., Comunicaciones Móviles del Perú (antes BellSouth Perú S.A.), Americatel Perú S.A. e INEI.

## 2. Telecommunications in Peru

Peru's telecommunications market was liberalised in 1999, and the country enjoys free competition in fixed and mobile telephony, internet and value added services. The number of mobile subscribers surpassed fixed line subscribers in 2001, and the mobile market continues to expand. Fixed line teledensity increased from 3.21% in 1994 to 7.20% in 2004 and mobile from 0,16% in 1993 to more than 13% in 2004.

In spite of liberalisation, telecommunication services are still largely in the hands of a single company, Telefónica del Peru, which still has an overwhelmingly dominant position in both fixed telephony and in mobile communications, with the recent acquisition of the cellular subsidiary of BellSouth in Peru.

Table 2 – **Mobile Services Indicators (1993- September 2004)**[5]

| | Lines | Telephony Density (1) |
|---|---|---|
| 1993 | 36.881 | 0,16 |
| 1994 | 52.000 | 0,22 |
| 1999 | 1.045.710 | 4,06 |
| 2001 | 1.793.284 | 6,76 |
| 2002 | 2.306.943 | 8,56 |
| 2003 | 2.930.343 | 10,71 |
| 2004-Sep | 3.769.608 | 13,63 |

Notes:
- All data corresponds to December of every year, except the data of the year 2004 that corresponds to the pointed out months.
- Some of the values provided by the companies for the period 1994-1996 were reported in thousands, for what the data is not exact.
- Includes cellular mobile telephony, service of personal communications (PCS) and digital trunking.
- The number of population of the country every year was estimated based on data about population published by the INEI for June of every year, assuming a constant monthly rate of growth.
(1) Lines for each 100 habitants. Considering the estimations of population of INEI.

Source: Telefónica Móviles S.A., Comunicaciones Móviles del Perú (antes BellSouth Perú S.A.), Nextel del Perú S.A., TIM Perú S.A.C. e INEI

Table 3 – **Fixed Lines per company (2001-September 2004)**[6]

| Companies | December 2001 | | September 2004 | |
|---|---|---|---|---|
| | Installed lines | Lines in service | Installed Lines | Lines in service |
| Telefónica | 2.019.761 | 1.565.804 | 2.260.831 | 1.919.605 |
| Telmex Perú (1) | 7.044 | 4.747 | 16.896 | 10.594 |
| Comunicaciones Móviles del Perú (previously BellSouth Perú S.A.) | 550 | 405 | 58.934 | 58.934 |
| Americatel (1) | - | - | 3.100 | 1.380 |
| Impsat (1) | - | - | 96 | 96 |
| TOTAL | 2.027.355 | 1.570.956 | 2.339.857 | 1.990.609 |

Notes:

(1) Telmex Perú, BellSouth, Americatel e Impsat only operate in Lima.

Source: Telefónica del Perú S.A.A., AT&T Perú S.A., Comunicaciones Móviles del Perú (previously BellSouth Perú S.A.) and Americatel Perú S.A. e INEI.

Table 4 – **Participation by company: Number of Mobile lines (1993 - Sep 2004)**[7]

| | Telefónica | Comunicaciones Móviles del Perú (previously BellSouth Perú S.A.) | Nextel | TIM | TOTAL |
|---|---|---|---|---|---|
| 1993 | 59,3% | 40,7% | - | - | 36.881 |
| 1994 | 57,7% | 42,3% | - | - | 52.000 |
| 1999 | 68,1% | 30,0% | 1,9% | - | 1.045.710 |
| 2001 | 60,4% | 23,9% | 6,1% | 9,5% | 1.793.284 |
| 2002 | 53,7% | 23,8% | 5,6% | 16,8% | 2.306.943 |
| 2003 | 51,4% | 22,2% | 5,0% | 21,4% | 2.930.343 |
| 2004 | 52,2% | 18,3% | 4,6% | 24,9% | 3.769.608 |

Notes:

- All data is from December, except the data of for 2004 that is from September.

-Includes cellular mobile telephony, service of personal communications (PCS) and digital trunking.

-Some values given by the companies for the 1994-1996 period were reported in thousands, therefore, the data is not exact.

Source: Telefónica Móviles S.A., Comunicaciones Móviles del Perú (previously BellSouth Perú S.A.), Nextel del Perú S.A. y TIM Perú S.A.C

As a result of the absence - in practice - of competition, Peru has a fixed line teledensity rate of 7%, one of the lowest in South America. Interconnection is "the single most important determinant of successful transition from monopoly to competitive telecommunications markets." [8] The more barriers are imposed, the less real competition will exist. In Peru interconnection costs are high and the process of obtaining interconnection is tedious.[9] The current interconnection regime provides an effective barrier to entry for new companies and thus contributes to Telefónica's continued dominance.

On the positive side, competition in long distance service provision is very strong and has resulted in a significant reduction of rates. At the moment there are more than 27 long distance operators competing arduously and traffic has increased from 400,000 minutes of international distance traffic in 1999 to more than 1.6 million minutes during the first three quarters of 2004. Another positive development was a significant reduction of termination fees for fixed to cellular calls in 2004.

Table 5 –**Traffic of Long Distance Telephony (1999 - 2004)**[10]

| Type of Traffic | 1999 | 2000 | 2001 | 2002 | 2003 | 2004- (*) |
|---|---|---|---|---|---|---|
| National Long Distance | 826.362 | 859.962 | 878.287 | 889.159 | 984.459 | 796.500 |
| International Long Distance | | | | | | |
| • Outgoing | 107.616 | 107.916 | 109.788 | 144.690 | 187.618 | 156.773 |
| • Incoming | 293.835 | 458.592 | 792.685 | 1.063.785 | 1.561.629 | 1.480.307 |
| • Relation Outgoing - Incoming | 2,73 | 4,25 | 7,22 | 7,35 | 8,32 | 9,44 |

Note:

The traffic is expressed in thousand of minutes.

(*) Data correspond to the traffic from the beginning of 2004 to the end of the pointed out quarter.

(**)Accumulated traffic at third quarter of exercise.

It only includes outgoing traffic from the fixed telephony nets and public phones.

Data from traffic of origin that correspond to 1999 are estimated.

Source: Operator companies

The most competitive markets during the last two years have been those of mobile telephony, long distance and corporate communications. The strategy of the companies has been to focus on increased segmentation of their offer, designing products and services according to the necessities of the market. Additionally, the entrance of new products is observed for the low incomes sectors, as well as the sale of value-added services.[11]

The teledensity rate for fixed telephony and mobile telephony in Peru can be seen in the following maps.[12]

**Geographical coverage by type of service**


**Geographical coverage by type of service**


Investment in telecommunications have been primarily from foreign sources, especially Telefónica de España, and have been concentrated in the capital city.[13]

Table 6 – **Investment by precedence**

| | 1998 | 1999 | 2000 |
|---|---|---|---|
| International Investment | 81% | 72% | 81% |
| National Investment | 19% | 28% | 19% |
| Total (US $ Millions) | 736 | 500 | 514 |

Source: Projections OSIPTEL, survey to telecommunication companies, Osiptel (2001)

Table 7 – **Annual Investment in Telecommunication. (US $ Millions)**

| | 1998 | 1999 | 2000 |
|---|---|---|---|
| Telefonica of Peru % | 80% | 63% | 50% |
| Rest % | 20% | 37% | 50% |
| Total (US $ Millions) | 736 | 500 | 514 |
| Annual Goal 1998-2003: US $ 500 Millions | | | |

Source: Projections OSIPTEL, survey to telecommunication companies, Osiptel (2001)

In summary: *…the telecommunications market in Peru has experienced an important growth in certain services such as mobile telephony and national and international long distance. Transformations have also taken place as a result of convergence and the development of new technologies. However, teledensity levels remain below other countries of the region and there are persistent disparities between socioeconomic status and regions - the sectors with fewer resources have limited access to these telecommunication services -, and a marked deceleration of the growth rate has taken place in fixed telephony over the past years. The structure of the industry presents high levels of concentration. Few services are offered that respond to the needs and demands of low-income consumers, and those that do are mainly in smaller cities and the urban periphery.*[14]

### *2.1 Opening up of the Telecommunication Market in Peru*

The government of Peru began the process of privatisation of telecommunications in 1991, when it established the Commission of Promotion of the Private investment (COPRI) and the Special Committees on Privatisation (CEPRI), to be in charge of the privatisation of a number of government enterprises, including CEPRI Telecom.

According to Campodónico, the most important criteria of CEPRI Telecom was that the company awarded the phone service in Peru be an international operator with appropriate technology and an major presence in the area. For this it was important, according to CEPRI, to offer potential buyers a limited period in which it would be the monopoly

operator and a tariff level that would allow the expansion of the Peruvian telephone network.[15] These conditions would offer an incentive to investment in the network and would end following an agreed upon period, after which the sectors would be open to a free competition and tariffs would be structured to allow the entrance of new companies.[16]

Three consortiums made offers in February 1994, agreeing to make minimum investments estimated between US $1 billion and US $1.2billion, over the following five years. Telefónica won the bid with an offer more than double that offered by the nearest competitor.

### *2.2 Telecommunication Market Access for New Operators*

Public telecommunication services in Peru are subject to regulation by the Ministry of Transport and Communication (MTC) and the telecom regulator, OSIPTEL. For the purposes of this study, we are interested in analysing regulations that allow new operators to enter the market and the instruments designed to guarantee universal access to telecommunications.

The current regulatory framework sets the conditions under which an enterprise can offer services in the telecommunication market. In all cases it is understood that service providers must pay for the right and that they have obligations such as to ensure the continuity and quality of the service or to fulfill universal access requirements. All network service providers require licences. Value-added service providers do not require licences. The Ministry of Transport & Communication is responsible for granting licences and the regulatory body, OSIPTEL, is responsible for supervising the telecommunications market and can set standards, regulations, and tariffs, and is empowered to arbitrate in the case of conflicts between service providers and users or among service providers.

Obtaining a licence is relatively straightforward. The applicant must fill out and submit a form to the Ministry, attesting to the legal status of the applicant and any individual or company holding more than 10% of the shares, its registration with tax authorities, and a statement certifying that it is legally entitled to contract with the government. In addition the applicant must provide:[17]

1. A technical profile of the project certified by an engineer specialist in the subject.
2. An investment plan covering the first years of operation as well as the amount of the initial investment. The investment plan must be consistent with the project's technical profile.
3. If the project is to be undertaken in the province of Lima or of Callao, a payment bond covering fifteen percent of the planned initial investment must be provided as a guarantee.

The decision will normally be made within a maximum of three months, which can under certain circumstances be extended by forty days.

### *2.3 Universal Access and Market Failure*

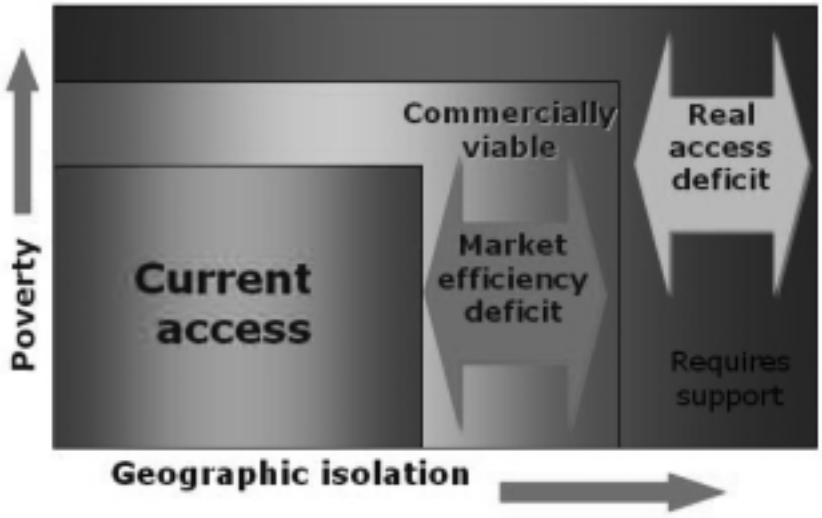
According to the indicators reviewed earlier in this study, market growth has resulted in teledensity rates of 7% for fixed line and 13% for. However, the majority of Peruvians still lack easy local access to telecommunication services because of inability or unwill-

ingness of existing companies to provide service in rural areas, preferring to serve urban areas where more dense populations provide them with significant economies of scale.

In Moscol's words: *to provide services, operators need to invest in the development of their own networks and infrastructure; or they need to have enough resources to pay to use the networks and infrastructure of other operators. For this reason, operators invest where –in economical terms– it is more convenient to provide service. Operators will thus favour more profitable urban areas, such as the capital cities of the main departments of Perú.* [18]

In Peru, the demand for telecommunication services is higher than the current offer. Telecommunication companies worked to satisfy demand in major cities when the market was opened. Then, largely due to regulatory requirements, secondary markets in smaller cities were served. However, in rural areas demand is still high and unmet by supply.

This is easy to understand if we look the model followed by OSIPTEL for determining its activity in the universal access field.[19] They use the "Real gap" model, which is the gap between potential demand and the demand covered in an efficient market.[20]




Access to telecommunication services facilitates access to information and permits communication and is thus considered a human right, and it is thus a duty of the State to ensure that it is guaranteed. Additionally, it has been widely accepted over the past few decades that the development of telecommunication networks generates positive externalities for society as a whole.[21]

Because market returns do not provide sufficient incentives for the private sector to attend to the demand of users in poor and rural areas, the Peruvian government has developed mechanisms to ensure *universal access*, either through subsidy schemes –allocating existing resources– or by establishing regulatory norms governing information infrastructures in rural areas.[22]

### El Fondo de Inversión en Telecomunicaciones Rurales – FITEL (Rural Telecommunication Investment Fund)

Peru's Telecommunication Law created a special fund named "Fondo de Inversión en Telecomunicaciones – Fitel", whose main objective is to fund telecommunication services in rural and poor areas. According to the legislation, OSIPTEL collects 1% of the gross revenues of the telecommunication sector to fund FITEL. From mid-1994 to mid-1998, when FITEL started its first pilot project, the fund had raised than US$30 million.[23] At the present time there is no official information regarding the amount of money raised.

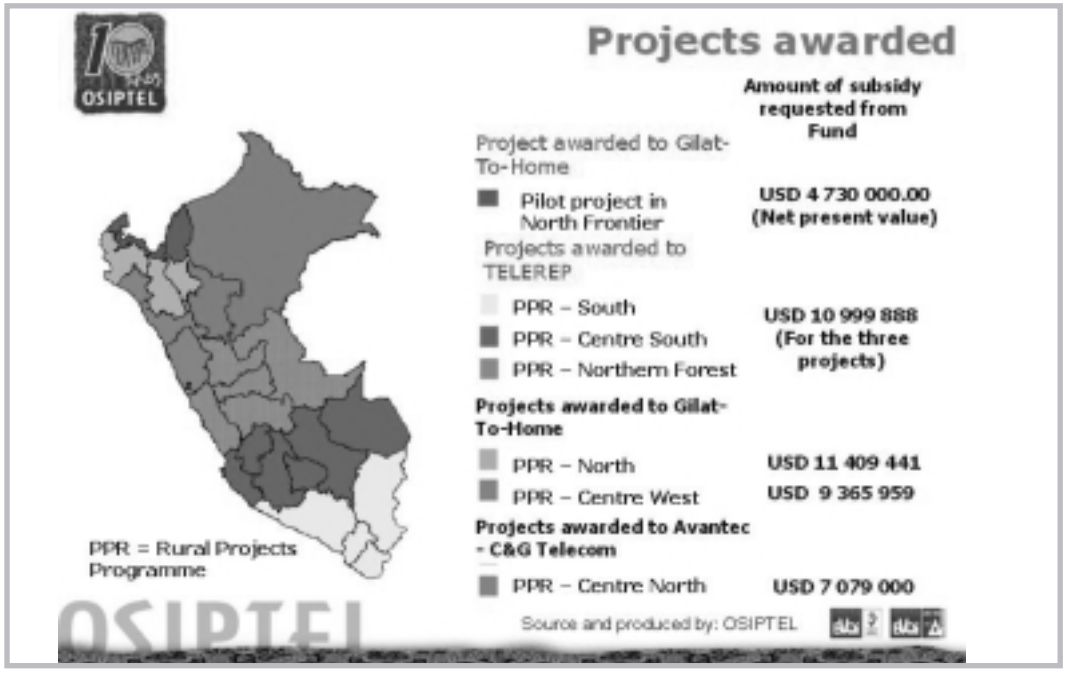
The criteria for selecting the areas able to access the fund are set out in the regulations and include:

- towns and villages with populations between 400 and 3000;
- district capitals; and
- towns in areas defined by the state as being of particular social interest.

According to the regulations, FITEL must make a list of projects that fulfill the requirements for receiving subsidies and submit this list to the Ministry of Transport and Communication for approval. Once the Ministry approves the list, OSIPTEL prepares the specifications in order to issue a public tender and select the operators who will develop the projects.

FITEL's programme began with the "Frontera Norte" pilot project, selected in May 1998. This was an experimental project and it was used to evaluate the programme. The project covered 213 villages in four departments, covering approximately about 59,000

**Projects awarded**



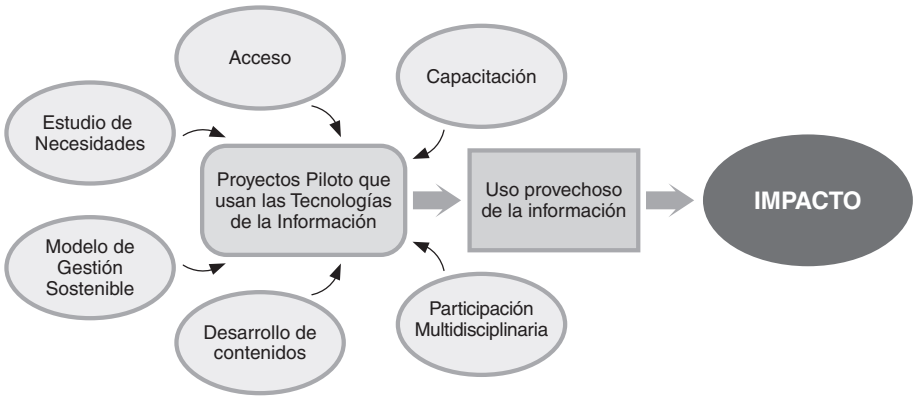
inhabitants, and it provided for the installation of a public telephone in each village. Success of this pilot project allows promoting the Rural Projects Programme[24].

A second tender process was held for a project supplying public telephones in the interior.[25]

FITEL also finances telecommunication pilot project in rural areas. These projects involve the participation of the State, the private sector and civil society, and encourage innovation and new ways of expanding rural telecommunications. In the words of FITEL: *"Pilot projects are small scale tests of services and technologies where the use of ICTs can generate social impact for the beneficiary populations"*[26]

These projects must demonstrate that they are novel and worthy of financing:

To date FITEL has financed the following projects:




**Box 2 – FITEL Projects**

| Project | Description |
|---|---|
| Communication systems for rural health settlements | The project consist of the implementation of a communication system and access to information for public sanitary personnel in 40 rural health centres in the province of Alto Amazonas.[27] |
| Information system for rural development | This project consists of the implementation of rural information centres (InfoCentros), in six localities of the province of Cajamarca and the design of a rural information system for them.[28] |
| Agricultural information via internet for farmers in the Users Committee of the Chancay-Huaral valley. | The project consist of the implementation of an agricultural information system, using the Irrigation Committees which are members of the Users Committee of the Chanchay-Huaral Irrigation District of as their organizational base.[29] |

**Communication Projects Office of The ministry of Transport and Communication**

The Communications Projects Office of the Ministry of Transport and Communication is responsible for designing and executing projects to provide telecommunications services to remote and poor areas of Peru. The objective of the projects is to promote democratisation of communication services and information and communication technologies.

The Office is currently working on the following projects:

- Proyecto de Apoyo a la Comunicación Comunal (PACC )[30]: Comunal Communication Support Project. Seven hundred and fifty-seven systems installed for television via satellite reception and for low power television broadcasting.
- Proyecto de Control Espectro Radioeléctrico[31] Radio Spectrum Control Project)
- Proyecto Implementación de Telecomunicación Rural - Internet Rural[32] Implementation of Rural Telecommunication Project - Rural Internet)
- Proyecto Plataforma de Comunicaciones del Estado Peruano - PCEP[33] (Peruvian Communication Platform project)
- Proyecto de Establecimientos Rurales de Tecnologías de la Información y Comunicación - ERTIC[34] (Rural TIC Settlement Project)

The projects are financed with state resources. It is important to note that the resources available for the Office can be more than the funds available for FITEL.

### *2.4 Analysis of Peru's Regulations for Telecommunication Development in Rural Areas*

In a paper outlining an Andean region global information society initiative, AHCIET, (Asociación Hispanoamericana de Centros de Investigación y Empresas de Telecomunicaciones) described characteristics of a regulatory framework that would successfully promote telecommunication development in rural areas.[35] According to AHCIET, such a framework would:

- Promote the creation of conditions for egalitarian and massive access and effective access to information sources and infrastructures;
- Guarantee adequate access to information for all citizens under the same conditions.
- Promote free and fair competition;
- Guarantee the protection of citizens' rights arising as a consequence of information technology deployment, such as the right to privacy and confidentiality of data, protection of content and intellectual and industrial property, as well the environment;
- Protect the intellectual property produced by citizens;
- Promote effective interconnection and access policies;
- Promote the development of alternative technologies and applications for the deployment infrastructure and broadband networks;

- Guarantee security of electronic transactions and exchange of information;
- Promote awareness and assure training and dissemination of information technologies and applications;
- Promote the development of services, applications and contents via information and communication technologies.

A series of policy guidelines adopted by the OSIPTEL and the Ministry of Transport and Communication seek to conform to the AHCIET recommendations.

**Universal Access Policy guidelines[36]**

OSIPTEL approved Universal Access Policy Guidelines. These guidelines:

- Adopt the definition of the national statistical institute of rural areas, including district capitals with populations of up to 3,000 people;
- Establish maximum tariffs for public telecommunication services in rural areas;
- Enable rural telecommunications service operators to determine the locations of the of the interconnection points with the national telephone network;
- Propose a special numbering regime enabling the identification of calls to and from rural areas;[37]
- Establish principles governing interconnection rates between rural networks and the national network.

**Policy Guidelines to promote access to Internet[38]**

The second set of guidelines seeks to promoting the use of Internet by the government and the public at large, recognizes the need for coordinating work between government, civil society and telecommunication companies and highlights the importance of developing pilot projects in ICT applications for education, health and tele-working. These policy guidelines:

- Recognize the need for the participation of all sectors and the formulation of policies to encourage access to and use of the internet and define the role of various entities:
- Identify barriers that impede access to many sectors of the population. These include both economic barriers (such as the cost of access, the cost of international links, cost of hardware and software) and social ones (such as the lack of training about uses and benefits of the internet).
- Establish policies to promote access to the internet. Among these main ones which are related to access in rural areas, are: (1) Promote access by optimising the existing national telecommunication infrastructure; (2) Promote the establishment of public internet centres (cabinas públicas); (3) Develop pilot projects using ICTs for tele-education, telemedicine and teleworking, among others; (4) Take advantage of commercial opportunities offered by ICT use, including electronic commerce.

**Policy Guidelines for promoting access to Telecommunication Services in rural areas**[39]

The third and most recent set of guidelines specifically focuses its attention on rural areas and aims to expedite the incorporation of ICTs into rural areas and to facilitate their integration into the national telecommunication network. These guidelines do the following:

- Establish appropriate incentives and promote licensing favourable to consolidating universal access in rural areas;
- Facilitate the shared use of telecommunications infrastructure;
- Establish a band of unlicensed frequencies for use in rural areas;
- Establish that rural network operators offering service within an area already served by a fixed line operator, can interconnect with the existing network;
- Adopt measures to reduce the payment of rights of way and taxes by rural telecommunication operators;
- Promote the development of small networks and telecommunication companies in rural areas. The guidelines also include a commitment to consider the complete deregulation of certain services in rural areas;
- Encourage the spread of ICT applications to rural areas and training of rural populations in their use.

In conclusion, the policy and regulatory framework has been significantly modified since 1998, including the adoption of a Universal Access policy for ICTs. Additionally, OSIPTEL has been making substantial efforts to solve regulatory challenges, which had previously impeded efficient development of rural telecommunications.

## 3. Looking for new rural telecommunication models: The cases of Huaral and Cajamarca

Competition and private entrepreneurship are necessary but insufficient conditions to achieve universal access. Also required are alternative business models that allow the coexistence of micro, small, medium and large operators. In the previous section we reviewed the progress made in adapting the Peruvian regulatory frame to these needs. In this section, we present two embryonic cases of new business models that could allow the proliferation of small rural telecommunication undertakings in the future.

**Box 3 – The Project**

| | |
|---|---|
| Name of the Project | • Agricultural Information Via Internet to farmers of the Board of Users of the Valley of the Chancay-Huaral.<br>• Peruvian Center of Social Studies CEPES.<br>• Donoso Experimental Station. INIA-MINAG. |
| Entities who participate in the project | • Technical Administration of the Irrigation District of ATDR-Huaral-MINAG.<br>• General Direction of Agricultural Information. DGIA-MINAG.<br>• Board of Users of water of the Irrigation District of Chancay-Huaral. |
| Services to provide | • To provide agricultural information to the farmers members of the Board of Users of the Irrigation District of Chancay-Huaral via Internet.<br>• Interconnection of the Technical Administration of the Irrigation District, Donoso Experimental Station, The Board of Users and the Commissions of Irrigators of the Irrigation District of Chancay-Huaral via Internet for a better management of the water resources and the institutional fortification of the irrigation institutions.<br>• To provide access to Internet to many rural local actors.<br>• Local Telephony via IP |
| Area of execution of the Project. | • The project is developed in the Province of Huaral, Department of Lima, and will include 14 locations (points of connection) of the district of Huaral, Chancay and Aucallama. |
| Beneficiaries | Directly: 6000 habitants.<br>Indirectly: 16000 habitants. |
| Contact Data | Phone: +511 246-0918 / 246-0748<br>Las Violetas 340, Residencial Huaral |

## 4. The Case of Huaral: Irrigation and Telecommunications

Huaral is the capital of the Province of Huaral, Department of Lima, Peru. The Chancay-Huaral River, which begins in the Andean Mountains, at 5.000 above sea level, irrigates large areas of intense farming in the Huaral Valley.


This Valley has potential wealth in its natural resources: good quality land and abundant water; and in its socioeconomic char-

acteristics: proximity to the markets of Lima and the north of the country, the presence of food processing companies, and the existence of specialized agricultural educational and experimentation centres.

Along the valley, a significant number of villages exist, most of them with precarious communication facilities and few, if any, public services. For this reason, the rural residents give a great importance to the possibility of having communication services such as those offered by the Project "Agrarian Information System via Internet for Farmers of the Board of Users of the Chancay-Huaral River Valley". The project is managed by CEPES (the Peruvian Center of Social Studies), with the Board of Water Users of the Irrigation District of the Chancay-Huaral River Valley, the farmers' organization responsible for the management of water and irrigation.

Perhaps the most remarkable strength in the project of Huaral, and the one that we believe is giving viability to the project, is the institutionality that has been created around it. A group of existing institutions in the valley united their forces to plan, elaborate and, finally, execute this project that involves not only agricultural information, but also rural VoIP telephony.

The main organisation is the Board of Users of Water of the Irrigation District Chancay-Huaral Valley. It brings together all the farmers in the valley, organised in seventeen Irrigation Commissions. Being the primary beneficiaries of the project, they participate actively in the execution of it and eventually will take charge of the administration of all services, including telecommunication.

Before continuing it is important to understand why the Board of Users is so important in this project. The Board is the most important basic social organization of any Peruvian coastal valley. This is because the main economic activity of the coastal valleys is agriculture and the use of river water for irrigation is essential to sustain it. The water boards are established and made obligatory in Peruvian law. They are solid organizations, with appropriate representation and with the capacity to administer water resources and other agriculture-related activities.

In order to manage water resources, Peru has been divided into Irrigation Districts, each with its Board of Irrigators. In the case of Huaral, the Irrigation District is named "Huaral-Chancay". Although all the users of an Irrigation District are organized in a Users Board, those that use water for agricultural purposes also participate in an Irrigators Commission. Both organizations have the objective of promoting the active and ongoing participation of their members in the operation, maintenance, development and rational use of the water and land resources.

Each Users Board includes one or two representatives of the Irrigators Commission, as well as representatives of each of the other non-agricultural uses (e.g. entities that provide repair services, mines, etc.). All this makes this organisation; the most important social organization in the valley, and the case of the Huaral-Chancay is no exception.

### *4.1 Telephony and Information Systems*

The project in Huaral began with the general objective of ensuring effective, collective and organised use of agricultural information available to them via the internet. The specific objectives were:

- To train farmers on the Users Board in the effective use of agricultural information;
- To develop an agricultural information system that efficiently provides information via the internet to the farmers of the Users Board.
- To strengthen local capacity for obtaining, distributing and using agricultural information.

Surprisingly, telephone service does not even appear in the initial project documents, but rather came up as a specific demand of project beneficiaries. Maicu Alvarado, coordinator of the project tells us: "*In principle the project sought to build an agricultural information system based on the Internet. The idea of the telephone came up in early conversations held with the farmers in Huaral. We talked about what we could do to distribute agricultural information and two things were mentioned that should be added: 1. To see how other people in the community used computers and the internet (as the schools) and 2. To see if the system could be used for making phone calls. Our answer was that technically it was possible. We told them that they would be able to make international calls and that they were cheap. The project didn't adopt telephony as a priority, but as a complement."* [40]

The original design of the project allowed the use the network to make VoIP calls between the computers of each one of the Irrigators Committees connected to the project and to make international calls via the international suppliers of that service. At this time the project foresaw using a narrowband satellite link to interconnect the Committee offices in the district.

However, telephony came up again as the project was being designed, this time in a way that changed the initial orientation and permitted the case that we will present here. In the words of the Maicú Alvarado: "When it was decided that the best alternative was a WiFi connection, we noted that one of the advantages of this system was that the bandwidth between the points was enough to allow voice over IP applications. Thus that technical decision enabled us to offer the ability to make telephone calls between the various points."

During this process the telephony component became central, not only for CEPES, but for the project beneficiaries. When the president of the Board, Mr. Marcial Vega, describes the project one of the first things that he mentions is that "it is possible to talk on the phone for free between the Commissions of Irrigators".[41] Only after highlighting the importance of the telephone does he talk about what the internet can do for the community.

While the telephone became more central to the project the design still limited it to calls between the computers located at the Commissions' offices. However, when the moment came to choose the technology and designing the wireless solutions, the idea of installing a VoIP router at each of the points is raised. Suddenly telephony begins to overshadow the information system that was the initial central objective of the project. As Alvarado said:

> This is a project that it is being managed by the Boards and the Commissions - with all the problems and difficulties that that implies. The telephone service is key for their own organisation – the Board sees that first. Second, they see that it is an attractive question in terms of the generation of revenues and some see that that will be the main source of income in a telecentre.

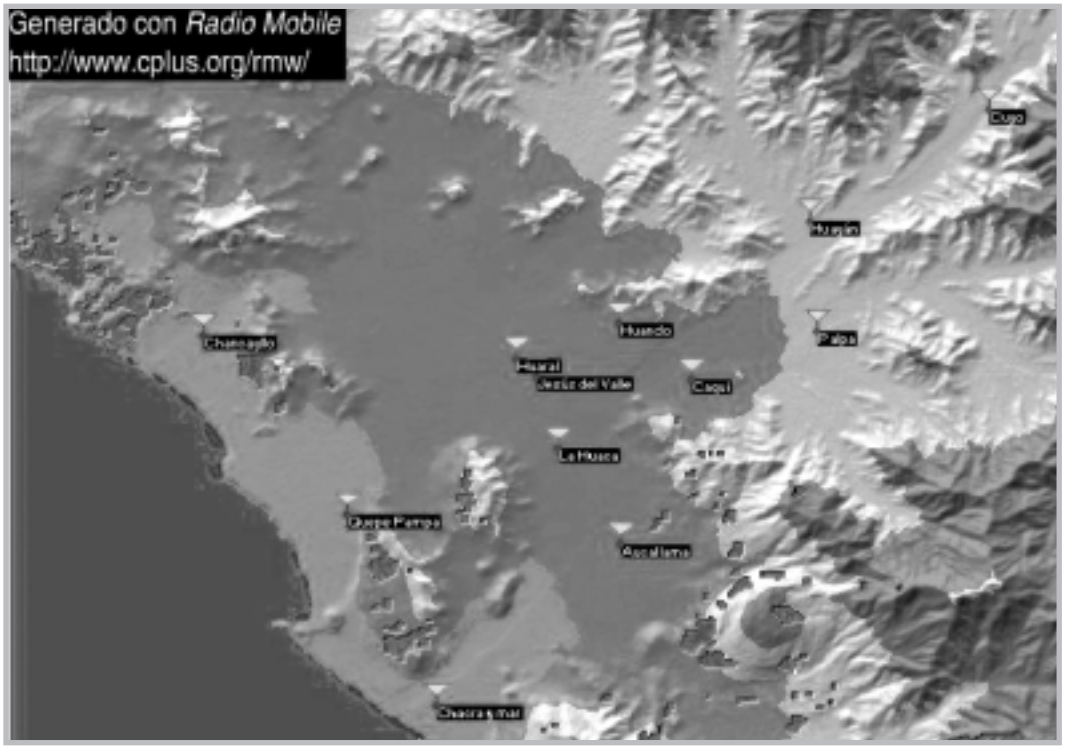
Mr. Vega tells us:

> The telephone plays an important role. The Board, will be able to communicate with the Irrigators Commission, with a director, or representative of one of the sectors if a user or resident has emergency. We'll be able to communicate immediately with the police, the hospital, or clinic. Without the phone, when a sick person comes to our office, hours can pass before we get a message out.... So many things the phone line will be helpful for. Right now the system is only for the internal network but they are going to install some equipment and we'll be connected with the public phone network.

With time, the Users Board has become aware of the importance of the telephone network and the need to organise the service appropriately. The Board has accepted the challenge of not developing the telephone project from a limited business perspective. Instead they will develop it as a public service. They believe that they have an obligation to provide the service to the farmers of the valley, and that this is more important than making profits from the network.

According to Mr. Vega:

> There are some that are looking at it as a business, but for me it is not. We can charge for the maintenance of the equipment and to make sure we can continue growing, but firstly this

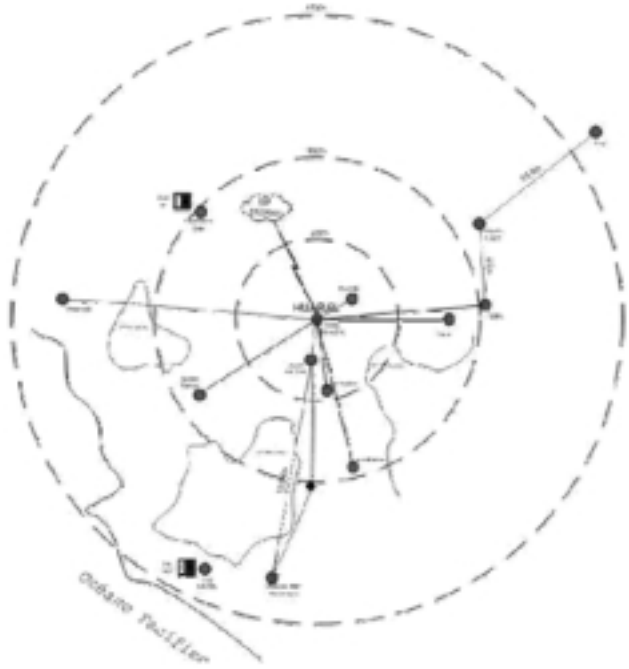


is a working tool. In rural areas all are children of farmers, families of farmers, we want to develop everything together, to develop the farmer economically and culturally. In the same way the neighbour will also develop more because when a farmer is better off, he will hire more help. In all the cases we are communicating with them and developing the idea in a cooperative way.

### *4.2 From Project to Public Service*

**Installed Infrastructure**

The project has deployed a wireless network that connects 13 populated centers of the middle and low areas of Huaral Valley with the Board of Users located in the town of Huaral. The interconnection of the locations of the project will be done with digital linked radio equipment that allows high-speed data transmission using WiFi 802.11g technology in the 2.400-2.500 GHz frequency range over distances up to 25km. The system will enable the locations to be interconnected fulltime, using their own infrastructure and, therefore, having low monthly maintenance costs.



The locations are: Huando, Retes Naturales, Huayán Chico, Cuyo, San Miguel, Caqui, Palpa, Chacra y Mar, Quepe Pampa, Chancayllo, La Huaca, Jesús del Valle y Aucallama. Esperanza Baja, Las Salinas y Acos will not be connected.

The use of this technology will allow the interconnection of the computer networks at each location mentioned above, at speeds ranging from 64Kbps to 2Mbps. Each location will be able to add new computers to its local network without altering the wide area network linking the communities. All thirteen locations share the 512 Kbps broadband connection that the Users Board contracted in Huaral for the project.

At the present time, CEPES and the Users Board are negotiating with Peru's universal access fund, FITEL, for the purchase of a voice gateway that works as a PBX. As the network has expanded it has become apparent to everyone that Huaral's private network must be connected to the public network. With the installation of the gateway, the service will technically be fully connected to the public network. However, regulatory decisions are still pending. We will return to these later in this paper.

**Management**

This issue has to be divided in two parts. The first has to do with the management of the services that the project is providing and the second to the management of the equipment and the physical aspects of the network.

The administrators of the thirteen communication centres are the secretaries that are working there and who have been trained for that. As the network services develop there may be a need to hire local managers, but that is not yet necessary. In the words of Mr. Vega: "*I think this is a good way to start. We can't afford to have two people at each centre. When we grow, and have more equipment and revenue, we'll be able to afford more*".

The CEPES technical team is currently handling management of the equipment, configuration, maintenance and technical support. Twelve local people are being trained, all of them committed to the project and with the capacity and ability that will enable them to take charge of some administration tasks. So far they are been trained to use the network and to identify connection errors and routine maintenance. Eventually they will be trained to manage, configure and administer the network so they can add new voice points, configure new extensions, and so on.

Alvarado told us that he already has experiences that indicate that the Commissions have a high sense of ownership of the project and the ability to adapt it to their needs:

> In many of the offices the company that installed the phones placed them where nobody was going to use them. When they discovered the inconvenience, they found local phone technicians and moved the phones themselves. Now in the phone are in the president's office and the secretary's. That showed us that they don't have to depend on the CEPES team for the issue of phones.

Configuration and maintenance of the VoIP router and making sure remote points are working properly, requires a trained person with a certain degree of knowledge of the technology. The twelve technicians being given a basic training on the phones, updating and maintaining software and hardware are not going to be able to do everything that will be needed. In rural areas it is very difficult, if not impossible, to find someone with the required background. Until the end of 2005, the project will support one person based in Huaral to be in charge of the technical support of the overall network. Afterwards, the Board and the Commissions will take on full responsibility and pay the salary with revenues generated by the services.

**Scalability of the infrastructure**

Due to budgetary restrictions, the project was only able to install voice routers with two

ports each. However, it will be possible to replace these with larger routers to meet increased demand. The bandwidth available on the network would permit at least 64 simultaneous voice connections for each Commission, far exceeding the actual demand in each populated center. (voice channels are using about 6 Kbps and the Commissions are connected with a minimum of 512 Kbps.. If 128Kbps are dedicated to internet, the rest can be used for voice channels: 64 channels of 6kb each).

**Economic Sustainability**

The Users Board has established a budget item for the maintenance of the wireless infrastructure. It is expected that revenue from the internet and telephone services will cover the costs of interconnection with the public network and the cost of maintaining the technician who will oversee maintenance and development and the volunteer technical supporters in each office.

Mr. Vega understands perfectly the sustainability issue. During the interview he said:

> Sustainability… today we have a meeting with CEPES and the directors to examine the costs of this equipment and its maintenance. The idea is to take a percentage of the revenue and to save it, but only for the system. If there is one sol (the sol is Peru's currency) of surplus, we'll save it. If I have enough to buy more equipment I will buy it and the Board is going to supervise the Commissions just as we do it with the water rates.

### *4.3 Perspectives*

At the present time, the project's network is completely operational. The phones work and every day there are calls between the Commissions and the Board. As the interviews with the managers show there is no systematic registry of the volume of the generated traffic, but the software that has been bought by the project and the phone gateway that will be installed, will enable precise records to be kept.

For the members of the Users Boards, the network's value increases as it expands and more farmers have access to it.

> All the business or companies progress little by little, so we'll do the same. When we can install another phone in the community, we will do it. If that goes well that money will be there, accumulating, accumulating, and accumulating. Today we have two booths, tomorrow or the day after tomorrow we will have four or five and in that way we will be growing. That's the idea. There are some sectors, for instance in Pasamayo, with a tower and an internet café. Two kilometres away there is a big school and a few kilometres further on another school. What would we need to be able to bring internet over there directly so the students won't have to come here? To put up a repeater. Then if there is enough money we will donate it: so that the school have their own internet connection. The same in other sectors. We will be interconnecting. Giving facilities to the schools… I think that will be important.

They are also planning the possibility of expansion from the Huaral Valley to other valleys in the region. Marcial Vega says:

> there is a Regional Board that has been formed at the departmental level. The ten boards met

> and decided to submit their own proposals to FITEL. So we'll be interconnected…. Maybe there could be other financial institutions. That way it will be easier to put up antennas.

In Huaral, the Board and CEPES are working to interconnect with other institutions and businesses such as the Agricultural Agency, SENASA, INIA, the stores and the Rural Banks. They are going to establish commercial agreements with these organisations for the use of the phone because they are going to be able to communicate better with the valley's residents. Mr. Vega says:

> There are requests, conversations with them. We are going to ask for more bandwidth in order to provide service to everyone. (He believes that in 6 months all the institutions can be connected). And we want to reach the most rural communities, in the high areas, the mountains. There are areas in the higher part with satellite connectivity to the internet and we can communicate with them. In the area of the lagoons a school has asked us for a computer, so we want to connect them. We are going to organize here and then we are going to grow.

For its part, CEPES is going to explore regulatory alternatives. Its concern is that the Users Board does not have the ability to analyse this issue and orient the telecommunication services according to the parameters established by Peruvian authorities. Alvarado says:

> I am sure the managers don't understand all the regulatory hurdles. I don't know to what extent the president of the Board understand the regulatory complexities. All of this of the internet and the wireless link was also complex, but since he saw it was possible, he'll say the next step will also be possible.

Alvarado's concern goes further, because at the beginning CEPES did not plan on embarking on a telephone project:

> This wasn't a telephone project. Telephony was added because there was a demand and the equipment offered the technical possibility. But now it is more present every day and is growing as people become aware that it will allow them to call areas where there were no phones (the case of most of the Commissions). That reality has made us look at developing a business plan and to looking at how much we can grow. Our concern now is for a regulatory framework that will allow the Board and the Commissions to commercialize the service.

At the beginning of this case study we said that the network is in operation, there is private communication between all the points and it is in the process of expanding to reach, for example, institutions related to the Ministry of Agriculture. The first mile of connectivity is working, now it needs to connect to other networks and that is where the regulatory concerns start.

The Users Board, with CEPES advice, is studying how they are going to manage the telecommunication service. Mr. Vega said:

> Yesterday we had a meeting with the technical area of the Board, accountants, the Technical Management, and the Legal advisor. What CONSUCODE[42] and SUNAT[43] said? Do we have to pay the taxes or not? If we have to pay, we'll form a company parallel to the Board. Once we're a company we'll consider provide other things – selling fertilizer to farmers in the valley. If we're a company, we can buy fertilizer and agricultural equipment and sell it at reduced prices. That's also one of the goals… to relate the telecommunication company with agricultural issues.

Once they decide whether or not to set up a company, the Board of Users will face another decision: How to arrange the interconnection of their private network with the public network. This is still a distant discussion for the Board, but it can end up meaning that the company or the Board itself request a license to act as a local telephone operator.

The option that they immediately discard is that of allowing their infrastructure to be absorbed by an existing operator because they feel that a telephone company cannot provide the type of service they want. Other options involve selling service to third parties, establishing interconnection agreements with other operators based on the guidelines discussed in the first section of this paper. Alverado says:

> In order to be able to offer access to the public network we have to reach an agreement with Telefónica or another operator to resell their service. That's not the best alternative because it would mean charging for the calls from one Commission to another, which isn't part of the plan. The other possibility is interconnection with the public network. That will require getting a licence, which is complex for organisations like CEPES or the Boards. We haven't discarded that option because we could work in agreement with an existing small telecommunications company with the necessary permits and we could do this in a way that allows us to have some income. We don't want the third option: that the whole service is absorbed by a company, with the Board and Commissions losing control of the infrastructure they have developed. The option that we find more interesting it is second one. We realise that the regulatory issue is the most complicated. It seems that it is a stony, difficult road, which is absurd. What do we have left? We have to walk that road.

Even with little clarity on the regulatory possibilities, CEPES has already begun to explore the alternatives of allying with a small operator. Alvarado says: "For this topic of the interconnection we have the offer of a company, VALTROM. They want to make an agreement with us not only in Huaral and have offered support. We know of other companies that might also be interested."

Among the other companies Alvarado referred to is Red Científica Peruana (RCP - Peruvian Scientific Network) through its company, *Infoductos and Telecommunications CORP*. Early in 2005 it became the first Peruvian company offering fixed telephony based on VoIP. RCP has license to operate in Huaral and it would be able route the traffic of the network from the Board of Users to the public network because it already has interconnection agreements with Telefónica, Telmex and the cellular operators.

### *4.4 Testimonies of Telecentre Managers*

**Manager of La Huaca Telecentre – Betsy Núñez**

We have the phone since a month or a month and a half. There is no other phone in the area. There are public phones in the store, it belongs to Telefonica but there are no network cables, there is another one near that works with antenna, but it only works with phone cards. Almost nobody uses it because I always see it closed. The only one that works for general public is the one in the store. Before, there were problems but now it is working fine.

This phone is only good for the Board and Commissions, no more. Right now we have some problems. There are commissions with which I can't get a connection. System

errors, I guess. When we have a problem with the phone we go to the people in charge of the project, meaning CEPES. Before, in order to communicate with the Board and other Commissions I used my cell phone, because there is no other type of service. There are some commissions that have cell phones but others don't. Or I had to go to the public phone and make the call from there, when I wanted to communicate with the Board.

Constantly we use this phone. For example in the mornings I have to communicate every day with the Board because they have to report the volume of water that we have. Still, we do not use email (not with the Board). CEPES gets the reports by Internet if I find the technical support guys. If not I call them. Still CEPES does not belong to the private net, but yesterday I was told that using this net I could also call CEPES location, before that was not possible. The members of the Commission use the phone to communicate mainly with the Board, that is the main entity of this. The quality of communication is good. Other uses of the phone: for public service, because with this phone is not possible, it is only good for the Commission. We had a lot of people asking if there is going to be a long distance service, national, and local. People are interested. I think that if there will be the possibility to install phones at home people would pay for it. This one only works from 9 to 1 and from 3 to 7. The rest of the day it does not work. It is critical for emergency calls, when the public phone does not work or there is no cell phone available.

**Manager of Retes telecentre – Janett Rodríguez**

This phone has worked for about two months. Some times it doesn't work because the cables are moved. There are other phones in the area and people have phones at home. For example, there is one over there, another one at the side of the store. I use the phone to call other Commissions, the Board or other entities in order to find to find out about prices. There are also public phones; there are users that would like to call another phone with the same digits of Huaral or Lima. They have used the phone to contact two people. They call the other Commission and ask them to find a person because another person from another area wants to talk to them.

Right now we are not charging. Now I lend the computers for chatting and they get connected but they would like to talk. In spite of the fact that there are 3 public phones and that there are 6 people that have phone at home I think in this town would be a bigger demand. Because, for example, I have phone at home but I cannot use it to call a cell phone. Most of the houses have the popular system. Once I saw a phone that showed the rate, the minutes… that one would be convenient for us.

I still don't have a salary. We are here to support the Commission, since the beginning. If there is the possibility to have everything, I would be great. I have the offer from the Commission to have the secretary position besides this one.

**Manager of Tele Center Chancayllo – Delia**

The internet is very useful to us. So is the phone that came with it because often Telefónica's phones don't work. Sometimes the cables are stolen, so we need to communicate with the Users Board, Commissions many times at valley level: Retes, Naturales, Chancay Bajo. There are 12 other Irrigators Commissions that have this service. Sometimes a need comes out. A user comes: "I want to call a family member in Huando, because there is no phone". In

Huando there are no phone many times either. So I call the Commission of Irrigators of Huando and ask the secretary to get a hold of the family member and tell him that a family member here will be waiting for a call back a certain time. Everything for free.

When I need to get a hold of a provider most of the time there is no signal, what I do is call the Board of Users and ask them for that service. So they do the call. Everybody has the same problem; even the public booths don't work. This is the only booth, there is no Internet elsewhere. When the people of here want to make a phone call they have to go to Chancay by bus and come back. At least 1.60 soles roundtrip, plus the cost of the phone call.

Recently the telecentre are being tested, there had been problems of disconnection, then no problems. The quality of the conversation is good, direct and is good because it is totally free.

It is a limitation that this phone does not allow outside calls. The users that come to the telecentre know that is a closed network. I think here, because of the line problem, people would buy another phone from Telefonica, because that company, in spite of the errors, they always have to pay the rate and maintenance.

I think the school, medical center; the same people for their home would be interested in having phones. Here the people have a minimal rate of 50 soles a month. Around 200 people or 300 people have phone at home. We have signal twice a week, the rest of the week, there is no signal. Everything because of the cable issue. I communicate by phone or Internet. The cell phone signal does not work here. Only Nextel and Bellsouth. Even to bring Internet they had to bring a repeater by Laure Area because of the mountains the signal was not clear.

## 5. The Case of Cajamarca: Rural telecommunication Micro-entrepreneurs

The Department of Cajamarca is located in the north of the Peruvian Andes. With more than 1,300,000 inhabitants it is the third most populated department of Perú. It also has the most rural population (75.3% rural compared to the national average of 29.9%) and is one the five departments (of 24) with extreme poverty conditions. The migration level from the country to the city and to other regions of the country is the highest of the country.


Cajamarca has the lowest education level in Peru. In 1993 average illiteracy was 12.8% nationwide, but 27.2% in Cajamarca.

The road system is deficient, making communication difficult inside the department. There is only one paved road, from Cajamarca

city to the coast. The rest are ill-maintained dirt roads, on which trips of 60 kilometres take three or more hours. This difficult transportation situation limits the exchange of culture and information, focusing everything on the capital city.

In recent years, there has been important progress in the field of communication –such as the access of telephone service to many cities of the district– which it is expected to continue.

The following table shows how service has rapidly expanded over the past few years.[44]

Table 8 – **Expansion of service in Cajamarca**

| | 1998 | 2003 | Density |
|---|---|---|---|
| Permanent Lines | 13,698 | 20,946 | 1,43% |
| Mobile Lines | 0 | 37,649 | 2,57% |
| Public Telephones | 865 | 2,083 | 0,14% |
| ADSL connections | 0 | 539 | 0,04% |

Cajamarca has important natural resources, including gold, as well as opportunities in the tourist sector. There is a recent tendency for agricultural diversification, including food processing plants. With respect to public administration, at a local level, there is a tendency towards decentralisation of power with more functions granted to mayors and other local authorities.

These changes are happening at different rates, mainly determined by the lack or presence of local markets, by the existence of communication networks, by the proximity of populated centres, etc. In that respect, despite the many problems, significant potential economic development has taken place in the area, largely thanks to better commercialisation of agricultural production.

### *5.1 Telephones and Information Systems*

Since it began working in Cajamarca, ITDG has been providing appropriate and timely technical information to the population. This is why various information and communication projects were undertaken, notably InfoDes, SIRU, and Chilala Broadcasting and Rural Telecommunication: Connecting the Andes.

From 1998 to 2001, ITDG executed InfoDes project[45], which aimed to run an Information System for urban-rural development, focusing on small rural farms and local governments. As a result of this project, a network of Information Centres was setup, located in rural and isolated areas such as: Chanta Alta, Comayo, Huanico, Llanacora, La Encañada. These Information Centres brought basic information services to the communities.

During the execution of the project, the need to deepen research in various directions: the role of traditional media, local mechanisms for knowledge generation, sustainable mod-

els to assure the supply of information and local communication services, and so on. So ITDG began a set of investigations and projects to complement or extend the InfoDes project.[46]

One of these was the Rural Broadcasting Project[47], which installed three radio stations in three villages, Asunción, Chanta Alta and Huanico. The purpose of the project was to develop a sustainable model for rural radio stations seeking to strengthen local knowledge and to reduce isolation. The Rural Broadcasting Project used radio, the mass medium most used by the rural population, to enable distribution of information to the widest audience.

Another project, Telecentro INFODES[48], not only provides public internet access in Cajamarca city, but it is also an ICT experimental and training centre.

As a direct result of the InfoDes project, an interinstitutional coalition was created with the main non-governmental organizations of Cajamarca that wanted to continue the work on rural information systems and the information centres. This led to a new project, SIRU, Rural Urban Information System[49], with the objective of promoting new ways for exchanging information among development organisations, InfoCentros, farmers, small entrepreneurs and local governments in Cajamarca.

The Rural Urban Information System had the following objectives:

- Consolidate a network of suppliers of economic and agricultural information in Cajamarca, linked by an Information Processing Centre (IPC).
- Develop capacity for 11 infocentros, to gather, produce and disseminate information and for beneficiaries who use the information.
- Produce relevant information, answering local needs, in forms that can be used in the economic activity of at least 11 localities.

However, the InfoCentros designed as part of the InfoDes project and used in SIRU had to deal with the problem of not having telephone services, much less Internet and for this reason the flow of information was limited.

In order to strengthen the Rural Information System and respond to the needs of the population, ITDG planned to create a Rural Telecommunication System to improve InfoCentros infrastructure and to generate a valuable management experience. This was how the Connecting the Andes project was born.

### *5.2 Connecting the Andes*

FITEL financed the development of a Rural Telecommunication System, which installed 6 pilot InfoCentros in rural areas. The interesting aspect of this was that it proposed to test various ways of managing the rural telecommunication services. It sought to demonstrate that it was possible to manage telecommunication projects locally and to use them for community development, ensuring quality and public access while being sustainable in the long term.


The Infocentros included in the Project are located in La Encañada, Chanta Alta, Combayo, Huanico, Puruay Alto y Llacanora[51] and each one is equipped at least one computer connected to the internet, a public telephone, a printer, scanner and a webcam.

The project also developed training modules on management, marketing, computers and rural telephony to enable the operators to use the equipment and manage their businesses successfully.

Apart from infrastructure deployment, the project designed a socially sustainable management model that answers to community interests and priorities. A point to highlight in this model is that ITDG started working with voluntary promoters of information but most of the same people ended up being local entrepreneurs who manage the InfoCentros as businesses. While there are recognised problems with the amount of income generated, the best indicator that shows the model is headed in the right direction is the fact InfoCentre managers are still operating the centres, two years after the project ended.

The Connecting the Andes project allowed the development of an infrastructure management model that promotes the establishment of new enterprises to supply telecommunication services. This model was a pioneer project, which proposed public private alliances as the best scenario for the expansion of rural telecommunications. This model originated with the work ITDG did with stand-alone electricity plants.

**Box 4 – The Project**[50]

| | |
|---|---|
| Name of the Project | Rural Urban Information System / Connecting the Andes. |
| Entities who participate in the project | • ITDG – Intermediate Technology Development Group.<br>• OSIPTEL/FITEL<br>• World Bank / InfoDev<br>• Local Municipalities<br>• Local NGO of Cajamarca |
| Services to provide | • Access to local information, based on rural population needs.<br>• Voice communication (Cabins)<br>• Access to Internet |
| Area of execution of the Project. | The total area includes La Encañada, Llacanora, Purhuay Alto, Chanta Alta, Combayo and Huanico; localities of Cajamarca, department of Cajamarca. |
| Beneficiaries | • Directly: 5,928 habitants.<br>• Indirectly: 9,926 habitants. |
| Contact Data | • Cajamarca: Las Casuarinas 738. Urb. El Ingenio. Telefax: (51)(44)828759 / 824024<br>• Lima: Jorge Chavez 275. Miraflores. Telephones: (51)(1)447-5127 / 444-7055 Fax:446-6621 |

### The Original management model

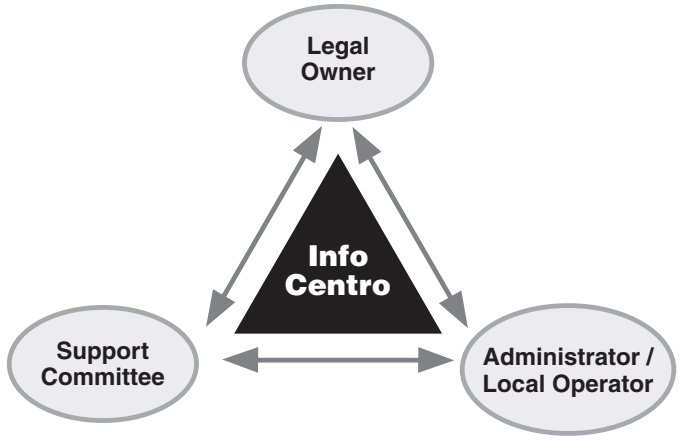
It is very different to work with a telecommunication service in rural areas than in urban areas. There are special conditions such as:

- Low numbers of users and low population density;
- Users without the basic skills for using the services such as literacy and very basic technical knowledge;
- Low income of the target objective (teachers, farmers, children, and others);
- Communities with problems of organization.

For ITDG, and for the communities, it was a difficult task to design a business model for telecommunication services in those conditions, especially since it was important that the deployment of public infrastructure of communication be managed efficiently and in accordance with the interests of the communities where the infrastructure was to be deployed.[52]

For that reason, a business model for rural telecommunication services was proposed in which the most important premise is that the community owns the infrastructure. A local organization or institution represents the community and is the **Legal Owner**. This Legal Owner delegates the administration of the InfoCentro to an **Administrator or Local Operator**. This Administrator manage the InfoCentro as a micro-enterprise and provides

the services the community demands. The Support Committee represents local authorities and users and assures the proper use of the InfoCentro.




The original model is shown in the diagram below:

This model considers three actors clearly identified at the moment of providing a rural telecommunication service and is thus very similar to existing public-private alliances. The legal owner (representing the government or community in this model), a support Committee (civil society) and an Administrator / Local Operator (private sector). It was expected that the proper triangulation of these actors would guarantee the Infocentros sustainability.

However, lets pause to analyse each actor, an essential step to understanding the current model this project is promoting.

- **Legal Owner.** The project assumed that the infrastructure is public property, therefore a public entity, such as a municipal government, should be responsible for it.

  As the model was based in localities where there is a municipal government, this was the ideal institution, for its representativity, because it has a legal status that allows it to enter into contracts and receive goods, and for its ability to make bylaws.

- **Administrator/Local operator.** In the model developed the government should not manage the supply of services and therefore a local concessionary scheme for internet and telephone services is envisioned.[53] The company or person receiving the concession would be a local operator selected by the legal owner through a public tender.

  Once the local entrepreneur was selected, s/he must register the company and then sign a contract for the concession with the legal owner for a period to be determined. During this period s/he should summit monthly finance reports and will be responsible for the equipment and infrastructure.

- **Supporting Committee.** This committee was to represent the users of the service and assure the legal owner and the local operator carry out their functions as well as they

can and provide a quality service. This includes the participation of the local actors involved in the development of the community, such as: local authorities, representatives of governmental sector, and representatives of local organisations.

ITDG and the operators established standards for running InfoCentros, which set the services, and quality standards expected.

The Supporting Committee was to monitor compliance with the standards and to support Operators in their various activities.

In the end the assumption of public ownership was not correct. Despite the design of the project, at the moment of its implementation, the universal service fund, FITEL, insisted on the rural telephony operator, Gilat to Home (GTH), being the legal owner of the entire infrastructure, including the local computers, and not just the provider of connectivity. This resulted in a more complex and inefficient model. In practice, the operators had to sign standard contracts that GTH has with all their concessionaries and where ideas such as contribution to local development, community participation and support committees are not considered.

**Adjusting the Model: Infocentros as rural micro entrepreneurs**

As we have mentioned, this project also sought to support the participation of young people. The Infocentro operators have obtained their own places in the life of their communities, and they have found an opportunity to develop themselves as individuals as well as contribute to their communities' development by providing telecommunication services.

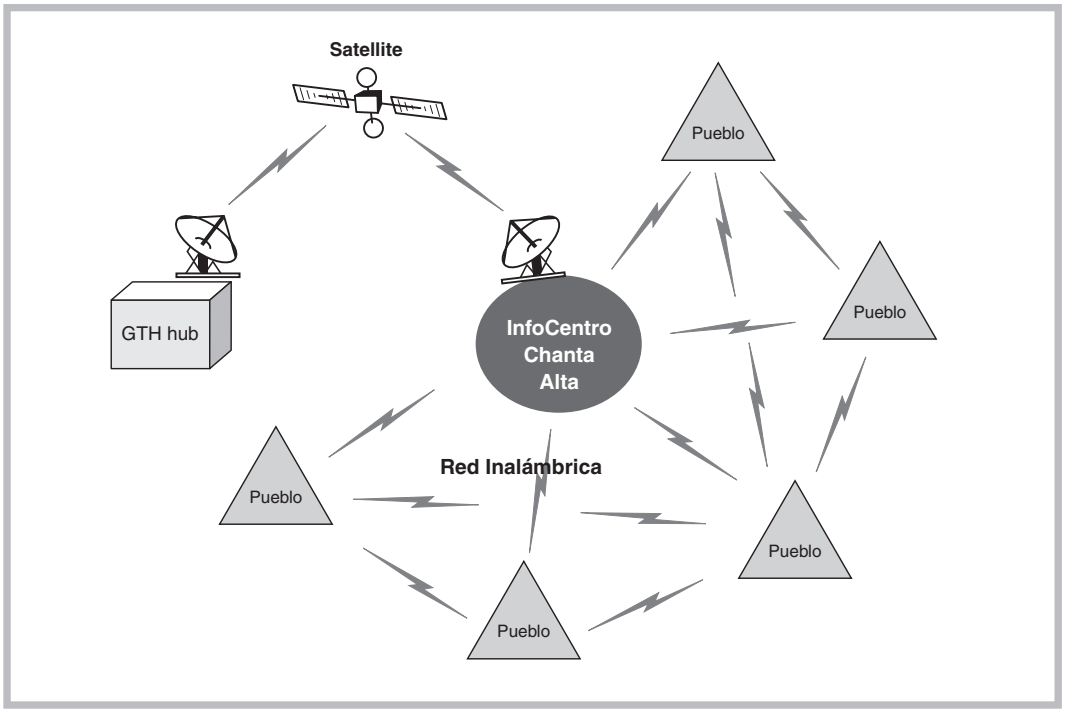
Monthly reviews carried out by ITDG and the Infocentro managers have highlighted the need to develop a business model that includes support for the managers, so they can eventually have incomes sufficient to live with dignity. For that reason, ITDG has been working on developing a new business model in which the Infocentros are run as micro rural telecommunication businesses. This is based on the original model, but considers new options for regulating and making these micro enterprises viable.

In more than 6,000 rural settlements with public telephone call centres in Peru and in the 500 rural settlements that offer internet access for rural populations, the model is the same: the operator is the last link in a distribution chain, whose distant owner is the network operator. The manager's participation in the telecommunication business is marginal and demoralising. S/he is formally limited to selling pre-paid telephone cards, although informally, s/he may provide other services, such as reception of messages, which give him/her a little more income.

Getting a better share of the profits is not viable. Without significantly increasing the rates, there is simply not enough revenue to provide a decent living to all the managers.

The alternative being studied by ITDG involves the commercialisation of a public-private telecommunication service and interconnection with the phone network via subscriber lines.

The vision of the model is that the InfoCentro operator sets up a wireless network that enables the connection with smaller nearby towns, using WiFi technology to providing telecommunication services. This private network will generate a permanent income each month for the operator, by renting the equipment and charging a flat rate for access to the network.




This model also allows incoming calls to be put through to the wireless subscribers, either via software or by installing a PBX that allows automatic re-direction of calls.

To this point, it seems there is no problem. The problem arises with outgoing calls, because the private network has to be connected to the public network. The model foresees the use of pre-paid cards of the company that provides the connection for InfoCentro, GTH in the case of Cajamarca. In practice this involves commercialisation of the line and the regulatory hurdles that might be put in the way are discussed in the final section. Nevertheless, research indicates that the model is both technically and financially viable.

The InfoCentro of Encañada demonstrated the technical viability of the model, until it was forced to stop providing service because it did not have GTH's permission. At the time this study is being conducted, the managers of Encañada and Llanacora are conducting market research to determine potential demand in their communities.

ITDG has purchased equipment for a new technical test, this time for Chanta Alta, which has a lower population density than Encañada's and Llanacora's and where nearby towns are farther. GTH has authorised this pilot project.

ITDG is also researching the financing of wireless infrastructures. Building on this and the market research in Llanacora and Encañada, ITDG hopes to have the necessary information to design a business plan that shows that shows how long it will take to recover investment and what margins the managers can expect. Armed with this information, ITDG will negotiate with micro credit organisations to design a special credit programme for rural telecommunication micro enterprises.

Finally, the proposed model represents an opportunity for increasing traffic on GTH's and the national network, providing both with more revenue without requiring additional investment.

### *5.3 Testimonies of the Operators*

**Eleazar – Administrator of InfoCentro of La Encañada**

My name is Eleazar and I have been the administrator of the InfoCentro in La Encañada for a couple of years. In the morning, I attend to the public at schools; I ask if they want courses. I tell them about InfoCentro. Then they visit me in the afternoon. That is the moment when I can get more clients because the InfoCentro is dead before. Students go frequently. In the morning I teach them at school and in the afternoon they go to practice in the InfoCentro. Internet is the most used at InfoCentro.

Not so the telephone, because there are telephones of Telefónica in La Encañada. There are two public telephones in the centre of the city and I am a little far from that. We get revenue by typing letters and forms, receiving calls and messages and by selling phone cards. In the case of farmers, it is difficult. You have to go there because they do not come to InfoCentro.

Sometimes there are meetings of peasant groups. They have committees there and I have been at three meetings where I introduced the InfoCentro and the services it provides. They gave me ten minutes to speak. Since then they know about InfoCentros and some have visited me. There is only one committee whose member are farmers from La Encañada. There are many farmers, but only leaders of each group of dwellings attend the meetings.

Well, while there is not much profit, we get experience, knowledge, and training. We couldn't get these skills otherwise. In the beginning InfoCentro was going down hill, it only had a few clients. I had to go to them and invite them to come. After a while we're having results, but only recently. I feel I am part of the town and that I am supporting the development of our community.

Income has been increasing in my case. It is going up bit by bit each month. I'm making a bit of profit now. Our vision is to establish it as a business, to grow, where more people come. Of course new services will be necessary, for example, a photocopy machine and an extra computer.

It would be good to organize workshops with farmers. It is another expense. We need the support of specialists. What the farmers want to know is about agriculture. I can talk about Internet, but when I talk about agriculture, then they listen. They choose the subject they want to know. We are preparing workshops with SIRU but they'll have to wait because there is no money to cover it yet. We do not know when we're going to be able to hold these workshops. It is difficult to meet farmers; you have to bring something, a gift or something, if you want them to listen.

The radio programme we had each Saturday was an important support. It was about agriculture and livestock. We researched the subject. First we were nervous, you get

tongue-tied in front of the microphone, but you get used to it and forget to be nervous. It was not easy. It was live. We had one hour from 1 to 2 in the afternoon. It was for information and also had music. In my case, it happens that they saw me walking in the street and asked me: "We have listened to you in the radio, it was you? Say "hi" to me next time".

They were famous already. And we said "hi". They received calls from the listeners, some that they knew. They requested songs, greetings and also information. We got extra clients from the radio because they wanted to know who was the voice on the radio. Radio is always good, as long as it is a station that people listen to.

What I like best most of my work is teaching people. Sometimes I do it for free so they'll want to come. Once they know how to do it, I charge. First we promote the InfoCentro for free then when they know it and like it, we start charging…

SIRU is a big help for information. They send newsletters, prices, etc. We are responsible to provide that information to whoever asks for it.

**Administrator of Llacanora InfoCentro[54] -– Alamiro Marcelo**

My name is Alamiro Marcelo Gonzáles, I have been the administrator of Infocentro of Llanacora since the 6 of October of 2003. I give training courses on basic informatics for students and to people who need them.

It feels weird, but there are farmers who request information. They also known that we have information (apart from radio) from the leaflets we made. I do advertising when I go to school, talking to the students, to teachers in order to give priority to InfoCentro as an information centre.


They have trained us in a technology, the Internet, and that is at the height of its fame in the world and also for the experience. This job is very different from the last one I had, incomes are lower but I have received much experience and training and that is useful for me. They hired me to install software or fix machines. Honestly, it is true that I missed my last job because we have an extra income; but being at the InfoCentro, I am supporting my own town.

If there were no InfoCentro, maybe people would not have knowledge, or not know about Internet, or how to use a computer.

There is a lack of equipment. I only have one computer and it is not enough to do all the trainings. We have asked for support from the Municipality but they say next year.

**San Marcos InfoCentro[55] – Marilú Salazar**

My name is Marilú Salazar and I work as the administrator of the InfoCentro of San Marcos since a year and a half. I used to work as a secretary in the municipality before I started at the Infocentro. The work is different because, while you get experience, you also get people's trust. They know what software I know and hire me to help them. They know I can make websites, so they hire me to make web pages of their stores and there also are students who ask for help with their homework and to teach them about computers.

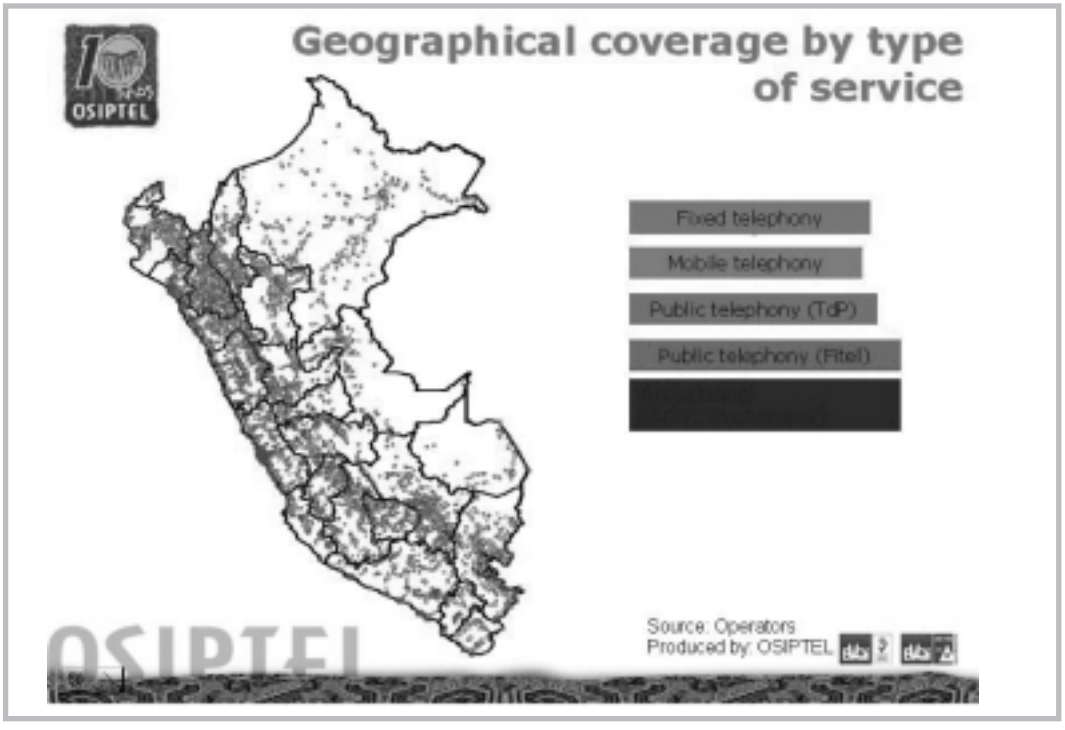
I feel different from before. I feel people care, and I like to teach them. Everything you know, you can teach to those who don't. It would be better with more income. At the beginning there was a profit because the municipality paid a salary. Now there is no salary and only the income the Infocentro brings in.

I feel that the InfoCentro is for all the people of the town. It's not mine only because I manage it. It's a service for the community, for people who need information.

Concerning information for farmers, we have pamphlets and sometimes they ask for the subjects these pamphlets have. They knew it because they listened it on the radio.

## 6. Challenges of Rural Telecommunication regulations

As shown in the various documents cited in this study, Peru is directing its universal access strategy towards the development of a regulatory framework that supports new telecommunication entrepreneurs, especially in the 63,000 communities that are still without



basic telecommunications services.[56] However, the commitment to this is not as sustained and forceful as it might be.

Neither the telecom operators nor the Government have been so daring as to propose new business models that might be able to profitably exploit the rural infrastructure, together with the existing social network in rural areas. Rural people have been seen only as clients of the service and never considered as potential partners for extending services and infrastructure. As a result, rural telecom projects are unsustainable and the deployed infrastructure is under-utilised.[57]

In this sense, the strategy to develop telecommunications is to ensure the network reaches more people: Cable operators, community radio and television can play a relevant role in extending the network infrastructure. But this will require that the government adopt a position favourable to the involvement of the communities.

The cases examined here are looking for new ways to promote local telecommunication enterprises that involve local communities and entrepreneurs in the telecommunication business by raising the role of local actors from mere resellers to service and network developers and owners.

In this final section, we briefly outline some regulatory challenges, which, if properly dealt with, could enable the sustainability of local telecommunication enterprises and the help meet the unsatisfied demand for rural communications.

### *6.1 Interconnection*

The problem with interconnection stems from the rates and rules established for it by the regulator, OSIPTEL. According to OSIPTEL resolution No.11-2003-CD[58], since the provision of public telecommunication services in rural areas is not profitable, the tariffs and interconnection charges must be low enough so people can afford to make calls while still providing sufficient revenue to enable rural operators to maintain and expand their networks. In the same resolution, OSIPTEL modified its standard tariff and interconnection regulations to allow rural network operators to set their own tariffs and non-rural operators (basically Telefónica) to set interconnection rates, with the difference between the two being the rural operators' revenue.

The rural telecommunication enterprises readjusted their rates, but Telefónica, claiming technical problems, failed to re-programme their public telephones with the new rate and restricted outgoing calls to the rural networks to users with pre-paid cards. As Telefonica's public phones are the main source of calls to the rural network this had a devastating effect on traffic levels as many people cannot afford to buy even the least expensive card or have problems using the cards, which require inputting a long series of numbers. More than a year after OSIPTEL's resolution, Telefónica and the rural operators have not resolved the problem.

OSIPTEL has recently issued new resolutions that modify the current regulatory framework and are expected to have a positive impact on the development of small telecommunication entrepreneurs on rural areas.

### *6.2 Access to Market*

The policy guidelines to promote the access to telecommunication services in rural areas establish the principle of preferential fees and tax rates for rural operators and committed the regulator to modify its policies and procedures regarding the awarding of concessions in order to promote the entry of new operators.

The first step was a decision by the Ministry of Transport and Communication not to require permits or other authorisation from businesses offering public access to the internet (cybercafés and telecentres).

Other measures introduced in December 2004 and that will potentially impact on the development of rural telecommunications in Peru, include:

1. Allow free use of frequencies in the 5150-5250 and 5250-5350 Ghz. bands to facilitate the deployment of wireless networks. This measure will promote the installation of wireless broadband networks and will make more viable medium size wireless projects in areas where there is sufficient population density.
2. Enable more flexibility in granting of temporary permissions to use radio frequencies for experimental purposes such as testing new technologies and for engineering studies, particularly in areas outside of Lima and Callao.
3. Temporarily reduce spectrum usage charges for mobile operators outside of the provinces of Lima and Callao. It is expected that measure will result in the expansion of networks to rural areas and complements OSIPTEL's project for "Mobile devices in Rural Areas".[59]
4. Adopt policies to expedite the allocation of resources to the universal access fund, FITEL. While in principle this is a valuable measure, the specific proposals have raised some concerns. According to the proposed changes:

OSIPTEL shall present a timetable of activities to the Ministry every January, each year. This Timetable of activities will consider the execution of at least two (2) telecommunication projects of its (FITEL's) own initiative for rural areas and those areas of priority social concern per year.

> Additionally, concessionaries can present projects for services, such as telephony and internet access, to OSIPTEL, requesting the allocation of FITEL resources for rural areas and areas of priority social concern, using a mechanism of direct adjudication. OSIPTEL must announce its decision no later than thirty (30) days from reception of the request and must properly justify any negative decision in a report to the Ministry.
>
> The above-mentioned projects will not need the approval of the Ministry, although in order to access this process, concessionaries must be-to-date on their payments.
>
> Allocations under the direct adjudication process mentioned above will not exceed the amount the applicant concessionary contributed to FITEL up to the date of the application.

This new measure endangers the availability of FITEL resources for projects which respond to established government priorities and it can be understood as a decision to

cease guiding the universal access, leaving it in the hands of the market and its short-term commercial interests. By allowing telecommunication operators to access FITEL's funds to subsidise their own expansion the measure is contrary to the intention behind FITEL's creation, which was to prioritise the needs and interests of people in rural and poor areas. One final issue arises out of amendments to OSIPTEL's regulations intended to enable the regulator to ensure operators' compliance with contractual obligations and thus protect consumers of telecommunication services. The text of the amendment says that:

> Article 118o. – The Ministry will make a full analysis of the applications presented to give telecommunication services, in order to grant concessions and authorizations to those applicants who present projects that best contribute to communication aims. (…)
>
> The full analysis referred to in the previous paragraph consists of an evaluation of the technical profile of the project presented, in order to determine its consistency with the service to be offered; and whether it fulfills the requirements ordered in Article 147o. and the Guidelines approved by Decreto Supremo Nº 020-98-MTC and its amendments.

It will be necessary evaluate how the application of the article above does not constitute a bureaucratic or political barrier to new entrants.

Linked to this issue is a procedure adopted to make it easier for current operators to expand their services. The procedure is referred to as "commercialisation" and while it is not intended to facilitate new entrants, it is relevant to this study.[60]

Commercialisation, in this context, involves purchasing services and/or volume of traffic wholesale in order to resell them to third parties. Public communication services and capacity of any operator located in Peru can be commercialised.

According to the regulations governing commercialisation functioning the reseller is responsible of the quality of the services or services, even though he has no control over the technical aspects. Additionally, the reseller is responsible for resolving customer complaints, following the procedures established by OSIPTEL.

Finally, the reseller is committed to:

- Inform OSIPTEL about: **(i)** rates, conditions and term of validity offered to users, one day before its application, at least. **(ii)** the toll free number for information and free assistance for users, **(iii)** Any change of address or of legal representative.
- Submit to OSIPTEL the agreement signed with the concessionary that is supplying the wholesale services and or volume of traffic.
- Report: **(i)** Rates charged; **(ii)** Conditions of the services provided and term of validity.
- Provide information and assistance services via a toll free number.

While these requirements seek to avoid informality in the resale of telecommunication services, rural micro enterprises will have difficulty complying because of the complexity of the reporting procedures, the requirement to submit documentation in Lima and the

obligation to take responsibility for technical failures (which are more common in precarious rural conditions and may be connected with a variety of factors beyond local control), and even the requirement to offer a toll free number. As a result, rural resellers will be obliged to continue to operate informally, or not at all.

### *6.3 Capacity Development and Content*

Early in this study we referred to the AHCIET guidelines for universal service, which state that universal access requires policies to promote capacity development and the development of local content that adds value to telecommunication access.

In terms of capacity development, AHCIET writes that: "*…training about technologies must take into account things like economy and digital literacy, and the use of new information and research systems at all levels. The training process is completed with the training of leaders and specialists in information technology –also at all levels– who will benefit all users, interpreting and applying. If those are the objectives, training in information technologies requires a combined effort between public and private sector, and the coordination of interventions from the different organisms and authorities involved in general and specialised education.*[61]

Once basic capacities are available, it will be much easier for the government to promote the development of content in the Internet, especially for sectors such as health, education, economy and others necessary for rural development.[62]

### *6.4 Sharing Infrastructure*

Regulation Nº 28295[63] establishes that shared access use of telecommunications infrastructure is both desirable and necessary in order to make efficient use of it and to promote competition in; thus benefiting consumers, operator and owners of the infrastructure. It also seeks to promote an ordered growth of the infrastructure without affecting the urban landscape, while reducing costs by avoiding needlessly redundant infrastructure.

The obligation to share telecommunication infrastructures (at least three years old) will be ordered in cases where it is impossible to build new infrastructure for reasons such as: the environment, public health and security. The regulations that will govern this law are currently being drafted.

There are other experiences in the world that instead of promoting the shared use of infrastructure, have generated incentives to develop new infrastructure, while reaching higher levels of competition.

In the case of micro and small enterprises, network deployment will be done in areas where there is no existing infrastructure and therefore, after three years, they can be required to share their networks. It will be necessary to study the regulations to see if it protects new operators or will be used as another way of consolidating the market for the incumbent.

### *6.5 Other Challenges*

The idea is to generate new processes to promote and facilitate investment in rural telecommunication. In addition to challenges mentioned, we can add the need for tax incen-

tives such as those related to the special treatment for mobile companies providing service outside of Lima and Callao; or unregulated use of certain frequencies when they are used to for rural telecommunication services.

Nevertheless, we believe that it is of central importance to development new business models using rural telecommunications and that could help ensure the sustainability of the networks. Among these could be rural yellow pages, e-courier services, clubs for migrants, etc..

Finally, it is necessary that the state and the private sector recognise and learn about the entrepreneurial capacity of many rural people who are accustomed to overcoming difficult situations. Rural telecommunication network operators should learn from these experiences and incorporate them in their business plan.

Maicu Alvarado, CEPES' coordinator for the Huaral project, believes that the state should not only learn from the innovative experiences and the entrepreneurial capacity, but it should be the institution that promotes and assists them: *"The regulator should also be an advisor to these innovative initiatives; because they know what's needed. We don't want to do intensive research on things that have already been studied by others, or that others already know about and can help us with. A regulator should be a good advisor."*

---

1 http://www.inei.gob.pe/

2 http://www.pnud.org.pe/idh.asp

3 http://www.latin-focus.com/spanish/countries/peru/pereisum.htm

4 http://www.osiptel.gob.pe/Index.ASP?T=P&P=2636

5 http://www.osiptel.gob.pe/Index.ASP?T=P&P=2637

6 http://www.osiptel.gob.pe/Index.ASP?T=P&P=2636

7 http://www.osiptel.gob.pe/Index.ASP?T=P&P=2637

8 http://rru.worldbank.org/PapersLinks/Telecom-Interconnection/

9 http://www.spri.com/pdf/reports/peru/Peru%20Interconnect%202-12-99.PDF

10 http://www.osiptel.gob.pe/Index.ASP?T=P&P=2641

11 Actual situation and perspectives of the Telecommunication sector. Special report Nº 4 / Support Counseling, December, 2003

12 Edwin San Roman / Developing access to the Information society in Latin America. The case of Peru. Ponencia presentada en el IV World Congress of Computer Law (15/10/2004). http://www.itu.int/ITU/D/ict/mexico04/doc/doc/22_per_e.ppt

13 Inversion in the telecommunication sector in Peru: 1994-2000 / Humberto Campodónico. Santiago: CEPAL, 2000. http://www.eclac.cl/publicaciones/DesarrolloEconomico/6/lcl1206/lcl1206e.pdf

[14] Internet Atlas, produced by RCP. http://www.yachay.com.pe/especiales/internet/

[15] Campodónico, op cit.

[16] Campodónico, op. Cit..

[17] Extract of a report made by Dr. Renato Carrera, Estudio Muñiz (http://www.munizlaw.com) as part of this research research project.

[18] Moscol, op. Cit.

[19] Edwin San Roman / Developing access to the Information society in Latin America: The case of Peru. Report presented in the IV World Congress of Computer Law (15/10/2004). http://www.itu.int/ITU-D/ict/mexico04/doc/doc/22_per_e.ppt

[20] Filling the market efficiency gap: lesson learned from the mobile sector and how to identify the true access gap / Sonja Oestmann. Presented to the ITU Global Symposium for Regulators, Geneva, 8-9 December 2003. http://www.itu.int/ITU-D/treg/Events/Seminars/2003/GSR/Documents/Sonja_Oestmann_4.pdf

[21] * The telephone system as a public good: Static and dynamic aspects / R. Artle y C. Averous. En: *Bell Journal of Economics*, vol. 4, 89-100.

* Análisis de los Servicios de Infraestructura Rural y las Condiciones de Vida en las Zonas Rurales de Perú / Máximo Torero y Javier Escobal. Lima: Grade, 2004. http://www.grade.org.pe/infraestructura/doc2analisis.pdf

[22] Moscol, op. Cit.

[23] http://rru.worldbank.org/Documents/PapersLinks/telecom_modulo6_spanish.pdf

[24] http://www.fitel.gob.pe/

[25] http://www.fitel.gob.pe/contenido.php?ID=50&tipo=H&pagina=contenidos/ProyE/concursos/fitel-iv.html

[26] http://www.fitel.gob.pe/contenido.php?ID=9

[27] http://www.fitel.gob.pe/contenido.php?ID=48&tipo=H&pagina=contenidos/PPT/Cartera/ehas.html

[28] http://www.fitel.gob.pe/contenido.php?ID=48&tipo=H&pagina=contenidos/PPT/Cartera/itdg.html

[29] http://www.fitel.gob.pe/contenido.php?ID=48&tipo=H&pagina=contenidos/PPT/Cartera/cepes.html

[30] http://www.mtc.gob.pe/sectorcom/proyectos/PACC.doc

[31] http://www.mtc.gob.pe/sectorcom/proyectos/PCER%20Web.doc

[32] http://www.mtc.gob.pe/sectorcom/proyectos/internet_rural.pdf

[33] http://www.mtc.gob.pe/sectorcom/proyectos/plataforma%20comunicaciones.pdf

[34] http://ertic.inictel.net/

[35] Iniciativa Andina para la Sociedad Global de la Información. Cuarta Parte: “Un plan de Acción para el Desarrollo de la Sociedad de la Información en la Comunidad Andina”. http://www.ahciet.net/si/general/IASGI.zip

[36] Resolución de Consejo Directivo N° 017-98-CD/OSIPTEL de fecha 05 de octubre de 1998 http://www.osiptel.gob.pe/Index.ASP?T=T&IDBase=2731&P=%2FOsiptelDocs%2FGCC%2FEL%5FSECTOR%2FNORMAS%5FOSIPTEL%2F%2E%2E%2F%2E%2E%2F%2E%2E%2FGCC%2FEL%5FSECTOR%2FNORMAS%5FOSIPTEL%2Fost%5F01%5F05%5F12%2Ehtm

[37] http://www.mtc.gob.pe/gtelecomunica/mlegal/planes/ptfn.pdf

[38] Decreto Supremo 066-2001-PCM 8 de Junio de 2001
http://www.ahciet.net/Regulacion/observatorio/paises/Peru/Pe-066-01.doc

[39] Decreto Supremo 049-2003-MTC
http://www.elperuano.com.pe/normas/baja.asp?Referencias=1099262003081717

[40] Interview to Maicu Alvarado and Jaime Torres on November 12, 2004, in Huaral. Interviewers: Miguel Saravia and Alejandra Visscher.

[41] Interview to Marcial Vega on November 18, 2004, in Huaral. Interviewers: Miguel Saravia and Alejandra Visscher

[42] Consejo Superior de Contrataciones y Adquisiciones del Estado http://www.consucode.gob.pe

[43] Superintendencia Nacional de Administración Tributaria http://www.sunat.gob.pe

[44] http://www.itu.int/ITU-D/study_groups/SGP_2002-2006/SG2/CaseLibraryRuralTel/documents/Peru-es.doc

[45] http://www.infodes.org.pe/infodes/

[46] Construction concerted of a provision model of information for rural population in Cajamarca./ Miguel Saravia y Cecilia Fernandez.
http://www.itdg.org.pe/archivos/tic/Modelo%20de%20provision.pdf

[47] http://www.infodes.org.pe/chilala/

[48] http://www.infodes.org.pe/telecentro/

[49] http://www.infodes.org.pe/siru/descripcion.htm

[50] Oficial information taken from FITEL:
http://www.fitel.gob.pe/contenido.php?ID=48&tipo=H&pagina=contenidos/PPT/Cartera/cepes.html . the website of the project can also be looked up: http://cepes.org.pe/huaral/proyecto-index.html

[51] http://www.infodes.org.pe/telefonia/infocentros.htm

[52] http://www.itacab.org/gate/eventos/sistemasdeinformacion/experiencias/Exp%20Tel%20Rur-ITDG.doc

[53] After 2 years of finishing the project ITDG affirms that was able to finish the formal documents that support the consesion model of the service. Those will be available in the website of the project.

[54] http://www.infodes.org.pe/llacanora/

[55] http://www.infodes.org.pe/sanmarcos/

[56] Author's estimate. According to the Instituto de Estadística e Informática, in Peru, there are 70 thousand populated centres. 69 thousand have less than 500 habitants and therefore, TdP did not assist them during the limited concurrence period. FITEL has installed near 6000 public phones in those locations, leaving an approximate total of 63 thousand locations without direct access to telecommunications networks.

[57] The sustainability of the telecommunication network has also been questioned in other reports. In this particular case we are referring to the implication that the business model has on the under-utilisation of the infrastructure.

[58] Modifies the Texto Único Ordenado de las Normas de Interconexión
http://www.osiptel.gob.pe/Index.ASP?T=T&IDBase=2731&P=%2FOsiptelDocs%2FGCC%2FEL%5FSECTOR%2FNORMAS%5FOSIPTEL%2F2003%2F%2E%2E%2F%2E%2E%2F%2E%2E%2F%2E%2E%2FTemporal%2520PDF%2FRes111%2DCD%2Epdf

[59] http://www.osiptel.gob.pe/osipteldocs/proyec_expans_celular.htm

[60] Based in a report of Dr. Renato Carrera and Dr. Martha Fernández of Estudio Muñiz (http://www.munizlaw.com) related to the present research.

[61] "Andean initiative for Global Society of Information". Fourth section: *"A plan to Act towards the Development of the Society of Information inside the Comunidad Andina"*.
http://www.ahciet.net/si/general/IASGI.zip

[62] Moscol, op. Cit.

[63] http://www.osiptel.gob.pe/osipteldocs/Temporal%20PDF/ley%2028295.pdf

# Case Study 5:
# The Akshaya Experience: Community Driven Local Entrepreneurs in ICT Services

Anita Gurumurthy, Parminder Jeet Singh, Gurumurthy Kasinathan

## 1. How Community Demand Sparked off an ICT Initiative

Akshaya[1] is a project of the government of the state of Kerala[2] in India, to extend the benefits of new ICTs to all its citizens. In this initiative, the Kerala government put first things first. It was rolled out at district level (piloted in the district of Malapuram), and began with an e-literacy campaign. Using public funds, the target of teaching basic computer skills to at least one person in every family was achieved in less than a year (during 2003-04). More than half a million people have been provided with basic computer skills, and around 65% of the beneficiaries under this program are women.[3]

**Box 1 – Some Facts about Malapuram and Akshaya**

Malapuram is one of the 14 districts in the state of Kerala. Though Kerala has the best human development indicators in India, Malapuram is among the state's more socially backward districts.

Malapuram has a per capita annual income of INR[4] 16,766 (USD 390), as against Kerala's INR 25,764 (USD 600) and India's overall per capita income of INR 18,825 (USD 438). A very large number of people from Malapuram work as unskilled and semi-skilled labour in West Asia.

Malapuram's population of 3.6 million lives in 135 villages and 5 towns, spread over an area of 3,550 square Kilometres. It has a high population density of 1,022 persons per square kilometre, as against 819 in Kerala and 324 in India. Local self-government systems are highly developed in Malapuram, as they are elsewhere in Kerala. There are 100 village self-government bodies (panchayats[5]) and 5 elected municipalities. These elected bodies have considerable powers, and a significant chunk of development funds are spent through them.

Akshaya has been started as a pilot program in Malapuram for extending the benefits of ICTs to all people. At present more than 600 Akshaya centres have already imparted basic computer literacy to at least one member in every family in the state, and are functioning as the hubs of a large number of ICT-enabled services for the community. The Akshaya program is now ready for a state-wide rollout, aiming at 6,000 centres, which would cover the whole state.

The demand for an initiative such as Akshaya originated from the local communities. A large number of people from Malapuram are employed in West Asia as unskilled or semi-skilled labour. Earlier, basic education was considered a bonus for migration to these places, but it was increasingly felt that, even for small jobs, some computer skills would enhance employability.

Kerala has one of the developing world's most decentralized systems of governance, and local self-government bodies at village and town levels have considerable powers, including financial powers. The village self-government bodies (encompassing one or more villages) are called panchayats. In April/May 2002, the panchayats of Malapuram approached the state government regarding setting up a government-backed computer education programme. The context of this demand was that the computer education 'shops' proliferating in Malapuram were charging exorbitant fees while providing low quality education. Additionally, since most of the immigrants to West Asia leave their families behind in the villages, there was an emerging demand for Internet based personal communication.

The government of Kerala had earlier set up an IT mission with a broad agenda to harness the 'IT opportunity' for the state. So while it was the job of the IT mission to promote IT and IT based industry in the state, it was also involved with e-governance and IT-led reforms in public administration. The IT Mission also had the agenda of extending IT connectivity, education and services to the rural population.

The panchayats were ready to contribute their funds for the 'one computer literate person per family' programme – which was designed by the IT mission on popular demand raised by the panchayats. But the IT Mission immediately decided against two possible options for implementing the programme: outsourcing the e-literacy campaign to existing private computer education institutes (as is done by many other state governments) or setting up government-owned education centres (which would have incurred expenditure in the absence of clear plans for the continued use of centres after the completion of the e-literacy drive).

Instead, the mission saw in this IT literacy drive an opportunity to set up a network of telecentres that could provide a range of ICT-based services to rural citizens. Thus the idea of Akshaya was born.

## 2. Choice of Ownership Model for Akshaya Centres

The IT Mission was already running an urban service – FRIENDS (Fast, Reliable, Instant, Efficient Network for Disbursement of Services) – that used ICTs to front-end some interactions with a range of government and some non-government agencies. FRIENDS centres are owned by the government and run by its employees. However, the magnitude of the challenge of getting an ICT-enabled interface agency to the villages is huge. The development benefits of providing widespread access to ICTs are still not proven enough for governments to commit a dedicated budget to ICT services infrastructure of the proportions required to reach every citizen. Also, since initially only a limited range of governmental and other developmental activity can be offered from rural ICT centres, the ICT access

infrastructure (telecentres) ideally should be used to provide other ICT-based services to the community, for which demand is building.[6] However, all these services, and further innovative possibilities, would demand a lot of enterprise on the part of the centre operator. These factors meant that avenues other than fully government owned and managed structures were explored.

The IT Mission of Kerala decided to call for applications from private community based entrepreneurs to invest in and run the envisaged centres in Malapuram. The required investment was set at 0.45 million INR (USD 10,465), invested in an infrastructure of 9 computers, equipment and other costs. (Later the minimum investment was reduced to 0.25 million INR (USD 5,814) with 5 computers.)

The location of the centres was chosen in a manner that would ensure at least one centre within 2 kilometres of every habitation, with each centre catering to an average of around 1,000 families.[7] A total of about 600 centres covering the district of Malapuram have been set up. To ensure universal coverage, some centres are also located in remote places lacking road access.

The call for applications met with a huge response, since the successful applicants were also to be helped by the government in obtaining loans on easy terms. Clear rules and conditions were in place under which Akshaya centres were to be run, which were incorporated into the agreement entered into with the private operator. A key feature of these is the extent and nature of influence of the local community. Local panchayat members sat through and participated fully in the process of selection of the private operators, and the criteria of selection included previous involvement in community activity. Even after selection, when the Akshaya centre starts operating, the franchisee is under the clear oversight of the panchayat as well as the district administration for staying within the parameters of the agreement that he or she has entered into, which ensures that important community interests are taken care of.

On the issue of the ownership model of Akshaya, chief government functionary of Malapuram district, the District Collector, Sivasankar, notes that they had considered the complete range of options, including the use of self-help groups for running the ICT centres. But it was felt that collective ownership could be a disincentive for the level of enterprise required. Furthermore, the income from the centres was expected to be sufficient only for one family. A single private franchisee model ensured a more focused ownership and responsibility essential to running this new and untested business, which was perceived to require a lot of initiative.

The decision on ownership model was also based on the earlier experience with the village library project of the Kerala IT Mission. In this project, Internet-enabled computers were bought by the government and placed in government-owned village libraries. The library manager, a government employee, was encouraged to develop internet usage in the community, for which a small fee was charged, the manager receiving part of the proceeds. This experiment did not succeed, and little use was made of the facilities. The library manager was found to have put in no additional effort to evangelize the usefulness of the internet and the availability of the service. He would just sit through the normal library hours, and collect the charges if a user came along.

The lack of enterprise of a manager who was assured of an independent, regular income was not the only cause of failure. Internet use is in not usually in itself a popular service in rural settings. The Akshaya team decided that the way forward was to actively develop ICT-based services, along with their offline components, in the form of services networks. (Services networks develop and deliver a variety of services, sharing some common infrastructure, management and linkages to service providers.) And the Akshaya team, in an effort to maintain the revenue streams of the private franchisee, have been very active in developing new services for the Akshaya centres.

## 3. Building an ICT-based Services Network

While the Akshaya team is mandated by its very raison d'etre to develop ICT-based services that are useful to the community, the fact that the private operators mostly depend on the team to develop revenue-generating models motivates it to work harder and faster. In fact, what we see here is a "profit pull" impacting positively, though in an indirect way, on the efficiency and accountability of a government body.

The key strategy for the initial sustainability of the Akshaya centres lay in guaranteed returns that the centre operator received from the e-literacy campaign. Each centre catered to about 1,000 learners and a fee of INR 140 (USD 3.26) per learner was collected by the centre operator for teaching the basic computer course developed by the IT Mission. Of this, INR 120 (USD 2.79) came from the panchayats and INR 20 (USD 0.47) was paid by the learner herself. Thus INR 0.12 million (USD 2,791) of the INR 0.25 million (USD 5,814) invested by the private franchisee was recovered in the first year through e-literacy program itself, covering to almost 50% of capital costs.

However, the e-literacy program finished after about a year (in 2004), and the Akshaya team's task was to find new sources of income for the operators. A number of other ICT-based services have now been successfully developed.

The FRIENDS project operating in urban areas already had an arrangement with many government and non-government agencies for collection of their utility bills. The IT Mission extended this arrangement from the FRIENDS project to the Akshaya centres. Collection of these bills, for which the centre charges a small fee per bill, especially of electricity and telephone bills, is now a major source of revenue for Akshaya centres. E-payment of bills directly into bank accounts of the various agencies is also being introduced now.

The Akshaya team has also developed linkages for the centres to sell financial services, such as banking and insurance, to the local community. The centres work as pick-up points for a courier agency, and a few computer courses developed in partnership with expert agencies are offered. These courses are certified by the government, which makes them more valuable. At Akshaya centres, children work on curriculum related projects on computers. Considerable content connected to school curriculum in Kerala has also been put online, which students can access at these centres.

Some centres have kids clubs that organize different activities, and some are used by women's groups for computer-based and other activities. Private Internet centres in these

areas are considered by many women to be unfriendly. Viewing of pornography by men in private centres is quite common, and traces of computer usage by women users, such as their email addresses, may be retrieved and used to harass them. The Akshaya centres have the credibility associated with 'community spaces', and are freely used by women. Users regard these centres as accountable to the local panchayat and the district government, and therefore worthy of trust. The centre operator is also very conscious that issues like complaints of pornography viewing are taken seriously by the district government and the Akshaya team. The atmosphere inside Akshaya centres is palpably different to that of a purely commercial space, which is focussed on specific transactions that generate a profit for the owner.

Recently, the IT Mission, in cooperation with the state agriculture department, has designed and is beginning to rollout a massive program of agriculture content and services that can be accessed through Akshaya centres. Akshaya has also organized collectives of farmers who exchange information on best practices in agriculture. And the Akshaya team is working on getting other departments such as health, fisheries and tribal welfare to use these centres for their extension activities.

The model proposed is that the Akshaya centres will facilitate ICT-aided information dissemination, training etc. for community members on behalf of these departments, and get paid by the departments for each member of the community reached. These departments at present use resource intensive means, depending exclusively on their staff to reach communities, and Akshaya's proposal, if accepted, would reduce costs of extension services and is likely to enhance reach and effectiveness.

Overall, the effect of government 'presence' and 'patronage' is very evident at Akshaya centres, giving them a strong community character. While the centre operator does sometimes find a revenue model around community facilities and services, described above, the basic community orientation is unmistakable, and not every activity delivers pecuniary returns. In fact, the centre operators have participated in, and even spearheaded locally, campaigns for health check-ups, agriculture information dissemination, community resource and bio-diversity mapping in villages, working either entirely pro bono or for small payments from district administration that are disproportionate to the effort and resources invested by the centre operator.

## 4. Ensuring Conformity to Community Interests

What motivates the centre operator to facilitate community related work done by the government and other agencies? How can the government and the panchayats ensure that the centre operator will facilitate ICT-based community activity that is generally useful to many, but which may not generate revenue, or may target those who just cannot afford fees?

An example of such an activity is the recent announcement by the Chief Minister of Kerala that he will henceforth regularly interact with citizens over video-conferencing. The government would obviously like to see rural citizens use the Akshaya centres to participate in these video-conferences. But it might prove difficult for centre operators to charge

**Box 2 – Services at the Akshaya Centre**

A typical Akshaya centre has 5 to 9 computers, and employs 3 to 4 people. It typically is provided Internet connectivity through a WiFi network. Services offered at the centres are:

- Computer education
- Computer-aided education providing e-content relating to schools curriculum
- Content – education, health, career development, livelihoods, agriculture, law
- Internet browsing
- Utility Bill payments
- Stand alone computer-based services such as digital photography, desktop publishing, data entry, job work etc
- Financial services such as banking and insurance
- Courier services
- Facilities for children's clubs, women's clubs, farmer's clubs, youth clubs
- Community health mapping
- Community resource mapping, bio-diversity mapping

for participating in a video-conference with the chief minister. Or perhaps the scheduling of the video-conference might clash with another revenue generating use. The question thus arises as to whether the centre operator is permitted to displace health, livelihood support and welfare extension activities in favour of more profitable to conduct at that time.

When queried on these points, senior government functionaries involved with the Akshaya project insisted that the structure of the Akshaya network ensures that the required 'control' would always be possible. The centres gain a large share of their revenues from services networks that were built, anchored and run by the Akshaya team. The quid pro quo between public investments in the Akshaya network and the use, as required, of the centres for community interest activities is implicit and fully accepted by centre operators (even beyond such conditions that are specifically mentioned in the contract).

The crucial role played by the government in the Akshaya network has been further strengthened since the connectivity to the centres is now provided through a district wide WiFi Intranet owned by the government. Furthermore, a lot of useful content for Akshaya centres, including on health, education and agriculture, is hosted on the server at the Akshaya Network Operating Centre.

**Box 3 – Roles and responsibilities of various actors in the Akshaya network**

A typical Akshaya centre has 5 to 9 computers, and employs 3 to 4 people. It typically is provided Internet connectivity through a WiFi network. Services offered at the centres are:

**Kerala government:** Provides the legal, institutional and resource support to the Akshaya program.

**IT mission (of the Kerala government):** Designs the Akshaya structure and systems, including the business model and services; develops software support; organises linkages and agreements for content and services development; develops technology solutions and implements them; develops and hosts local content.

**Akshaya team at Malapuram:** Represents the IT mission at Malapuram, and carries forward the mission's work at the district level; liaises with franchisees and the district administration on a regular basis for smooth functioning of the Akshaya network – services network, technology support, connectivity - and sorts out any issue faced by the centres.

**Malapuram district administration:** Selects and oversees Akshaya franchisees along with the Akshaya team; provides help to franchisee for loans etc; supports the Akshaya team, and provides local help and facilities as needed; organises meetings with local panchayats and feeds their inputs, as well as the priorities of the district government, into Akshaya's functioning.

**Government line departments:** Co-ordinate with the IT mission at the state level for developing services and content for Akshaya; provide field based support and collaborate on specific activities with the Akshaya network such as education, health and agriculture services, at the district level.

**Village panchayats:** Oversee the Akshaya centres in their jurisdiction; develop local ICT-based services/activities along with franchisees.

**Franchisee:** Sets up the centre with own capital and borrowed funds; runs the centre within the framework and conditions laid down by the Akshaya team; helps the team develop innovative services and herself attempts to develop more and more services at the centre; gives input for running of the Akshaya network at regular meetings; helps the Akshaya team in many community activities; herself organises ICT-enabled initiatives in the community like community database development, as well as some community activities at the centre.

**Community:** Makes use of ICT services at the Akshaya centre; gives inputs to elected representatives about services, operational and physical conditions at the centres, and provides suggestions for new services.

Thus Akshaya is not just a services network, but also a technology network and a valuable content network, owned and operated by the district government. Being tied to the network, the Akshaya centre operator receives considerable support from the government, and the use of ICTs for community purposes at these centres can reasonably be ensured. The Akshaya system works through cross- sectoral accountability. The government bodies - the Akshaya team and the district administration - takes care that the private franchisee (centre operator) gets enough revenue for himself by facilitating various activities through the Akshaya network, and the operator in turn obliges by providing support, including the use of the ICT infrastructure, for activities that are important for the community.

At the community end, the panchayats have the means and the mandate to monitor the centre operator in relation to fulfilment of community obligations. Government officials

we spoke to on the question of community accountability told us that the voluntary community-mindedness and involvement of the centre operators should not be underestimated. During the selection of operators, attention is paid to the background and earlier community involvement of the operator. In rural communities, the social dynamics are such that any important community role – such as the centre operator comes to play - is highly valued, since this provides enormous credibility and 'respect' to the operator. This in itself contributes to operator's supporting government and community interests, and facilitating activities needed to bring the benefits of new ICTs to rural areas, with some equity.

In some cases, of course, the government may have to contribute a specific service-based subsidy to ensure access to the poor and the disadvantaged, or generally for universal service coverage, as it did in the case of the e-literacy program, and plans to do for its various extension programmes.

The officials associated with Akshaya are clear that these are only emerging institutional arrangements for using ICTs for community and developmental purposes, and that new challenges will be faced in the future. Meanwhile, they plan to learn through experience, and support and incubate appropriate institutions for this purpose.

The Akshaya team takes its responsibility for successful running of the Akshaya centres seriously, including its profitability for the franchisee. It keeps track of centres that are not doing too well because of their location (in areas with very little demand for ICTs) or other reasons, and provides them outsourcing work like data-entry from government and other offices. Such support has also been specifically given to centres run by women operators, where social disadvantages suffered by women is sought to be compensated by such positive discrimination.

## 5. Local issues: Local Connectivity Solutions

The Akshaya centres had initially started with dial-up connectivity. However, after promising to give priority allocation of telephones to these centres, the public sector telephony service provider, BSNL[8], backed out. Local BSNL officials claimed that they are constrained by telephone allocation policies of the corporate office in New Delhi, and were concerned that making an exception would expose them to litigation by other applicants for phone connections. Many centres were thus left with no connectivity at all, and many more had only a poor connection. The IT Mission and the Akshaya team therefore opted to provide a WiFi-based district wide Intranet, to deliver broadband connectivity to the centres.

At the time the WiFi intranet was commissioned and set up, WiFi was permitted for institutional campuses but not for non-institutional outdoor connectivity[9]. The Akshaya team used its influence as a government body and interpreted the scope of what is meant by an 'institutional campus' widely enough to cover an entire district! Apparently, the district network was nominated as an institutional Intranet for government-backed Akshaya centres - a circuitous way around the regulation, but one that succeeded since it had the backing of the local government. According to Sivasankar[10], who is also in charge of

Akshaya in Malapuram (and the chief functionary of the district administration), the team had faced numerous minor and major legal and other hurdles in setting up such an extensive wireless network. Here again, the fact that Akshaya was a government initiative was immensely useful[11].

**Box 4 – The wireless network in Malapuram**

Putting up a wired telecom infrastructure is a difficult proposition in the hilly terrain of Malapuram, which is also criss-crossed by many water bodies. Creating a wireless connectivity network, though, had its own challenges because of problems with respect to line-of-sight in such terrain and the fact that vegetation (Malapuram has an extensive tree/forest cover) absorbs wireless transmission.

For wireless network deployment, the service provider chose a mix of wireless technologies. The backbone uses a network of repeaters, each of which requires only one radio with two antennae, one pointing forward and the other backward. As the network grows, each node in a network can be promoted to become a repeater. This allows each node to be deployed as the centre of the network, thereby overcoming the challenges of line-of-sight issues. Throughput is high at 8 Mbps, and can be scaled up by adding another pair of radios if the need arises. The access network which connects the centres to the backbone is a point-to-multipoint wireless wide area networking system which utilises Internet Protocol. The system can carry voice, video and data services on a single platform over a wide area. Each of the connected centres can hook up to around 30 access points. With a transmission capacity of 4 Mbps, the bandwidth can be used to provide services such as Internet access, video conferencing and e-learning[12].

At present around 400 Akshaya centres, 56 government offices and a few schools and colleges are connected in a LAN environment, which, in turn, is connected to a network operating centre (NOC). The NOC has direct connectivity with the Internet backbone through optic fibre cable and provides the necessary bandwidth. All network traffic flows through this central access point. Next to the NOC stands a radio tower that provides wireless internet access to 17 POPs (Point Of Presence). Each POP is a radio tower on a hill. It provides access to local Akshaya centers, and also relays access through to the next tower.

The WiFi network, owned by the government, has been set up by a private operator, who operates it on a BOOT (Build, Operate, Own, Transfer) model. The government has contributed an initial investment of INR 30 million (around USD 0.7 million).

VoIP (Voice over Internet Protocol) is another area where regulatory issues have arisen. Most families in the district have relatives working abroad, and VoIP communication to other countries has a sizeable market. At present it is illegal to route VoIP through PSTN (Public Switched Telephone Network), though calls can be placed to locations abroad over VoIP from computers in the Akshaya centres. However, some centres use innovative methods to connect VoIP calls over computers at the centres through local lines to customers (dialling up the customer's house and connecting the line to the VoIP chat). People also come to the centres for voice and video chat with their relatives abroad, from the centres' computers.

Since the demand for inexpensive long distance voice services is huge, centre operators are eager to get VoIP legalised whereby they can run actual telephone networks on VoIP, providing connectivity - telephone and Internet - to their customers through wireless or cables. For this purpose they could operate as the local ISPs (internet service providers).

But telecom policies, tightly controlled by central government, are not very friendly to local connectivity solutions and are mostly oriented to protect the business models and revenue streams of existing vertically integrated telecom operators. The legalisation of VoIP is resisted by telecom companies and, in general, competition from small local operators is opposed by them. After lobbying by BSNL, the public sector operator, the government of India recently imposed huge license fees (INR 100 million) to become an ISP, while earlier anyone it required merely a token fee of INR 1. The recent refusal of the government of India to accept the recommendation by the Telecom Regulatory Authority of India that all incumbent infrastructure owners be asked to 'unbundle the last mile'[13] is also bad news for these operators, eager to make the best of both the existing demand for cheap communication facilities, as well as the further possibilities sparked by the Akshaya initiative.

Government officials at the state and district level agree with local centre operators that there should be greater freedom for developing local solutions for connectivity, and that current telecom policies are an unnecessary and serious hindrance. Given recent innovations in technology, local solutions such as wireless based local access combined with VoIP can ensure easier and faster connectivity to areas not reached by PSTN, and also bypass current problems about connectivity even at places served by existing PSTNs, such as long waiting lists for connections (as in Kerala), high cost of service and low Internet bandwidths.

The telecom policy, and the operation of the public sector telecom operator, is controlled by central government, and often insensitive to the needs of the local ICT-based initiatives like Akshaya. Aruna Sundararajan, the IT secretary to the Government of Kerala, recounts numerous instances of difficulties in getting connections from BSNL even for pressing public purposes. When asked about her opinion on the option of a nationalized backbone over which local access systems would be allowed to operate in an open un-obstructed manner (a paradigm that is beginning to emerge as a viable option for making ICTs widely accessible), she felt that such an arrangement would indeed be a lot more conducive to local rural IT based development initiatives.[14]

The district wireless Intranet is in itself emerging as an important communication platform, independent of its connection to the Internet backbone. It links crucial government offices concerned with citizen services, including the police. The stage is set for useful governance services to be delivered over these Intranets. Many of these offices use VoIP through computers for local communication, including some police stations that have heavy communication requirements. This district government and district community owned Intranet carries useful content in areas of health, education and agriculture services. Plans are also afoot for providing video conferencing over the Intranet between experts in these areas and citizens.

## 6. Mainstreaming ICTs in Domain Agencies

The Akshaya team has achieved the first step of putting in place a government/communally owned technology and services network, operationalised through private enterprise, and the necessary institutional structures supporting it. Now it has turned its attention to improving and expanding the basket of useful services and content for delivery over this infrastructure. This brings into focus the role of domain government departments of

health, education, agriculture, social welfare etc. The next frontier for achieving the full value of ICTs in rural areas is to mainstream ICTs into these sectors. This will enable services, content and applications in all these crucial areas to be produced and delivered in a manner that makes best use of the Akshaya network. All energies of the district administration at Malapuram and the IT Mission at the state capital are now directed towards this difficult task.

Agencies like Akshaya and the IT Mission that evangelize ICTs put in great effort - with a 'whatever it takes' attitude - to devise useful services for citizens to demonstrate the benefits of ICTs both to the citizens themselves and to the political and bureaucratic establishment in the government. Yet a non-specialist agency like Akshaya, despite good intentions and drive, cannot by itself achieve the professional levels in service development and delivery, in areas of health, education, agriculture, welfare, etc., which are the responsibilities of full fledged departments in the government. For this purpose they need the complete support of these departments. However these government departments, protective of their respective domains, often look askance at Akshaya's efforts.

ICTs open up many new possibilities that can make the education, health, agriculture, welfare and other government services much richer in content as well as more efficient in delivery. But before the government departments responsible for these services take up ICTs wholeheartedly, the Akshaya team must promote and publicise their potential by developing some of these services and demonstrate the benefits. The goal is to encourage and facilitate at least some authorities in domain departments to recognise the possibilities and begin work in-house for service improvement. At the same time, citizens, and their political representatives, seeing the new possibilities for themselves, can be expected to put pressure on these departments to use ICTs in their work.

In the interim period, however, conflicts are likely to arise between the IT department and the domain or line departments.

When, in 2004, Akshaya undertook a health mapping exercise on lifestyle diseases prevalent in the district, using some doctors associations, the government health department was less than enthusiastic, finding fault with the procedure and methodology. Similarly, securing the cooperation of the agriculture department at the district level in providing some agriculture-related services through Akshaya has encountered resistance. It can be worse in areas with cross-departmental jurisdictions, which are often 'no-man's land'. When Akshaya attempted a resource mapping in some villages they found that no single agency kept records of the various developmental activities implemented in the community at different points in time, or of the resources that were thus created.

It is evident that the use of IT in governance, as has been the case in world of business, puts great pressure on the very structures of the government as they have traditionally functioned. Pressures are built for structure or process re-engineering, resulting in predictable resistance from incumbent vested interests. In any parliamentary democracy, responsibility and work, and therefore the credit, in governmental activity are divided manifold among ministries and departments. Each of them has separate political accountabilities that can complicate the task of co-ordination, especially when restructuring moves in a direction that gives some particular departments or ministries greater visibility and credit (in this

case the IT ministry vis-à-vis other departments). In Kerala, the state government is a coalition ministry with different parties holding different portfolios, making this problem even more acute.

Under the circumstances, it is fortunate that the state created the IT mission early. It has built some credibility and standing for effective coordination between different departments from the state capital itself. There are also benefits to most of the IT mission staff being on contract, and not from the government bureaucracy. In the hands of such an agency, the governance of the Akshaya network and the difficult work of handling different stakeholders and different institutions, within the government and outside, is somewhat easier. However, further institutional developments towards structures best suited to extend the benefits of ICTs to all people will require strong political will and direction, as much as the highest quality managerial expertise.

## 7. Building the Blocks to ICT-enable Communities across the State

The most significant feature of Akshaya has been that it has both (1) a state wide implementation design from its inception, managed by a state government body, and (2) the participation of local government institutions. The role of IT mission, at the state capital, has been to provide essential resource support, including quality management resources, access to needed knowledge and the economies of scale for the success of the initiative (since common strategies for a state wide network have evolved). The involvement of the self-government bodies (panchayats) has ensured local feedback on useful services and the quality of service, and local community supervision of the franchisee.

The initial demand for the government to provide basic computer education came from the people and their elected representatives. However, it was the IT mission's idea to develop the Akshaya centres beyond IT training facilities to hubs for a variety of ICT services useful for the community. It had been the general experience that internet use, by itself, is not very popular in the community. A few private Internet cafes existed in Malapuram for quite some time, even before Akshaya. But even when the Internet was used at these private cafes, it was used mostly for chatting, sometimes for emails; and use was limited to a very small section of the people. Under the circumstances, Internet cafes were neither a good business model, nor was there any real 'empowerment' of the community in this limited use of ICTs.

The IT mission decided that setting up ICT centres would not be enough; it needed to undertake pro-active work to develop a variety of ICT-based services relevant to the community. And since developing such services required considerable content creation, processes for accessing them, linkages with a variety of service providers, common facilities like courier services (for movement of documents etc between centres, service providers and citizens), software and hardware support, and new connectivity solutions, it was found necessary to develop a services network with the district Akshaya team at the hub.

With the centrality of the Akshaya team to the functioning of the Akshaya network, and the accountability of the team to the panchayats and the government, the Akshaya centres function in a manner that serves community interests. However, the use of private

franchisees for operating individual centres was found useful for at least two reasons. (1) It brought in private capital[15], greatly reducing the resource demands on the government and (2) the franchisee had a strong stake in the success of the centre and its use by the community, which led him to be an enterprising partner in developing the facilities at the centre, as well as the Akshaya network overall. So, while the central involvement of a body accountable to the community ensures that the private partner works in a manner consistent with the best interests of the community, the need for keeping the 'business' of the franchisee running at a sufficiently profitable level ensures that public participation in the partnership in run on the basis of innovation and efficiency.

Akshaya also brings into focus the anomaly of the situation where telecom policies and controls continue to be exercised from remote levels by national governments. ICTs are increasingly recognised worldwide as a crucial development infrastructure, and that their control should therefore be in the hands of local communities for effective contextual employment. The distinction between (1) the inter-connection to telecom backbone, which is obviously an inter-regional issue (inter-state for a large country like India) and thereby should legitimately belong in the jurisdiction of the national governments, and (2) the means of extension of connectivity in its various forms and uses to local communities, needs to be seen in the light of new paradigms of ICT deployment and use. In many respects, the local community will be much better off owning and managing its own connectivity network.

As the basic structure of a viable ICT-based interface agency for serving the citizens has been developed by Akshaya, the focus now shifts to the range and quality of content and services that can be delivered leveraging the Akshaya network. The government is by far the largest development agency, with elaborate development delivery structures in the various areas of education, health, livelihood support, welfare services etc. For these services to effectively plug into the Akshaya network and benefit the community, the line departments of the government responsible for these services need to ICT-enable the delivery of their services. And this, by all accounts, is a challenging task.

The IT mission is now devoting greater effort to mainstreaming ICTs within these government departments. While this process calls for far-reaching changes within these departments, coordination and collaboration between different government agencies in delivering integrated services, especially the relationship between line departments responsible for the services and an interface agency like Akshaya that delivers these services using ICTs, are even more complex. Grappling with them effectively requires both far reaching structural changes in governments, as well as strong political vision and leadership.

The sustained delivery of 'value' to citizens through the Akshaya network can be expected to develop a political constituency for widespread reliance on ICTs for delivery of government and development services. However, Akshaya has largely ignored the participatory potential of an ICT platform for online engagement of citizens with processes of governance. E-governance services promoting governmental transparency and accountability, being developed in many e-governance initiatives elsewhere in India[16], are not to be found among Akshaya's list of services.

Similarly, the community media dimension is another aspect that has not taken root in the online platform that Akshaya offers. Only when the local community has greater con-

trol over its information and communication processes will it be able to engage with external institutions, including governments and markets, on better terms. This is the model through which the best potential of ICTs for development can be realised. But the very fact that such potent possibilities can challenge established power structures, including of the local and state politics, means that in a highly politicised state like Kerala transformation will take a circuitous path of negotiation, and progress only in stages. Meanwhile, it is a good sign that the state cabinet has approved the state-wide roll-out of the Akshaya initiative, aiming to set up 6,000 Akshaya centres across the state[17].

---

[1] www.akshaya.net

[2] A state in South India with the highest human development indicators in India.

[3] The capsule course, specially designed for the project not only taught basic usage skills for computer and Internet, it also included various practical uses of the Internet like finding the day's news, e-government services etc.

[4] Indian Rupee; it is approximately 43 INR to 1 USD at current exchange rates (January 2005).

[5] There are three tiers in the Panchayat system – village, block (a sub-district level) and district panchayats. The village panchayat is made up of directly elected representatives. Additionally, the *gram sabha*, consisting of all adult members of the village, is also considered a tier of the self-government structure.

[6] In many ways Kerala's rural situation is different from those of most other states in India. Apart from near universal literacy, factors like high levels of job-related migration, where families invariably stay behind, and the fact that Kerala is one large semi-urban stretch with a high density of population, makes the outlook for rural ICT centres better in this state.

[7] Malapuram has a high population density (1,022 per square kilometre), with much of the habitation along the roads. This makes it easier to locate centres within close reach of most households.

[8] Bharat Sanchar Nigam Limited

[9] The latest policy announcement of the Telecom department of the Government of India has legalized WiFi for outdoor use also.

[10] Sivasankar was the Director of IT Mission when Akshaya was conceived and rolled out. When it was time for a district posting, he chose the project area of Akshaya. This fact that the district administration is led by someone who has been involved throughout with the Akshaya project is a big factor in its success in the field.

[11] A simple example of the benefit of it being a governmental effort is the availability of government buildings in most places for rent-free installation of the needed towers, which can itself be a big cost saver.

[12] http://www.expresscomputeronline.com/20041206/management01.shtml

[13] Allowing the installed infrastructure to be used by other service providers for last mile service.

[14] Most state governments have commitments from telecom companies that own optic fibre backbones in their areas for certain free bandwidth, in return for 'right of way' granted to them by the authorities for laying the cable network. These governments, including that of Kerala, plan to use this bandwidth for taking connectivity to their offices, and to the outposts concerned with development delivery in the field, and also link self-government institutions right up to the villages.

[15] Private investment of more than INR 250 million (USD 5.8 million) was brought in this way into the Akshaya network.

[16] Such as Rural e-Seva in West Godavari district in the state of Andhra Pradesh, which is the subject of another case study in this series.

[17] As per contextual appropriateness, both wired and wireless broadband solutions will be employed in this expansion; for example, in areas with high cable penetration, Internet through cable may be the preferred mode.

## Case Study 6

# TeNeT, n-Logue and the DHAN Foundation: Exploring Appropriate Ownership Models for Rural Pro-Poor ICTD initiatives

Anita Gurumurthy, Parminder Jeet Singh, Gurumurthy Kasinathan

## 1. Telephony for Rural users: against the Odds

### *1.1 The Birth of an Appropriate Technology: Socio-economic Context of ICT R&D*

In the mid nineties, as the world was being swept by new advances in information and communication technologies (ICTs), a group of technologists at the Indian Institute of Technology[1] (IIT), Madras, saw great promise in the emergent opportunities for the developing world. They set out to find practical solutions using new ICTs to extend telephony and Internet to those left out by the rapid market-led telecom expansion, especially in rural areas.

The Telecommunications and Computer Networking (TeNeT) Group[2] at IIT, Madras, went straight to the root of the problem. Existing telecom infrastructure equipment in India was imported from the west and based on foreign R&D. Obviously, technology R&D is situated in and appropriate for the business environment in which it takes place. Implants of technology into other contexts may not always produce the best results. As Prof. Ashok Jhunjhunwala, who leads the TeNeT team describes it,

> …in the West, the cost of providing a telephone line is around USD 800. We use the same technology and it is not surprising that our numbers are similar. But this cost of USD 800 was reached in the West more than a decade back. There too, an operator needs between 35-40% of initial investment as yearly revenue to break even. However, this amounts to barely USD 30 per month and is affordable to over 90% of the homes. Therefore, homes in the West have been fully wired up quite some time back. Now, reducing the cost further no longer expands the market. Their R & D focus therefore naturally shifts to the replacement market, where more and more features and services need to be provided rather than lower cost products.[3]

The team calculated that in the Indian situation, on the basis of an average cost of around INR[4] 35,000 (USD 813) for laying one telephone line, the average monthly revenue required

by a service provider was INR 1000 (USD 23.2). This was affordable only by 2 to 3% percent households in India. The team was clear that for situations obtaining in developing countries like India, a low cost telecom solution was necessary and could only come from local R&D, pursuing the objectives specific to the context, including of costs, usage, and operational constraints. For telephone connections to be made affordable to the vast majority of people, the cost per line needed to come down to around INR 10000 (USD 232) a line.

Since 70% of the telecom infrastructure costs were in the access systems, the team concentrated on this component. They developed a local access system based on a wireless technology called corDECT.

> These small access systems (using corDECT technology) could be connected to a backbone telecom network. Such access systems would require low initial investment and could be operated very much like cable (as in cable TV) head-ends. A small entrepreneur could then serve a neighbourhood (either a few streets in an urban area or a few blocks in a rural area) and provide low-cost service in an accountable manner.[5]

Through corDECT, the average cost of reaching a phone line was brought down to around INR 11500 (USD 267). CorDECT enables simultaneous telephone and Internet connectivity.

> With rugged design (that can work at 55 C), low power requirement of the central unit (at less than 1 KW) and a cost of only USD 250 per village, corDECT promises 35 to 70 Kbps (sustained or unshared connectivity). An upgrade in the near future could take this up to 100 or 200 Kbps (dedicated connectivity).[6]

### *1.2 Taking a Technology to the Market: corDECT Meets Goliath*

The TeNet group thought that since corDECT was much cheaper and suited to Indian conditions, the incumbent public sector telephony provider BSNL[7] would readily adopt it. But these committed technologists had just entered the murky waters of telecom regulation and business. BSNL ignored corDECT, and preferred to import much more expensive systems, that were less suited to Indian requirements. In part, it was ignorance fed by disinformation campaigns by telecom multi-nationals, and in part, bureaucratic ineptitude.[8]

In the late 1990s, as private telecom companies began expanding their networks rapidly in India, Professor Ashok Jhunjhunwala, became hopeful. He expected that private companies would go for the cheapest and most appropriate solution. Even as they struggled with the indifference of the public sector, the team soon realized that they were now up against bigger obstacles of the business world. For instance, vendor finance (advances offered by vendors to companies buying their equipment) played a big part in financing the telecom operators, and this made them lock themselves in to the technologies provided by big multi-national players.

Efforts were made to close or co-opt the corDECT technology, including significant buy-out offers. But the TeNeT scientists stood their ground.[9] Finally, they got their first acceptance in some other developing countries. Per force, BSNL also had to seriously take cognizance of the new technology option. Today, corDECT technology is used by BSNL and some other public and private telecom operators in India, as well as in many other developing countries.

Enthused by the commercial success of corDECT technology (it earns the group annual royalties of millions of US dollars), the TeNeT group has become a prolific incubator of ICT and ICT-related technologies that are suitable for rural Indian conditions. They have developed:

- DIAS – Digital Internet Access System – This product employs Digital Subscriber Loop (DSL) Technology to provide simultaneous telephony and always-on, high speed Internet connectivity on existing telephone cables.
- A video conferencing software that works on very low bandwidths
- Local language interfaces and software
- A remote medical diagnostic kit, with the aid of which a doctor can do basic diagnosis online, and make appointments if required
- An ATM suitable for villages at a cost 1/20$^{th}$ of normal ATMs[10]
- A simple SMS and email device appropriate for low cost telecentres.

Professor Jhunjhunwala also spearheads the 'Centre For excellence in Wireless Technology' set up in the campus of IIT-Madras. The centre works with all possible wireless solutions for telecom connectivity including WiFi, WiMax, and some offshoots of GSM and CDMA technologies. Professor Jhunjhunwala speaks with a lot of hope for the future but also believes that it is necessary to go beyond the hype and actually explore the new wireless possibilities in the context of the conditions of deployment. This may call for local R & D for appropriate innovations. For example, though basic wireless equipment, like of WiFi, may have become increasingly cheap, the largest component of the costs in rolling out last mile solutions are actually towards the towers that raise radio equipment to line of sight.[11] Innovations here therefore need to grapple with local issues of topography, density of population, bandwidth requirements, affordability etc. The R&D at the Centre is actively engaged in addressing these issues for appropriate local wireless systems.[12]

### *1.3 From Appropriate Technology to Appropriate Business Model for Rural Telephony*

The TeNeT group, in developing appropriate technologies, owes its success in large measure to the organic linkage that their work has with ICT-based interventions in rural areas. This provides the group not only with the right feedback on the kind of technologies and equipment that is most needed, but also enables a short feedback loop on what is succeeding and why.

Even with the success of corDECT and other technologies developed, TeNet has not been satisfied just with producing appropriate technologies for ICT expansion in rural India. They had deduced that the high cost of the existing means of providing rural connectivity was due not only to expensive imported technology (an aberration that their invention and deployment of corDECT and some other technologies corrected), but also because of the high organisational costs of delivery by big telecom companies. Here they took their cue from the unprecedented rapid expansion of cable TV[13] in India which went from zero to 50 million within a decade.

> Cable TV operators are small entrepreneurs (at least when they start providing the service). They put up a dish antenna and string cables on poles and trees to provide service in a radius of 1 km. The operator goes to each house to sell the service and collects the bill every month. He/she is available even on Sunday evening if any repair is needed. This level of accountability has resulted in less-trained people providing better service using a far more complex technology, than that used by better-trained technicians (of incumbent telecom companies) handling relatively simple telephone wiring. However, what is even more important is that such a small-scale entrepreneur incurs manpower costs several times lower than that in the organised sector. Such lower costs have been passed on to subscribers making cable TV affordable.[14]

Since incumbent telecom companies, even those that used corDECT, stuck to high-cost business models of delivery, TeNet decided to complement their local access technology solution with a business model that would provide connectivity at the lowest possible cost. They planned to set up a Rural Service Provider (RSP) to cater only to rural areas, and provide cheap telephony and Internet by employing the distributed business model like that of small private cable operators. However, getting a Basic Service Operator (BSO) licence for telephony was very difficult for small players under current regulations. Fortunately, regulation changes made getting an ISP license easy[15]. The group launched the company n-Logue, which calls itself a 'Rural Internet Provider'[16]. N-Logue uses corDECT technology and works on a decentralised business model, where local entrepreneurs provide the last mile connectivity.

Since n-Logue does not have a telephony license, even with a complete infrastructure in place, they are not able to provide telephony services for which there is substantial matured demand. Professor Jhunjhunwala has been actively advocating with the government for allowing RSPs to provide telephony services in areas which are not served by big players[17] (which means no telephony service in these areas since the present regulations only allow limited number of players to provide telephony). Instead of an improvement in the regulatory environment, in 2003, the new telecom policy, under the guise of making a unified license (for all kinds of voice and data services, whether through wireless or fixed wire technologies) did away with the obligation for rural connectivity on telecom companies. The business prospects of n-Logue, which was partnering with some telecom companies to provide telephony through their RSP and help the telecom companies fulfil their mandatory quota of providing connectivity in under-served rural areas, suffered a further setback.

TeneT's strategy about taking telephony to rural masses through cheaper access systems and a decentralized private franchisee based business model was essentially sound, and would have succeeded. However, it was undermined by bad regulation, whereby n-Logue could not obtain a license for telephony, and its prospects for tie-up with the license holder were rendered more difficult since new regulation removed obligations on them for providing certain minimum rural telephony coverage. The task of rural telephony was left to the public sector provider BSNL, which still has the option to reduce its costs by relying on n-Logue's decentralized private franchisee based business model. However, it chooses not to exercise the option, even though it has adopted corDECT technology in many places. Similarly, even though at a few places n-Logue does still provides telephony, as a franchisee of private telephony licensees, the latter, in absence of regulatory obligations,

have not shown much inclination to expand the tie-up. There are several kinds of vested interests involved in major telecom companies' disinterest in partnering with a lower cost last mile access provider.[18]

All in all, n-Logue was left with few avenues to take telephony to rural areas despite having the cheapest technology solution and an infrastructure based on a low cost business model in place.

This has left them with the option of only providing Internet service to rural areas. They have also faced difficulties here.

## 2. Internet for Rural Users: Is there a Business Model Here?

N-Logue describes its business model for internet provision in rural areas in this manner. "n-Logue employs a three-tiered business model based on the belief that delivery and management of Internet services should devolve to the level of the supply chain that comes closest to the user of the service". This decentralised model of operation draws, in large part, from the success of cable TV operations in India.

N-Logue has adopted a dual approach to implementing the model, one based on a private franchise model, the other on a partnership with a local NGO.

### *2.1 The Private Franchisee*

In the franchise model, n-Logue, at the top level, provides equipment, training and support to a local entrepreneur (also called a Local Service Provider or LSP) and to kiosks serviced by the LSP, and also takes care of regulatory and connectivity issues. At the second level, n-Logue identifies and partners with the LSP in every area it plans to operate. These LSPs find subscribers, provide services and collect payments. At the bottom level are the village kiosks, which provide services and information aimed at the rural market. With the help of n-Logue, the LSPs recruit the local entrepreneurs who set up the kiosks"[19].

N-Logue began with a lot of optimism. In an article in the year 2001, when n-Logue started operations in Melur (in Madurai district of the state of Tamil Nadu) the project co-coordinator, Elizabeth Alexander, captured this optimism, quoting a local TV dealer. When he was asked how he would use the Internet, the dealer had said, "Give me the Internet and I'll tell you what I can do with it"[20]. After 3 years, the reality on the ground does not show that Internet connectivity turns so directly into value for most users[21].

Extending relatively affordable Internet connectivity to the end user was a big step, but this wasn't enough. It soon became evident to n-Logue that unlike telephony, Internet is far from a mature market. There were not many takers for Internet services.

Indeed, it was essential to develop usage and services, delivering a diversity of value-added services, around the Internet. For stimulating and supporting usage and value delivery over the connectivity, it was necessary to develop, incubate and support services and applications. However, unlike connectivity, these are not merely technology and business processes, but are much more complex social and socio-technical processes.

Most ICT expansion thinking extrapolates the spread of telephones to the possibilities connected with Internet expansion. Though there are obvious parallels here, the differences are crucial. The only service over telephony is voice messaging - generally synchronous. The service is known and understood, and easy to adapt to. It has been in use for a long time now leading to a high degree of familiarity with the technology and its use. And as the network effect[22] takes root, the value is firmly established. From here on, it is only a matter of affordability.

**Box 1 – Some facts about Melur, Madurai**

Madurai district is situated in the South of Tamil Nadu state and has seven blocks (a sub-district administrative unit) spanning an area of 3741 square kilometres. It is primarily an agricultural district with a density of about 733 persons per square kilometre. The district has a literacy rate of 79%.

The Melur block of Madurai district has a population of about 200,000 in over 80 villages, with a population density of about 289 persons per square kilometre. Around 78 per cent of the total population depends on agriculture. Labour migration is a common phenomenon in Melur. Several surveys have revealed that agricultural labourers find employment only for 65 to 70 days in a year. This had resulted in migration of labour to urban areas. West Asia, South East Asia and Africa are the most common destinations where migrants from Melur seek work mostly as unskilled or low skill workers.

On the other hand, the value delivery systems over the Internet are not as well established, especially in the context of rural communities in developing countries. Though Internet offers a much greater range of value delivery compared to the telephone, these value deliveries, except for personal communication, and some means of information transfer, require the incubation and development of systems and institutional frameworks, which are essentially, social processes. The experience of n-Logue in Melur confirms that since these processes take time, and conscious effort at a community level, a narrow profit orientation may not offer an ideal atmosphere in which to incubate these social systems and institutions.[23]

N-Logue realized that to sell Internet in villages, it has to first sell Internet based services, and these services need to be developed and orchestrated by it. N-Logue entered into partnerships with service providers, for services like health, education and e-government. However, web based services even today generate little revenue at n-Logue centres, and Prof Jhunjhunwala agrees that these services have not picked up.

Most of the revenue to the private franchisee come from ‘stand alone’ computer-based services like education modules, job work, print outs, DTP, digital photography, and some from Internet use, chiefly for ‘chatting’, including voice chats (mostly negligible). These revenues have not been enough to cover the costs of these centre operators.

At Melur, n-Logue set up 29 kiosks through private franchisees. Our field interviews revealed that most of these private franchisees are incurring losses, and are unable to repay the loans they took. Most are not really operational at all. In fact, some franchises are extreme-

ly critical of n-Logue, and have gone to the police and courts alleging false promises. They had been assured that they would get business support including back-end linkages with many service providers, and that they would earn enough to sustain their family in the rural setting. But this has not happened and the franchisees do not know what to do[24].

It is important to place in context, the perceived failure of n-Logue in Melur. The bottom-line is that the Internet per se is a non-starter in these rural contexts. But then how has n-Logue been able to get so many people to invest their money and take its franchise? The reason for this is that telecentre businesses like n-Logue, when first announced, attract a lot of interest among rural and peri-urban youth since most of these appear like 'self-employment schemes' coming tied with opportunities for soft loans to buy equipment to set up shop. Most of these interventions, including of n-Logue, have been designed in partnership with governments. There is a lot of educated unemployment in rural and peri-urban areas in the whole of India, and such easy possibilities of setting up a 'sunrise' business as promised are hard to resist, especially when the presence of the government partner, directly and indirectly as a facilitator of bank loans, gives the offer much credibility[25].

The CEO of n-Logue offers other reasons for the situation at Melur. He told us that the places where they have moved recently have more "enthusiastic" franchisees (implying that the older ones, like in Melur, who may be incurring losses are not good entrepreneurs).

But our evidence suggests that the failure of the business lies neither in n-Logue's false assurances (as perceived by disgruntled franchisees), nor in the lack of entrepreneurial capabilities of old franchisees (as claimed by n-Logue). The problem lies elsewhere: The applications, network of services and the social processes and habits that must be put in place for the Internet to achieve its potential in rural areas cannot take place in the commercially-driven environment of a private enterprise, where the entrepreneur is guided only by short-term profit and a purely business outfit like n-Logue. Obviously, the older franchisees have waited long and nothing has happened, while the new ones still believe what they have been told.

### *2.2 Making Connectivity 'Valuable' to Rural Users*

As described above, most of the current revenue of n-Logue franchisees flows from stand-alone computer services. Much of this comes from village students willing to spend some money on learning basic computers. This market can level off fast after an initial spurt. However, other computer based education courses have greater scope. But in this much depends on the capabilities of the centre operator. Job work, print outs and some digital photography, together with revenues from education, often does not add up to pay back the loans taken to set up the centre.

Both for impact on the community, and for revenues, services that leverage the Internet are most crucial.

A video-conferencing software, developed by the TeNeT group, which works on low bandwidth, is being seen atleast in the long term as the likely 'killer application'. Face to face interaction with service and information providers in areas of health, education, government, law and agriculture has found much favour with the villagers where video-conferencing has been tried out by n-Logue and others in Melur.

However, n-Logue is facing difficulties in promoting these video-conferencing based services and developing revenue models around them. There is an incubation period for the development and maturing of such services, and in the interim, villagers cannot easily be expected to pay money to sit through a chat with an agriculture expert, or a government official, informative as that may be. Even in the case of health consultations and school curriculum based remote-tuition - areas where value delivery is relatively straight forward - services are taking time to pick up. And in the interim, they may need to be provided free. (It is another issue that the poorer sections may just not be able to afford fees for such services even when they have matured.) And the private operator is not very keen on having his or her place run as a laboratory to mature social processes, when no cash is flowing in.

This raises the second approach to local service development pursued by n-Logue, a partnership with a local foundation.

## 3. The Partnership Approach: Dhan Foundation

When n-Logue began its operation in Melur in 2001, with 29 private operators, it also partnered with DHAN Foundation, a local NGO, to run some centres. In fact, both n-Logue and DHAN centres were part of a pilot project, named SARI (Sustainable Access in Rural India), a partnership also involving the government. DHAN is a grassroots NGO, which has been working for decades in the rural areas of Madurai district on issues of rural development through self-help groups (SHGs) at the village level. It works closely with the community, in a participative manner, on a range of issues like micro-finance, agriculture development etc. DHAN set up 37 ICT centres to bring the gains of the new ICTs to the excluded rural people, and especially use ICT opportunities in the areas DHAN already works in. Additionally, DHAN also installed Internet-enabled computers in 2 colleges, 8 secondary schools and two SHG offices in the community.

Though DHAN centres at present still take connectivity from n-Logue, relations between n-Logue and the Foundation are under strain. The management of n-Logue believes that NGOs in general do not make good partners in pushing the 'business', and that centre operators set up by NGOs like DHAN, do not have the initiative and drive because they are supported by the Foundation, and not completely dependent on the revenues to stay afloat.

DHAN Foundation, on the other hand, believes that n-Logue is a connectivity provider, and should stick to this job, and that it is not competent to develop community-oriented services in the rural areas. It feels that the company interferes unnecessarily in services development, which is a very localized and community oriented activity, and that DHAN is best left to do this on its own. And since DHAN doesn't take services support from n-Logue, and only takes the connectivity solution, they would like to get a discount (on the general connectivity plus services package for centre operators) on the cost incurred, which n-Logue doesn't give.

In fact, Seenivasan, of DHAN Foundation says:

> We are ready to buy the local access system equipment and run the local Intranet, as well as directly buy Internet connectivity from the backbone. N-Logue can provide vendor support on its technology and equipment. We cannot understand what else their role is. As for maintenance, basic technical expertise comes cheap in our area, and we can recruit some people to maintain the system.

DHAN Foundation operates its centres on a model different from n-Logue's private franchisee model. This approach, which is community oriented, lays limited emphasis on profits. The equipment at every centre is provided by the Foundation. DHAN also pays the operator INR 1000 (USD 22) a month, which supplements the revenues that the operators earn from providing services through the centre. DHAN has identified this amount as the sum needed to subsidize the operator in the period when services and the market for them are being developed. DHAN provides regular training and orientation to the centre operators, and also all kinds of support, which may be needed, including of maintenance.

While we found that the n-Logue office in Melur concerned itself mainly with attending to technical issues of providing connectivity, and collecting charges, the DHAN office which is in charge of running IT centres (DHAN calls it the "Resource Centre") acts as the hub for organising varied activities at the centres. It not only develops and supports various services, and help the centre operators market them effectively, it also develops local content for these centres and provides regular capacity building to the centre operators. The DHAN Resource Centre also organises DHAN staff and centre operators to go to colleges and schools where DHAN has installed computers to help with computer based education. In some villages, panchayats (village self-government bodies) also use DHAN centres for job work, and DHAN also encourages its SHGs to use the computer facilities at the village centres, and trains them for this purpose. Many centre operators are daughters of the members of various self help groups that DHAN has facilitated, or are otherwise connected to DHAN's work, and belong to poorer and disadvantaged sections of the community.

Obviously, this approach is different from the way n-Logue selects operators. For the latter, capacity to invest in setting up and sustaining business is a fundamental criterion in the selection, and this often means someone from the elite sections of the community. For DHAN, on the other hand, promoting equitable access to ICTs and the integration of ICTs with their basic organizational strategies and activities are the priority areas. Providing an opportunity to someone who is disadvantaged, to run the centre, is only a step to this larger objective.

The DHAN operators are directly dependent on the Foundation, and thereby obliged to it and to the general community to have a community service attitude. Often, the Foundation gets the operators to go from house to house, to develop community data bases, and organize other community services like information dissemination. During the house visit, the operator is also able to explain the nature of services available at the centre and encourage the villagers to come over and avail of some of these services. Since the operator is visibly engaged in community service that is evidently not self-serving, and also carries DHAN's credibility in the community, it is relatively easier for her to get the villagers over to the centre.

The Foundation also arranges with service providers for video-conferencing with villagers every day of the week, on a pre-advertised timetable, (a doctor one day, an agriculture expert the next, a government official on the third, and so on). And the DHAN centre operators provide free video-conferencing service[26] to groups that turn up. Usually, the service provider at the video-conferencing also provides the service pro bono. It is obviously easier for DHAN, with its credibility and long record of community service in the area to get these service providers, than it is for n-Logue to come and deliver such free services. DHAN also keeps close track of pressing community needs in shaping the services at the centres, something which comes naturally to DHAN since its functioning is based on self-group groups involving themselves in a range of community activity. In 2004, the area received abundant rainfall after many years of drought and there was a lot of demand for agriculture related information. DHAN arranged frequent video-conferences with agriculture experts to meet this demand.

In Melur many men work abroad, chiefly in West Asia, leaving their families behind. International calls are expensive, and it is easier to 'chat' over computers. However, most women folk in these families are from poor backgrounds and it not easy for them to begin using chat facility on computers. DHAN centre operators have been giving free training and trials to these women for chatting, including through video mode. Though this video mode of communication is richer than mere telephony, it is new, and villagers are still taking time to adapt to it. Ironically, a soft, community oriented approach gives better marketing results in the typical rural personal interactions-based community conditions, rather than the kind of hard-sell on a commercial pitch that n-Logue's private franchisees are encouraged to do. It is also not easy for a relatively well-to-do operator, as most franchisees of n-Logue are, to go house to house in the village to explain the services, and given the evidently self-serving motive, neither is the context very conducive to sell new propositions and services.

DHAN Foundation, while supporting community objectives, is also able to harness the entrepreneurial energy of the operators because it has created proper incentive structures to capture such enterprise (since the operator retains the revenues from the services offered). The Foundation keeps a close eye on the revenue flow, as well as the working of the operator. DHAN centres also provide other services available at n-Logue centres such as job work, DTP, computer education, browsing etc, which are sources of some revenue to the operators. Centre operators are encouraged to be innovative to increase their revenues, and DHAN provides all support in this regard. It is planned that when the revenue has risen sufficiently for the operator to support herself, the INR 1,000 (USD 22) subsidy will be phased out. Already, four centres operator have been identified as approaching this stage.

A summary comparison of the two approaches, the private franchisee and the DHAN Foundation is offered in tabular form below.

**A Comparison of n-Logue Private Franchisee and DHAN ICT centres in Melur**

| | n-Logue – Private Operator | DHAN Foundation |
|---|---|---|
| Connectivity | Provided by n-Logue through wireless (corDECT), using low cost decentralised business model, and is affordable | Provided by n-Logue through wireless (corDECT), using low cost decentralised business model, and is affordable |
| Initial investment in equipment at the centre | By the private operator, through bank loans | Put in by DHAN Foundation |
| Choice of centre operator | On basis of financial strength | Made by DHAN from among those with linkages with its community development programmes |
| | Mostly from stronger sections of the community | Mostly women from weaker sections of the society |
| Incentive for centre operative | Revenue from centre operation | Revenue plus stipend from DHAN |
| | Revenue are insufficient to cover costs | Stipend bridges the revenue - cost gap |
| Development of services | By n-Logue | By DHAN |
| | n-Logue not very successful, because most services need development and incubation periods in which revenues models may not exist. | DHAN is able to invest conscious efforts to develop and incubate useful services |
| | Not found efficient since linking with public service providers not easy for a business organisation | DHAN has community credibility and is able to get service providers to cooperate in the development and provision of services |
| Marketing of services in the community | By n-Logue and private operator | By DHAN and the centre operator |
| | Not very successful because of a short-term profit oriented approach, often inappropriate in rural community contexts | Successful: DHAN has community credibility, and the operator undertakes home visits and does community work like building databases for village resource mapping, disseminating useful information etc. |
| Orientation and objective of activity | To get enough revenues to sustain self, pay back loans and pay for connectivity to sustain other levels in the n-Logue value chain | To provide services useful to the community, and as far as possible also to increase revenues for improved sustainability |
| Services offered | Those which have clear revenue models – computer education, job work, print-outs, digital photography, browsing etc | Apart from all revenue based services, community services like video-conferencing with service providers, useful local content, useful information dissemination, computer education in schools, community database building, supporting SHG and village self-government activity etc |
| Current Status of ICT centres | Since revenues are not enough to cover costs, only a few (less than 10 out of 29) centres are still operating | Almost all 37 centres are operating and serving the community and developing new services, though revenues are still not enough to cover costs. DHAN plans to phase out monthly stipend as and when revenues are sufficient. |

## 4. Conclusions and Lessons

### *4.1 Community Control is Crucial*

The TeNeT - n-Logue - DHAN story offers a number of important and interesting lessons on the process of extending the benefits of ICTs to rural areas, that may be under-served, and to the poor and the disadvantaged in these areas.

- Appropriate technologies may need to be developed and incubated locally in developing countries, because those imported from the developed nations may not be suitable to local conditions and also not cost effective enough.
- Developing these technologies is best achieved when the technology R&D keeps close organic contacts with ICT efforts in the field.
- Wireless local access solutions may be the best way to reach connectivity relatively inexpensively to widely dispersed/ far-flung rural areas.
- Apart from appropriate telecom technology, especially of local access systems, an open, competitive and un-regulated last mile 'business model' of connectivity needs to be encouraged by the regulatory bodies. This will lower costs of connectivity.
- Just providing Internet in most rural communities does not automatically convert into value for the community. It appears that most ICT-enabled value deliveries, even if their transformatory potential is immense, will need to be mediated through development of new systems and institutional structures, as well as personal habits, which are social and socio-technical processes. These processes take great commitment, time and effort to be built.
- The interests of the poor and disadvantaged need to be protected, as well as actively promoted, through pro-active strategies in all stages – from developing appropriate technology and devising services to ensuring equitable access.

As we have seen above, there are a series of important steps in any sustainable and large-scale effort for brining the benefits of ICTs to excluded or marginalized communities. And there are important considerations to be kept in mind at each step. The case study also tells us how institutions and stakeholders interplay at each stage or link of the value chain (appropriate technologies – local access connectivity – services development – community interface), and these interactions can throw up a variety of results.

While the optimal institutional and ownership structure for extending the benefits of ICTs to disadvantaged sections and communities may vary contextually for each link or stage in an initiative, a few general lessons can be discerned.

It may be necessary to pool the competencies of more than one institution and stakeholder across the spectrum of private, public, NGO and community bodies. While it is often necessary to capture the enterprise and resources of the private sector for its virtues of innovation and accountability to parameters of efficiency through appropriate partnership structures, *it is almost invariably necessary that the crucial control of the partnership structure lie with a body that is accountable to the community.* Such a structured involvement of the community is a necessary condition for ensuring the interest of the poor and the under-privileged.

### *4.2 Ownership Issues at Each Link of the Chain*

The need for a community oriented ownership, that ensures accountability to the community at each link of the value chain involved in carrying the benefits of ICTs to rural areas and to disadvantaged sections, is borne out at all stages of the TeNeT – n-Logue - DHAN story.

The initial impulse and drive for creating appropriate technologies that could reach connectivity cheaply to rural India came from a publicly funded academic institute, and not from any of the multi-million dollar telecom R&D centres of private telecom companies, even after regulation had thrown the Indian market wide open to the private sector. And not only that, even when the TeneT group came up with corDECT, private companies did everything possible to undermine the technology by lobbying governments, through disinformation campaigns, and even buy-out attempts.

These telecom companies, in the face of weak regulation, also preferred to default on their rural connectivity obligations and pay penalties to regulators (which are very low compared to the 'losses' they would incur in connecting rural areas), rather than fulfil their obligations. And, later, when changes in the regulatory regime freed them of such obligations, they have shown little interest in partnering with n-Logue to use their telephone licenses for cheaper rural connectivity. In doing so they are ready to forego profits that n-Logue would have shared with them just for the use of their licenses, in areas in which they are anyway not interested. With the advent of the new regime, they have scaled back existing partnership commitments with n-Logue. Cheaper service models, which rely on last mile competition, do not suit these vertically integrated telecom companies, which can profit more easily from oligopolistic privileges. Unfortunately, the public sector provider (BSNL) often chooses to protect its turf, in a fashion similar to these companies, rather than to focus on public interest objectives. These objectives will be better served with lowering costs of delivery through a distributed last mile or local access business model, at least in under-served rural areas where in any case the BSNL does not make much revenue.

Even though n-Logue strongly asserts its private sector identity in its operations, it is important to remember that the company was born out of a concern of the TeNeT group, a group of public spirited academicians, to extend the benefits of the new ICTs to rural areas. The company is still owned and controlled by TeNeT. This background is visible in the fact that n-Logue refrains from doing internet business in big towns and cities.

But when the profit motive becomes the sole driving force, as in the case of n-Logue-private franchisee attempts to develop ICT-based services where market demand is weak, the failure to serve long term community interests, especially of the poor and the excluded, is thrown into relief. Under such conditions, when markets for a service may be immature and crucial community interests may be involved, public/community-based bodies are more appropriate to play a central role.[27]

The experience at Melur shows that the centres and services networks[28] owned and run by community based bodies, that co-opt private enterprise through institutional mechanisms, succeed much better than private services networks supporting private operators not only in providing equitable access to these services, but also for:

1. incubating social and socio-technical processes and systems for developing Internet based services and community habits, and
2. providing a complete range of ICT-based services useful for and needed by the community (even those with immature or non-existent revenue models).

A central role for a public or community body therefore appears to be very important in developing ICT-based services that meet crucial community needs, while also addressing issues of equitable access.

### *4.3 The Role of Private Enterprise*

The case study also shows that private enterprise almost always has some important contribution in ICT initiatives. The TeNeT group, though essentially controlled by the public spirited technologists, works much of its R & D today through companies set up in the IIT-M campus on venture capital. (Though it would be pertinent to say here that most of this venture capital is contributed by the alumini of IIT, Madras, working abroad, and this funding has some public service orientation).

N-Logue's experience with a distributed business model involving community based entrepreneurs also indicates that given a mature market for connectivity i.e. sufficient established demand (as there is for telephony), the local community-based entrepreneur can be very useful for providing connectivity at a relatively affordable price.

The model used by DHAN Foundation for its ICT centres demonstrates that although community control of ICT initiatives is essential for fulfilling community objectives, appropriate structures that capture the energies of private enterprise are also very useful.

The typical flip side about the role of public institutions, non- government organisations, and other community representative organisations is that there can be significant problems of accountability and of promoting and handling innovation. Professor Jhunjhunwala is critical of the strings that come tied with government funding of R&D. He states categorically, "our real work started only in 1995, when we stopped taking government funds for research, and began to rely solely on venture capital for incubating commercially viable technologies". The disenchantment with government funding for technology incubation projects comes from the experience of inept interference by the bureaucracy which constrains sustained effort.

The role of the regulatory bodies as well as of the public sector telecom company, both meant to protect public interest, has also been very unhelpful in the case of n-Logue, which has sought to extend connectivity at affordable prices to rural areas, which is clearly a public cause. And many NGO and government-run telecentres, in various ICT initiatives all over the world, are known to be very un-enterprising in developing services and promoting their use in the community. E-governance is often the key service that can provide a lot of initial support for telecentre activity in rural areas, but due to the absence of accountability frameworks, many government officials are un-cooperative in extending and supporting these services.

In such cases, enterprising private capital, working in structured partnerships with public and community bodies, exerts pressure for extracting accountability from its partners,

because the private player has to keep generating profits, and profits may depend on every partner doing their bit for the ICT initiative to work. Such a cross-sectoral accountability framework is especially useful to ensure that the various branches of the partnering government keep playing their crucial role in ICT services extension to rural areas with sufficient effectiveness.

### *4.4 Role of Government as the Major Development Agency in Rural Areas*

The pull of accountability from private partners in an MSP for the effective involvement of government agencies will however work only if senior government officials have considerable stake in the ICT initiative, and believe in its vision. When the ICT initiative at Melur was launched in 2001, as the SARI project, the district government was very enthusiastic in supporting n-Logue and DHAN. It not only provided backend support to e-governance services, but also put in much effort to make the initiative a success. However, with change in officials the support has faltered. At present, while DHAN (and to some extent n-Logue) is very active in developing the centres and the services network with the resources at its command, the local government at the district level appears to have all but withdrawn itself from the project. We found little evidence of government support. There is minimal support for e-governance services, and there is no formal or informal mechanism at the district office level for nurturing the ICT initiative.

Real and sustained value delivery over an ICT infrastructure first and foremost requires institution-building for new ICT possibilities, whether it be in the area of governance, health, education, livelihood support, or even access to markets. It is unlikely that an NGO like DHAN can do much more than it already has in this direction without greater support from the government. DHAN is playing its role well on the community side, making the community aware of ICT possibilities, developing the community's capacities and stimulating other bottom-up processes. However, it is now imperative that the government, as the largest development agency, organises to build the necessary ICT-based institutional interventions in key areas of development.

Unfortunately, the state government in Tamil Nadu, at present, seems to be taking a ''hands off" attitude - trusting that reaching connectivity to various parts of the state, together with some private or community enterprise working for developing services, will be sufficient to get the benefits of the new ICTs to all. The government through a government order has declared the SARI project a success and is rolling it out in all districts. But if the SARI experience at Melur, which was the pilot project, is anything to go by, the implication is that the government expects private entrepreneurs or some other non-government bodies to do all the hard work of institution-building, required for sustainable rural ICT initiatives. The government does not seem to believe that it will need to actively involve itself in developing services and institutions for this purpose. However, the experience of other states in India, where rural ICT initiatives have been much more successful,[29] seem to suggest that a sustained effort by the government is very important, perhaps irreplaceable, for this purpose.

[1] A publicly funded technology institute in India, of world repute.

[2] Registered as a non-profit company. See http://www.tenet.res.in/wll/tenet.html.

[3] 'Making the Telecom and IT Revolution Work for Us' by Professor Jhunjhunwala, http://www.tenet.res.in/Papers/techolo.html

[4] Indian currency, Rupees; around 43 Rupees equals 1 USD

[5] Jhunjhunwala, op. cit

[6] ibid

[7] Bharat Sanchar Nigam Limited

[8] Jhunjhunwala, op. cit

[9] Jhunjhunwala's paper, op. cit. gives an account of how innovative telecom technologies that are not backed by the muscle of big companies have fared.

[10] For INR 35, 000 (USD 814) as compared to cost of standard ATMs at INR 700, 000 (USD 16,300)

[11] In a very good example of public money pitching in a timely manner at the right place, the state government of Tamil Nadu (IIT-Madras is in Tamil Nadu, as is Melur and Madurai, where we studied the field project employing corDECT technology) plans to put tall towers at key rural hubs, which can be used for free by any wireless connectivity provider.

[12] See www.tenet.res.in/presentation/wwrf_jun04.pdf

[13] The cable market in India is mostly non-corporatised, and is in hands of individual cable operators from the communities they serve.

[14] Jhunjhunwala, op.cit

[15] Anyone could become the ISP by paying a token licensee fee of INR 1. However recently, under pressure from the incumbent public sector telecom player, BSNL, GOI has reversed the decision and introduced substantial license fees (INR 100 million - USD 2.2 million - licence fees, apart from 8% revenue share).

[16] N-Logue has mandated itself to operate in only rural and small town areas. Putting such a limitation on itself of course may appear to go beyond business sense and represents the development orientation of the company promoters.

[17] There have been recent moves in policy in favour of niche service providers.

[18] Recently the regulator, TRAI recommended unbundling of the last mile infrastructure of all telecom infrastructure owners. However, Government of India, under pressure from BSNL did not approve the proposal.

[19] http://www.n-logue.com

[20] http://www.tenet.res.in/Press/15022001.html

[21] N-Logue today operates in 7 Indian states, of which it is has a major presence in Tamil Nadu, Maharashtra and Gujarat,. Our observation and analysis here comes from a field study done in Melur,

in Madurai district of Tamil Nadu, which is the place that n-Logue first set up its operation.

[22] In the case of telephony, the network effect simply implies that one has a certain number of other persons to relate to, who use telephones

[23] This is also borne out in the experiences of other profit-driven telecentre models in India. More importantly, the Internet's transformatory potential in most areas of human activity needs to be reached equitably to the poor and the disadvantaged, if we are to serve an inclusive rather than further an exclusionary agenda. These sections may just not be able to pay for the new services at market rates.

[24] n-Logue was not very forthcoming with actual data on how many centres were running successfully, and their bottom lines. The assessment here is based on field interviews in Melur. One good indicator of the number of operating private franchisee centres would be the number of the operators who turn up for the quarterly ICT centre operators' meeting in Melur. Only 1 to 4 of the n-logue operators have been turning up as compared to almost the all of 37 operators belonging to a local NGO also operating ICT centres in Melur (discussed later). n-Logue has also faced problems of private franchisees going to the police and the courts in the neighbouring district of Erode. These experiences have been described by a centre operator in the 'India e-gov' discussion list dated October 5, 2004, and also catalogued by C. Umashankar, senior government bureaucrat and an e-governance expert (India egov list, October 8, 2004) (http://groups.yahoo.com/group/India-egov/).

[25] Private telecentre businesses built on such promises and hopes, that do not get supported by services orchestrated by a suitably strong and otherwise capable agency, have been crashing all over India. See the story 'Systems error at Bengal cyber kiosks' carried in the 'The Financial Express' (23-12-04) about one such 'scheme' where private franchisees have been left suffering huge losses after setting up telecentres on promise of services support of an Indian state government that did not come through. (http://www.financialexpress.com/fe_full_story.php?content_id=77669)

[26] Since the service provider for video-conferencing is often connecting from within Melur itself, the video-conferencing can proceed without use of Internet bandwidth, from within the n-Logue's corDECT wireless Intranet connecting all the Melur centres.

[27] Currently n-Logue is concentrating a lot on the state of Gujarat, where its activities have a very strong government role and participation.

[28] Network of ICT-based services that develop and deliver a variety of services, sharing some common infrastructure, management and linkages to service providers.

[29] In Kerala and Andhra Pradesh; the rural initiative of these states are presented in two other case studies, accompanying this one.

# Community Owned NETWORKS: FAQ

## A. What are Community-Networks?

### *1. What does 'community-owned' Mean in practice?*

'Community-owned' means that the local community has a significant degree of control over key characteristics of a network, such as the nature of services offered, tariffs charged, and disposal of surplus income. Furthermore, the primary goal of the network is to serve the needs of all members of the community, including poorer and marginalised members.

In some cases, this means direct community ownership in the form, for instance, of a cooperative. In others the community may be part-owner, along with others such as local entrepreneurs or the public sector. But the right of the community to decision-making may also derive not from legal ownership *per se*, but be guaranteed in the legal constitution of an entity. Local authorities or municipalities, too, may own and run networks on behalf of communities.

What all have in common is that services are deployed explicitly with the *goal of serving the community*, and that the community has a *strong and ongoing* influence and commitment.

### *2. Does the community also operate the network?*

Not necessarily. In some cases communities may be directly involved in operating the network. A community cooperative, for instance, usually elects the Board which employs the staff. In others, network management and maintenance may be the responsibility of a public body, a partnership or even a private entity, though it would be done in the best interests of the community served. Some community-owned networks also use local voluntary labour for specific tasks.

### *3. Why does community ownership of infrastructure matter?*

The World Bank has this to say about community-driven development:

"Experience demonstrates that by directly relying on poor people to drive development activities, community-driven development has the potential to make poverty reduction efforts more responsive to demands, more inclusive, more sustainable, and more cost-effective than traditional centrally led programs."[1]

Community owned networks take this principle and translate it into practical benefits for ICT networks. Community ownership means the service is cheaper to provide, better focused on real needs, supported by the community and can enhance other development activities.

### *4. Are there examples of community-owned networks?*

The idea has a surprisingly long history.

For over seventy years, community owned rural telephony networks have flourished in the USA and about 1,000 exist today. Among our Case Studies are two rural Polish cooperatives that modelled themselves on this experience in the early 1990s, and are doing very well, offering higher quality services than their private counterparts and contributing to local development efforts. (Case Study 1) There are also recent cases of local authority ownership with strong community input. The first telephony cooperatives in Argentina were established in 1960 in communities that the state monopoly declared unprofitable. Following privatisation of the state telephone company in 1989 they continue to play a vital role. Today more than 350 cooperatives provide 600,000 telephone lines, serving 8% of Argentina's population. Many, such as TELPIN, (Case Study 2) provide additional services such as broadband internet at prices much lower than those charged by national telecom companies. In Peru, a wireless network that links 13 rural villages is operated by a farmers' organisation whose main activity is coordinating irrigation and water use. (Case Study 3).

Other recent examples in India, the Akshaya and TeNeT/Dhan initiatives (Case Study 5 and 6), focus not just on access but on ICT service development and provision. These are 'hybrid' public, community and local enterprise efforts, but incorporating a strong, often determining, level of community influence.

## B. Rationale & Advantages

### *5. Where is the approach likely to be most needed?*

The impressive ICT growth in recent years has largely failed to reach poorer villages and towns in rural and remote areas. To the conventional investor, they generate the least return and require the highest investment. Yet ICTs can contribute significantly to poverty alleviation and social and economic development of these areas. New approaches are needed to provide access and affordable and relevant services to these communities.

Given the presence of certain factors, community-ownership is well suited to application in such environments and can make effective use of such communities' own limited resources.

### *6. What are the advantages of community-ownership?*

Community ownership can offer a number of advantages:

- It can mobilise cost-cutting community resources, including labour, public commons and community institutions;
- Services are tailored to actual local needs, and are geared to maximise overall community benefit, not focused on specific groups such as the well off;

- The infrastructure tends to be more highly valued by the community, better cared for and maintained;
- High rates of return demanded by private investment are avoided, and the enterprise is focused on providing the services not on extracting profits;
- Profits generated are reinvested in the community, in ICT services or in more general development;
- The enterprise itself can act as a catalyst for local development and empowerment, building up skills and institutional capacities.

Thus on the one side, it can reduce the cost of service provision; on the other it enhances the development dynamic and capacities of the community served. The benefits are not just to communities. Local businesses benefit from having the service available, and in some cases may play a direct entrepreneurial role in providing the services. Similarly, local or municipal government can use the services for a variety of purposes, from provision of services to attracting economic activity, and may also be directly involved.

### *7. What is the emerging evidence of impact on the local economy?*

The Poland cooperatives offer clear evidence of knock on effects in the local economy. Not alone is the existence of high quality ICT services a significant factors in attracting business, the cooperatives themselves have acted as a catalyst for other local enterprises. The experience gained by the community has been an important ingredient in improving the general local economic capabilities.

Argentina's 350 cooperatives directly employ 3,500 people and manage more than US$3 billion dollars in assets. Originally established when their communities were declared unprofitable by the former state monopoly, the cooperatives not only proved their economic viability, but the telecommunication services they provide also contibute to the development and economic vitality of their communities. The quality services provided by its telecommunication cooperative made the town of Pinamar more attractive to tourists from the city and contributed to its development as a major tourist destination (Case Study 2).

### *8. Are such networks a good use of public/community/development cooperation resources?*

ICT are increasingly recognised as an enabler of a wide range of development activities, from supporting small scale economic activity, to providing transparent and efficient public services, to improving health and education.

However, such benefits are not inevitable. Adopting a community-ownership approach is more likely to result in real benefits to the community, since it is the community that determines need and priorities.

The community-ownership model also ensures that surplus revenues generated by the network will be reinvested in the local community rather than distributed as profits to distant shareholders.

## C. Financing & Mobilization of Resources

### *9. Through what mechanisms have community-owned networks been financed?*

Community owned networks do not attract conventional investment, seeking to maximise returns. In practice, however, they are supported by a diversity of mechanisms. These include:

- Membership subscription: Although this depends on the disposable income of the community, it can generate considerable amounts in some cases.
- Conventional bank loans: Community-owned networks usually operate as businesses and loan repayment is scheduled in.
- State grants: In the USA, rural cooperative receive federal grants in recognition of the high cost of providing telephony in rural areas and to expand into services such as broadband. Polish cooperatives received grants for ongoing technical assistance, funded by USAID.
- Local authorities may also provide funding, recognising the value that ICT services will add to the potential of the area. In Poland, about 30% of funding came from local authorities, though they gained no formal voting power.

### *10. What are some additional possibilities for financing?*

Universal access funds, given their goal of extending access, could support community owned networks in areas beyond the reach of the market. At present these are often utilised to subsidise the provision of services by private companies. However, where local factors favour a community-owned network, there is every reasons to devote some funds to this solution. It can have a significantly higher development impact. In Peru both of the projects examined in the case studies were supported by FITEL, the universal access fund.

Community ownership may also open other funding possibilities, because of its development orientation and non-profit operation. The Argentinean cooperative, TELPIN, was able to get a significant amount of start up capital donated by a private firm.

### *11. If community-owned networks can be sustainable, why doesn't the private sector typically see the benefits of providing access and services?*

Private sector investors generally require a high rate of return on investment. The experience in Poland offered a direct comparison between investor-led companies and the cooperative approach, and the latter had a significant advantage since they could reinvest all their profits in the business. Many of the investor-led local networks were forced to sell.

Community owned networks can also reduce costs, through deploying the resources of the community, and this too adds a margin of viability above that available to the private sector.

However, in some cases local entrepreneurs and private sector can collaborate with communities to provide services, in a community-driven approach, as in the India case studies.

The entrepreneur makes a reasonable return and the community is provides with the services it needs.

## D. Success Factors

### *14. Are some technologies better suited for community-owned networks?*

Emerging technologies may soon significantly enhance the potential applicability of community owned networks, in terms of their economic feasibility and the types of environment in which they can be deployed. Certain characteristics especially of wireless technologies, such as WiFi, WiMax, corDECT and others, are especially suitable.

- They cost less to implement in rural areas, as compared to wired or cellular based solutions;
- They have a flat cost curves, offering only limited economies of scale, and are thus suited to small scale implementation;
- They are scaleable, in that they can be expanded incrementally;
- They are relatively easily maintained;
- They are flexible in terms of the services they can provide, including data and voice;
- They use open standards, and low-cost open source network management software is now available.

All of these favour deployment in rural communities, with relatively limited investment and technical experience, but capable of leveraging local resources.

### *15. In what situations are such networks likely to work best? Are there alternatives?*

Certain characteristics are conducive to a community owned network. Experience suggests that these include the following:

- The presence of *well-organised community development institutions* is important. Unless these already exist in some form, the level of commitment and organisation required to be successful is unlikely to be sustained. They can comprise anything from teacher-parent committees (as in a case in Laos), to community enterprises, to development committees, to local NGO, or local government that works genuinely with the citizenry.
- As is so often the case in community development activities, *strong local leadership* for the initiative is an important ingredient in motivating change, generating a sense of ownership and steering the entity through the stages of development.
- If *communities themselves identify a need for specific ICT services*, arising in the context of broader social or economic factors, an impetus is more likely to build up to see the process through. This will underpin local investment, willingness to pay, and sustainability of the service. Although some subsidy may be required, the community must also be able ultimately to afford the services.

- Community ownership of networks breaks new ground, and existing rules, regulation and practices have seldom been devised with them in mind. The *support of local or regional political leaders* can prove decisive in negotiating locally and with national authorities regarding licensing, regulatory, interconnection and other aspects.

Some of these factors can be reinforced with the right support. In circumstances where these factors are weak, local SMEs might be in a position to take the lead role, and engage closely with the community in various aspects of the service. However, as a general rule, the more influence, participation and responsibility of the community, the better the initiative will suit the development needs of the community as a whole.

### *16. What are the regulatory and other requirements for community-owned networks to succeed?*

Some or all of the following measures would support the emergence of community owned networks.

- Given the range of obstacles and requirements, a *policy strand at national level* would offer a good framework. It could identify and designate the areas that could benefit most, develop appropriate legal structures and tax exemptions for non-profit enterprises, and perhaps consider a centre or unit of some kind to design, provide and oversee support policies and actions.
- A *friendly regulatory environment* would need a number of elements. Technologically neutral licenses, cost-free license exempt spectrum (e.g. WiFi), flexibility in license award conditions, and fair or 'asymmetrical' interconnections fees or an 'open access' approach to backbone would all help. Universal service funds should also be opened to community owned networks, including for the service and content development end.
- *Investment and financing mechanisms*, both nationally and internationally, could be refined to suit community ownership, giving them ready access to existing development and investment funds, low-cost loans and donor funding; and creating structures designed to attract investment from the local area, from users and others.
- *Capacity building* is essential, including through establishing national pools of expertise, exchanges with and visits to experience elsewhere, general business and management training and technical assistance, and specific ICT-related actions.

### *17. What are some of the obstacles to community ownership of ICTs?*

The main obstacles include the following:

- Regulatory restrictions on the use of low-cost technologies to provide ICT services represent a major obstacle to innovative ICT development.
- The lack of appropriate legal structures for community enterprises makes it difficult for them to establish and to reinvest their resources in the community.
- Opposition from mainstream telecoms operators, for instance in relation to affordable interconnection charges, can cause significant delays and difficulties.
- The absence of tailored financing arrangements, from pubic investment, loans and donor funded programmes.

- The absence of a 'champion' in national or international ICT policy. The main thrust of international ICT policy is for the opening of markets for FDI and introducing competition. Community ownership does not figure highly in their priorities.

---

[1] Community-Driven Development, Philippe Dongier, Julie Van Domelen, Elinor Ostrom, Andrea Ryan, Wendy Wakeman, Anthony Bebbington, Sabina Alkire, Talib Esmail, and Margaret Polski. World Bank 2002.