INFORMATION AND COMMUNICATION TECHNOLOGIES FOR POVERTY ALLEVIATION

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e-Primers for the Information Economy, Society and Polity

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PREFACE

The information revolution is commonly talked about as a phenomenon that affects everybody, bringing fundamental changes to the way we work, entertain ourselves and interact with each other. Yet the reality is that for the most part, such changes have bypassed the majority of humankind, the billions of poor people for whom computers and the Internet mean nothing. However, in a growing number of instances, and as part of a quieter revolution, a variety of local organizations, aid agencies and government bodies are discovering that Information and Communication Technologies (ICTs) can be used to extend the reach of the information revolution to the poorest of people living in the remotest corners of the world.

Under the right circumstances, ICTs have been shown to be capable of inducing social and economic development in terms of health care, improved education, employment, agriculture, and trade, and also of enriching local culture. Yet making this possible is by no means straightforward, as it involves more than the mere deployment of technology and requires as much learning on the part of the promoters of the technology as on the part of its users. It is all too easy to introduce technology with great expectations; it is far more challenging to create the necessary conditions under which the technology can attain its full potential, requiring as it does the combined and coordinated efforts of a range of stakeholders with disparate interests.

Much of the evidence in support of the use of ICTs for alleviating poverty remains anecdotal, and initiatives are proceeding with little reference to each other. There is a need for field practitioners to take stock of the experience that has so far been accumulated. Each experiment in the field generates learning opportunities and there are no failures, except perhaps our own when we do not learn from past experience. Moreover, as experience accumulates, we can begin to make general sense of it by detecting recurring themes and patterns of relationships that can be usefully carried forward.

This e-primer is brought to you by United Nations Development Programme - Asia-Pacific Development Information Programme, in collaboration with the Government of India. APDIP seeks to create an ICT enabling environment through advocacy and policy reform in the Asia-Pacific region. The APDIP series of e-primers aims to provide readers with a clear understanding of the various terminologies, definitions, trends and issues associated with the information age. This e-primer on ICTs for Poverty Alleviation reviews contemporary initiatives at field level and synthesizes the learning opportunities that they provide. It serves as a practical guide for field implementers, offering not only a glimpse of best practices, but also a deeper understanding of how these have been applied in a range of instances.

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INTRODUCTION

The major aid agencies and donors, as well as many developing country governments, are becoming increasingly enthusiastic about the prospects for improving the effectiveness of their development activities by making Information and Communication Technologies (ICTs) available to poor people. This primer describes how ICTs are being used to alleviate poverty. It addresses the so-called digital divide, which describes the stark disparities between the few people with abundant access to ICTs and the vast numbers of people without any access at all, and describes the efforts that are being applied to overcome it.

Information and knowledge are critical components of poverty alleviation strategies, and ICTs offer the promise of easy access to huge amounts of information useful for the poor. However, the digital divide is argued to be the result rather than the cause of poverty, and efforts to bridge it must be embedded within effective strategies that address the causes of poverty. Moreover, earlier patterns of adoption and diffusion of technology suggest that ICTs will not achieve their full potential without suitable attention being paid to the wider processes that they are intended to assist and to the context within which they are being implemented.

There are many examples of successful implementation that allow for a synthesis of experience that can lead to an understanding of how to approach the use of ICTs for widespread alleviation of poverty.

ICTs are usually understood to refer to computers and the Internet, but many consider this view to be limited, as it excludes the more traditional and usually more common technologies of radio, television, telephones, public address systems, and even newspapers, which also carry information. In particular, the potential value of radio as a purveyor of development information should not be overlooked, especially in view of its almost ubiquitous presence in developing countries, including the rural locations in which the vast majority of the poor live.

This primer describes several examples of how ICTs have contributed to poverty alleviation, to a greater or lesser extent. Several case studies are given at the end. Some lessons learned from the examples are synthesized and it is shown how implementation efforts have to take into account the wide variety of factors that are critical for success. A poverty alleviation framework is presented to facilitate the full consideration of all such factors and the framework is used to analyse the outcomes of the cases and the factors that have influenced them.

So far, the use of ICTs for poverty alleviation has not achieved the status of a mass movement, despite the many promising results that have emerged from experimental installations. Aside from the difficulties of measuring their impact, which should not be underestimated, there are considerable challenges in turning a promising experiment into a mass deployment. The widespread diffusion of a technology beyond the pioneering adopters requires a number of key enabling factors that serve to reduce the uncertainties of adoption. Advocates of the use of ICTs for poverty have yet to formulate these enabling factors, although they are getting there.

Many of the factors that will define how ICTs will be integrated into existing community and national development initiatives are highly contextual in nature; dependent on existing norms of institutional behaviour and on how vigorously reforms can be implemented. As a result, diffusion and replication rates will vary among communities and between nations. In some cases, we can expect slow progress towards further diffusion of ICTs for poverty alleviation. This slowness will lead to criticism, and claims that ICTs are not capable of helping the world's poor. However, such comments will focus, inappropriately, on technologies rather than on how they are being used, and they will be based on an incomplete understanding of the factors involved and what is required to achieve desirable outcomes with ICTs. This primer intends to illuminate the various factors at play and to describe the relationships between them so that involved parties can have a clearer view of the challenges and a better idea of how to overcome them.

I. CONCEPTS AND DEFINITIONS

What is poverty, where is it, and how does it look when it has been alleviated?

Before examining how ICTs might be used to alleviate poverty, it is appropriate to consider what is actually meant by poverty. The World Bank reports that of the world's six billion people, 2.8 billion, almost half, live on less than US$2 a day, and 1.2 billion, a fifth, live on less than US$1 a day, with 44 percent of them living in South Asia. The Millennium Development Goals set for 2015 by international development agencies include reducing by half the proportion of people living in extreme income poverty, or those living on less than US$1 a day. The figure of US$1 income per day is widely accepted as a general indicator of extreme poverty within development discourse, but of course there is no absolute cut-off and income is only one indicator of the results of poverty, among many others.

Figure 1

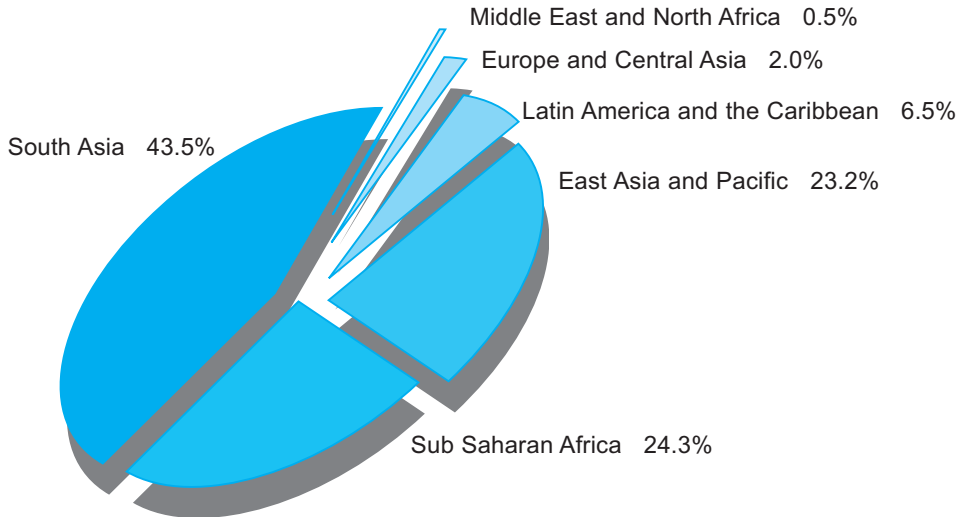

Figure 1 indicates the global distribution of poverty (World Bank, 2001/2002).

The World Bank report goes beyond the view of income levels in its definition of poverty, suggesting that poverty includes powerlessness, voicelessness, vulnerability, and fear. Additionally, the European Commission suggests that poverty should not be defined merely as a lack of income and financial resources. It should also include the deprivation of basic capabilities and lack of access to education, health, natural resources, employment, land and credit, political participation, services, and infrastructure (European Commission, 2001). An even broader definition of poverty sees it as being deprived of the information needed to participate in the wider society, at the local, national or global level (ZEF, 2002).

The assertion that a knowledge gap is an important determinant of persistent poverty, combined with the notion that developed countries already possess the knowledge required to assure a universally adequate standard of living, suggest the need for policies that encourage greater communication and information flows both within and between countries. One of the best possible ways to achieve this greater interaction is through the use of ICTs. But when this happens, how is it possible to measure the effects?

Increases in household income that can be directly attributed to the use of ICTs are probably easy to isolate with careful research. Changes in the other characteristics of poverty, such as voicelessness and vulnerability, will be harder to tease out with research, and are best detected by asking the people concerned directly.

Experiences with field evaluations of ICTs that were deployed to alleviate poverty have been mixed and are controversial. Pilot projects have often failed to deliver expected benefits quickly enough for their funding agencies, or they have delivered unexpected benefits that the evaluators have difficulty accounting for. Usually, the time scales that communities require to fully appropriate ICTs and to use them to achieve significant benefits far exceed the expectations of the technology promoters and/or evaluators, who run out of patience and prematurely and inappropriately declare the project a failure.

What is the "digital divide"?

The uneven global distribution of access to the Internet has highlighted a digital divide that separates individuals who are able to access computers and the Internet from those who have no opportunity to do so. Kofi Annan, Secretary-General of the United Nations, has said:

> *The new information and communications technologies are among the driving forces of globalisation. They are bringing people together, and bringing decision makers unprecedented new tools for development. At the same time, however, the gap between information 'haves' and 'have-nots' is widening, and there is a real danger that the world's poor will be excluded from the emerging knowledge-based global economy. (Anan, 2002)*

A few statistics serve to highlight the alarming differences between those at both ends of the digital divide:

- All of the developing countries of the world own a mere four percent of the world's computers.
- 75 percent of the world's 700 million telephone sets can be found in the nine richest countries.
- There are more web hosts in New York than in continental Africa; there are more in Finland than in Latin America and the Caribbean combined.
- There were only 6.3 million Internet subscribers on the entire African continent in September 2002 compared with 34.3 million in the UK. (Nua Internet)

Table 1 shows the gap in Internet access between the industrialized and developing worlds. More than 85 percent of the world's Internet users are in developed countries, which account for only about 22 percent of the world's population.

Table 1. Online Users as of September 2002	
World Total	605.60 million
Africa	6.31 million
Asia/Pacific	187.24 million
Europe	190.91 million
Middle East	5.12 million
Canada & USA	182.67 million
Latin America	33.35 million
Nua Internet	

Looking more closely at the access statistics reveals further levels of inequality within the developing countries that are least served. Typically, a high percentage of developing country residents live in rural areas. The proportion can rise to as much as 85 percent of the population in the least developed countries and is estimated at 75 percent overall in Asia. Rural access to communication networks in developing countries is much more limited than in urban areas. Table 2 depicts global teledensity levels (main lines plus cellular subscribers), indicating that the USA has more telephones than people, whereas Africa has a mere 6.6 telephones per 100 inhabitants.

In developing countries, rural teledensity is even lower than the global figures might suggest because of the differences between them and their urban counterparts. In the poorest countries, the already low urban teledensity can be three times or more that of the rural areas, whereas in the richest countries it is about the same. Table 3 shows how Internet host and personal computers are distributed throughout the world, further highlighting the gaps between developed and developing nations.

Table 2. Global teledensity levels, landlines and cellular subscribers (ITU)					
	Population Millions	GDP US billions	GDP Per capita US$	Telephone subscribers	
				Total (000s)	Per 100 Inhabitants
	2002	2001	2001	2002	2002
North America	319.8	10,912.8	34,125	362,577	113.4
Rest of Americas	530.6	1,886.2	3,555	188,729	35.6
Japan	127.3	4,143.8	32,554	149,386	117.4
Rest of Asia	3491.4	4,110.5	1,177	712,754	20.4
Africa	805.6	561.6	723	52,735	6.6
Europe	799.6	9,125.6	11,428	719,143	89.8
Oceania	31.76	422.5	13,655	28,075	88.9
World	6106.2	31,163.5	5165	2,213,399	36.4

Not surprisingly, the digital divide mirrors divides in other resources that have a more insidious effect, such as the disparities in access to education, health care, capital, shelter, employment, clean water and food. These other divides can arguably be viewed as being a result of an imbalance in access to information—in short, the digital divide—than its cause. Information is critical to the social and economic activities that comprise the development process. Thus, ICTs, as a means of sharing information, are a link in the chain of the development process itself (ILO, 2001).

Table 3. Internet host and personal computer distribution

	Internet				Estimated PCs	
	Hosts Total	Hosts per 10,000 Inhabitants	Users (000s)	Users per 10,000 Inhabitants	Total (000s)	Per 100 Inhabitants
	2002	2002	2002	2002	2002	2002
North America	109,083,612	3,411.0	170,200	5,322.1	193,300	60.4
Rest of America	3,412,479	64.3	35,458	668.3	32,533	6.1
Japan	7,118,333	559.2	57,200	4,492.6	48,700	38.3
Rest of Asia	3,684,804	10.6	143,879	412.1	91,692	2.6
Africa	281,184	3.5	7,943	99.6	8,708	1.23
Europe	18,363,144	229.7	166,387	2,079.0	156,896	20.0
Oceana	3,035,008	955.7	10,500	3,300.5	11,931	38.9
World	144,978,564	238.3	591,567	972.2	543,759	9.22
(ITU)						

Does the digital divide refer only to access to technology?

Eliminating the digital divide requires more than the provision of access to technologies. According to the International Labour Organization (ILO), although ICTs can contribute significantly to socio-economic development, investments in them alone are not sufficient for development to occur (ILO, 2001). Put simply, telecommunications is a necessary but insufficient condition for economic development (Schmandt et. al, 1990).

Martin and McKeown suggest that the application of ICTs is not sufficient to address problems of rural areas without adherence to principles of integrated rural development. Unless there is at least minimal infrastructure development in transport, education, health, and social and cultural facilities, it is unlikely that investments from ICTs alone will enable rural areas to cross the threshold from decline to growth (Martin and McKeown, 1993).

The digital divide then goes beyond access to the technology and can be expressed in terms of multiple dimensions. And if societies wish to share the *benefits* of access to technology, then further provisions have to be made in order to address all of the dimensions of the digital divide. Table 4 summarizes these dimensions.

These dimensions of the digital divide imply a variety of societal concerns that have to do with education and capacity building, social equity, including gender equity, and the appropriateness of technology and information to its socio-economic context.

Table 4. Dimensions of the Digital Divide	
Service availability	The services made available through the use of ICTs should be freely available to all who might wish to make use of them.
Awareness	Everyone is aware of how they might be able to use ICTs for their own benefit.
Opportunity to learn and use new media	Everyone has the opportunity to attain computer literacy.
Mastery of technologies	Everyone understands which tools are best suited for which tasks.
Experience	Everyone is able to accumulate sufficient experience with the use of ICTs to enable them to fully exploit their potential.
Skills	Everyone has the right skills for performing ICT related tasks.
Support	Everyone has access to appropriate assistance when they need it to help them make good use of ICTs.
Attitudes (motivation)	Everyone is encouraged to participate in the sharing of benefits available from equal access to ICTs.
Content	Sufficient content is available to enable everyone to gain benefit from ICTs.
Cultural	The other dimensions are adapted as required to the cultures of all potential users.
Disability	The other dimensions are adapted as required so that disability is not a barrier to equal enjoyment of the benefits of ICTs.
Linguistic	The other dimensions are adapted as required so that language is not a barrier to equal enjoyment of the benefits of ICTs.
Gender	The other dimensions are adapted as required so that gender is not a barrier to equal enjoyment of the benefits of ICTs.
Empowerment of civil society	Structural, political, and governance factors do not impede equal enjoyment of the benefits of ICTs.

Furthermore, some consider even the use of the term “digital divide” to be problematic. First, it is not the real issue; it is the information and knowledge gap that is the real concern and in that regard, the multiple dimensions in Table 4 deserve equal attention. Second, talk of a digital divide often implies that digital access alone will overcome the associated problems. Digital access requires only purchase and installation of technology. In fact, the multiple dimensions of the digital divide imply that it is not money and technology that matter but the right

approach, and unless the other divides are also addressed, crossing the digital bridge will not achieve much. Finally, and possibly more significant, is an understanding of the patterns of cause and effect. As the G8 DOT Force report points out, the digital divide is a reflection of existing broader socio-economic inequalities, and a symptom of much more profound and long-standing economic and social divides within and between societies. The report goes on: "There is no dichotomy between the 'digital divide' and the broader social and economic divides which the development process should address; the digital divide needs to be understood and addressed in the context of those broader divides." (G8 DOT Force, 2001).

The argument seems to be that the digital divide is the result rather than the cause of poverty, and that efforts to "bridge the digital divide" and increase access to ICTs, unless clearly rooted in, and subordinate to, a broader strategy to combat poverty, risk diverting attention and resources from addressing its underlying causes, such as unfair trade policies, corruption, bad governance and so on. In the next section, we examine the crucial aspect of how ICTs should be embedded within strategies for combating poverty so that both (the ICTs and the strategies) can achieve their optimal effect.

What information technologies are capable of alleviating poverty?

In this section we will discuss the following ICTs: radio, television, telephones, public address systems, and computers and the Internet.

Radio

Radio has achieved impressive results in the delivery of useful information to poor people. One of its strengths is its ubiquity. For example, a recent survey of 15 hill villages in Nepal found radios in every village, with farmers listening to them while working in their fields. Another survey of 21,000 farmers enrolled in radio-backed farm forums in Zambia found that 90 percent found programmes relevant and more than 50 percent credited the programmes and forums with increasing their crop yields (Dodds, 1999). In the Philippines, a partnership programme between UNESCO, the Danish International Development Agency and the Philippine government is providing local radio equipment and training to a number of remote villages. The project is designed to ensure that programming initiatives and content originate within the communities. According to UNESCO, the project has not only increased local business and agricultural productivity, but also resulted in the formation of civic organizations and more constructive dialogue with local officials (UNESCO Courier 1997).

In South Africa, clockwork radios that do not require battery or mains electricity supplies are being distributed to villages to enable them to listen to development programming. The Baygen Freeplay radio marks one of the first commercially successful communication devices to employ a clockwork mechanism as its power supply. It is sold on a commercial basis for approximately US$75 and has been used extensively by a number of non-governmental organizations as a key element

in community education programmes and disaster relief efforts. For instance, the National Institute for Disaster Management in Mozambique distributed Freeplay radios so that flood victims could receive broadcasts on the weather, health issues, government policy toward the displaced, missing family members, the activities of the aid community, and the location of land mines. In Ghana, the government distributed 30,000 Freeplay radios so villagers could follow elections.

In Nepal, a digital broadcast initiative is being tested that will broadcast digital radio programming via satellite to low-cost receivers in rural and remote villagers. The programme is targeting HIV/AIDS awareness, and has the potential to link with computers to receive multimedia content.

Community radio projects indicate how communities can appropriate ICTs for their own purposes. For example, in Nepal, two community radio stations are well established—Radio Lumbini in Manigram in western Nepal and Radio Madan Pokhara in Palpa District. The Village Development Committee holds one licence and a community group holds the other. Both services have proven to be very popular. Ownership of radio receivers in the coverage areas has increased dramatically (shown as 68 percent in the census). Programmes include valuable development messages, such as AIDS awareness and prevention. The Kothmale community radio station in Sri Lanka[1] accepts requests for information from community members and searches the Internet for answers, which it then broadcasts on the air.

Television

Television is commonly cited as having considerable development potential, and some examples of using it for education are given later in the report. Probably the most notable example of TV for development comes from China with its TV University and agricultural TV station. In Viêt Nam, two universities in the Mekong Delta Region work with the local TV station to broadcast weekly farmers workshops that are watched by millions.

Telephone

The well-known case of Grameen hand phones in Bangladesh, in which the Grameen Bank, the village-based micro-finance organization, leases cellular mobile phones to successful members, has delivered significant benefits to the poor. The phones are mostly used for exchanging price and business and health-related information. They have generated information flows that have resulted in better prices for outputs and inputs, easier job searches, reduced mortality rates for livestock and poultry, and better returns on foreign-exchange transactions. Phone owners also earn additional income from providing phone services to others in the community. Poor people account for one-fourth of all the phone calls made. For villagers in general, the phones offer additional non-economic benefits such as improved law enforcement, reduced inequality, more rapid and effective communication during disasters and stronger kinship bonding. The phones also have perceptible and positive effects on the empowerment and social status of phone-leasing women and their households (Bayes et al., 1999).

[1] http://www.kothmale.net/

A study in China found that villages that had the telephone, the most basic communications technology, experienced declines in the purchase price of various commodities and lower future price variability. It also noted that the average prices of agricultural commodities were higher in villages with phones than in villages without phones. Vegetable growers said that access to telephones helped them to make more appropriate production decisions, and users of agricultural inputs benefited from a smoother and more reliable supply. Better information also improved some sellers' perception of their bargaining position vis-à-vis traders or intermediaries. Finally, village telephones facilitated job searches, access to emergency medical care and the ability to deal with natural disasters; lowered mortality rates for livestock thanks to more timely advice from extension workers; and improved rates in foreign-exchange transactions (Eggleston et al., 2002).

Public address systems

Public address systems are commonly found in China and Viêt Nam where they are used to deliver public information, announcements and the daily news. One community in Viêt Nam is planning to augment its public address system by connecting to the Internet to obtain more useful information for broadcasting. Public address systems are more localized than radio, but are technically simpler and less expensive. However, research on poor communities suggests that the telephone and radio remain the most important (direct access) ICT tools for changing the lives of the poor (Heeks, 1999).

Computers and the Internet

Computers and the Internet are commonly made available to poor communities in the form of community-based telecentres. As the examples cited in this report and the case studies in the annex show, community-based telecentres provide shared access to computers and the Internet and are the only realistic means of doing this for poor communities. Although telecentres come in many guises, the two key elements are public access and a development orientation. It is the latter characteristic that distinguishes telecentres from cyber cafés. Of course, the cyber café can be a useful device in fostering development through ICTs, but the difference is crucial, because development-oriented telecentres embody the principle of providing access for a purpose—that of implementing a development agenda.

To achieve their development objectives, telecentres perform community outreach services in order to determine the types of information that can be used to foster development activities. Computer literate telecentre staff act as intermediaries between community members who may not be familiar with ICTs and the information services that they require. Telecentres can provide a range of ICT-based services from which they can earn an income, such as telephone use, photocopying and printing, email and word processing. This helps with financial self-sustainability, which telecentres are often required to attain, although some argue that ICT-based development services should not have to be paid for by poor people, and should be provided as a public service, rather like libraries. The results of experiments with telecentres are mixed: some have demonstrated considerable benefits for their target audiences; others are struggling with fragile connectivity and uncertain communities. Very few have achieved self-financing sustainability.

II. DEVELOPMENT STRATEGIES AND ICTS

What is the relationship between development, information and ICTs?

There is a risk that the argument in support of ICTs for development will be used excessively, in support of projects that cannot otherwise be justified by more rational means. The attendant danger is that the concept of ICTs for poverty alleviation loses credibility among development planners and decision makers. Nevertheless, the potential of information as a strategic development resource should be incorporated as a routine element into the development planning process, so that project managers become used to thinking in these new terms.

The most effective route to achieving substantial benefit with ICTs in development programmes is to concentrate on re-thinking development activities by analysing current problems and associated contextual conditions, and considering ICT as just one ingredient of the solution. This implies an approach to developing strategies for information systems and technology that are derived from and integrated with other components of the overall development strategy. This approach is depicted in Figure 2.

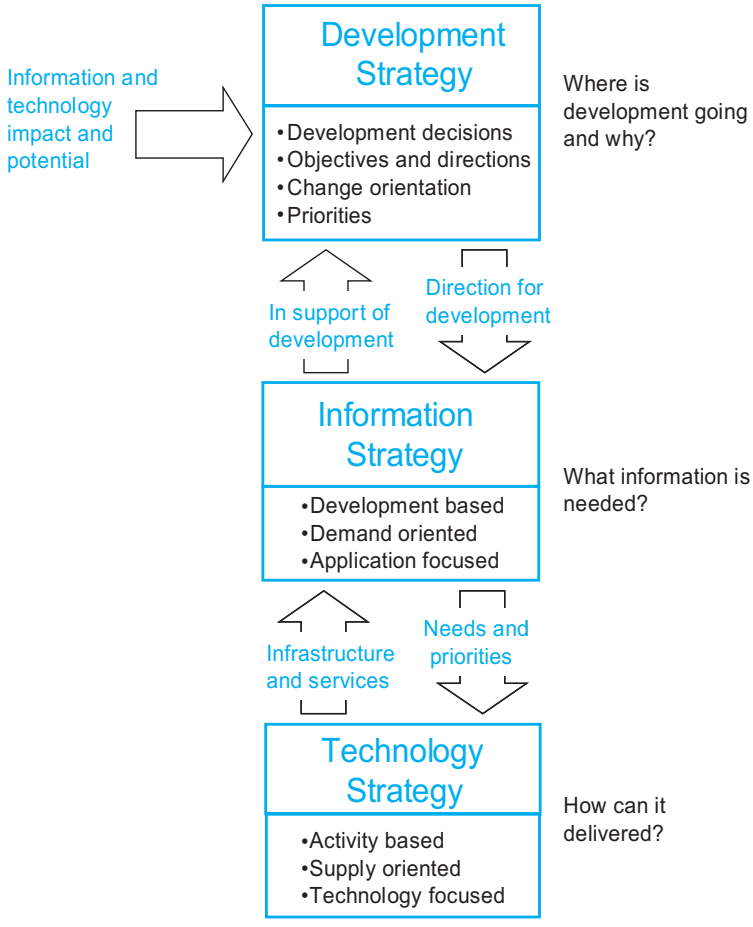

Figure 2. The Relationship Between Development, Information and ICTs

The general rule is that the application of ICTs to development should always begin with a development strategy. From that, an information plan for implementing the development strategy can be derived and only out of that should come a technology plan. While strategic thinking can be informed by an appreciation of the capabilities of ICTs, it is essential to have clear development targets that are specific to the context before the form of use of the ICTs is defined. Additionally, in considering the development strategy, bottom-up, demand-driven development objectives are usually preferable to top-down, supply-driven objectives, so that goals begin with an appreciation of the needs of development recipients as they would themselves express them.

From an unambiguous articulation of the development strategy, an information plan is drawn. This will set down the information resources required to achieve the development strategy. Again, this determination can be made against an informed background with regard to the capabilities of ICTs, but it should not be driven by the mere application of technology. Finally, a plan for the technology can be drawn up that will be capable of delivering the information resources required for the achievement of the strategy.

Although such an approach makes sense intuitively, there are many examples of technology-related development projects that are technology-driven, top-down and supply-driven, and they often result in sub-optimal outcomes because of this.

Modelling the relationship between ICTs and development addresses the earlier comments about the digital divide in greater depth. The model is applicable at all points at which closing the divide is attempted. It was developed to facilitate a grass-roots implementation targeting community development where heavy emphasis was placed on empowering the community to construct their own agenda for ICT-assisted development, prior to introducing the technology (Harris et al., 2001).

In the next section, a number of technology-related development initiatives are described, and the reader might wish to reflect on the extent to which the outcomes of each were a result of deploying technology or of implementing a sound development strategy. The earlier discussion of some of the technology choices available underscores the need to be clear about the development and information delivery strategies before deciding on the technology. In highlighting where such strategies may be applied, subsequent sections provide a brief overview of the major areas of application of ICTs to poverty alleviation that have been observed to offer some promise.

What strategies for poverty alleviation have been successfully pursued with the use of ICTs?

Distributing locally relevant information

In the case of Internet diffusion, a consistent finding of surveys of Internet users and providers in developing countries is that the lack of local language and locally relevant content is a major barrier to increased use. Unless there is a concerted effort to overcome this constraint, Internet growth in many developing countries could be stuck in a low-use equilibrium (Kenny et al., 2001). The undersupply of pro-poor local content inhibits the virtuous circle, known as the network effect, whereby the growth of the on-line community makes the development of Internet content a more attractive commercial and social proposition, and increasing amounts of attractive content encourages the growth of the on-line community.

In the Village Information Shops in Pondicherry, India, a major contributory factor to all operations is the use of Tamil language and Tamil script in the computers (Sentilkumaran and Arunachalam, 2002). Despite there being no standard for the representation of Tamil in software at the time of implementation, the project staff were able to develop the use of Microsoft Office applications in Tamil script. Moreover, the applications are operated in Tamil using a western, Roman script QWERTY keyboard. The operators (semi-literate women) have learned the appropriate keyboard codes for the Tamil characters and are quite proficient at data entry. The centre in Villianur has generated a number of databases for local use, and all but one are in Tamil. The centres collect information on indigenous knowledge systems and are developing useful brochures in Tamil.

Beyond the entry of data, the extent to which use of the Tamil language has promoted the use of the information shops and fostered interactivity and engagement between the various information systems that are available and their intended beneficiaries, cannot be underestimated. Local content is directed towards the information needed to satisfy the communities' needs, and is developed in collaboration with the local people. There are close to a hundred databases, including rural yellow pages, which are updated as often as needed. An entitlements database serves as a single-window for the entire range of government programmes, fostering greater transparency in government. Relevant content is obtained from elsewhere if it is found useful to the local community. For example, useful information has been collected from Government departments, the Tamil Nadu Agricultural University, Aravind Eye Hospital and the US Navy's web site. The centres have held health camps in the villages in cooperation with local hospitals as part of gathering information about local health care needs. The centres use multimedia and loud speakers to reach out to illiterate clients, and publish a fortnightly Tamil newspaper called *Namma Ooru Seithi* (Our Village News), which has become so popular that Government departments such as the District Rural Development Agency, Social Welfare Board, and the Small Scale Industries Centre use it to publicize their schemes (Arunachalam, 2002).

The Gyandoot project in Madhya Pradesh State of India is an intranet in the district of Dhar that connects rural cyber cafés catering to the everyday needs of the masses[2]. It provides the following services:

- Commodity marketing information system
- Income certificate
- Domicile certificate
- Caste certificate
- Landholder's passbook of land rights and loans
- Rural Hindi e-mail
- Public grievance redressal
- Forms of various government schemes.
- Below-Poverty-Line Family List
- Employment news
- Rural matrimonial
- Rural market
- Rural newspaper
- Advisory module
- E-education

Targeting disadvantaged and marginalized groups

Within populations of poor people, disadvantaged and marginalized sections of society usually face impediments to using, and making good use of, ICTs in much the same way that they might face impediments in using other resources. Women in developing countries in particular face difficulties in using ICTs, as they tend to be poorer, face greater social constraints, and are less likely to be educated or literate than men. Moreover, they are likely to use ICTs in different ways, and have different information requirements than men. Women are also less likely to be able to pay for access to ICTs, either because of an absolute lack of funds or because they lack control of household expenditure. Constraints on women's time or their movement outside of the home can also reduce their ability to access technologies (Marker et al. 2002). Such groups usually require special assistance and attention in order to benefit from programmes that are targeted at poor people.

People who do not understand the English language are also a marginalized section of society on the Internet. Such people include the majority populations of French-speaking Africa, the Middle East, Eastern Europe and Latin America. Even when users have basic English proficiency, they are discouraged from using web sites that are only in English.

Strategies for reaching marginalized sectors of society through ICTs include the collection, classification, protection, and commercialization of indigenous knowledge by minority groups using ICTs. Traditional remedies are being recorded in databases and afforded protection from foreign applications for patents. The value of such practices is evident from the stringent rules imposed by the state government of Sarawak, Malaysia, on the island of Borneo, over the collection of flora samples in their rainforests, where a particular tree species promises to yield substances that might lead to a cure for HIV/AIDS. The Honey Bee network in India collects local innovations, inventions and remedies, stores them on-line, and helps owners obtain incomes from local patents and commercialization of inventions. The database contains more than 1,300 innovations. Similarly, the Kelabit ethnic group of Sarawak, one of Borneo's smaller ethnic minorities, are recording their oral history in a database of stories told by the old people. They are also using computers to assemble their genealogical records.

[2] http://gyandoot.nic.in/

The selling of handicrafts on the Internet by local artisans, a form of e-commerce, also provides buyers with the historical and cultural background of indigenous products. Traders in such products deliberately disconnect ethnic artefacts from the identity of the artists in order to keep down the prices at which they can obtain the artists' works. Providing the artisans with more direct access to their market through the Internet allows them to build up a clientele and achieve recognition as the creator of original art and crafts. Relatedly, web sites that feature aboriginal art can now be found with strict warnings against using Australian aboriginal designs without permission, seemingly in response to complaints that T-shirt manufacturers freely plagiarize designs without any recompense to the creators. Whether such warnings are effective is hard to tell, but at least the web site can be used to register ownership rights and to demonstrate priority in the creation of designs.

Nearly 80 percent of the world's disabled population of 500 million people lives in developing countries. Usually their disability only compounds the difficulties they already face as (possibly poor) citizens of developing countries. But like people who live in isolated and remote locations, they probably stand to gain far more benefit from being able to make good use of ICTs. Efforts to enable access to ICTs by disabled people are under way. One such effort relates to the development of adaptive technology, which is a major prerequisite for many people with disabilities to use computer technology. These are modifications or upgrades to a computer's hardware and software to provide alternative methods of entering and receiving data. Many of the modifications can be made relatively inexpensively. Some modifications can be as simple as lowering a computer desk while others can be as elaborate as attaching an input device that tracks eye movements. Common adaptive technologies include programs that read or describe the information on the screen, programs that enlarge or change the colour of screen information, and special pointing or input devices. There are standards and guidelines for World Wide Web accessibility and electronic document accessibility for individuals with disabilities. The Web Content Accessibility Guidelines set out by the Web Accessibility Initiative (WAI)[3] is the world standard for WWW contents accessibility.

Digital Divide Data Entry is a philanthropic organization that uses the Internet, the English language and the computer skills of Cambodia's youth to provide basic information services to North America corporations. They employ 10 disabled people to copy type documents into a computer, a simple task that requires only typing skills and a basic knowledge of English. The organization is currently working on a US$30,000 contract to input more than 100 years of archives of the Harvard University newspaper. Once completed, the work can be sent to the US via e-mail. There are plans to hire more disabled people, more women and more poor people, and to expand from data entry to more complicated tasks, like creating web pages and Power Point presentations.

[3] (http://www.w3.org/TR/WCAG20/)

Promoting local entrepreneurship

It has been claimed that ICTs have the potential to impact the livelihood strategies of small-scale enterprises and local entrepreneurs in the following areas:

- Natural capital - opportunities for accessing national government policies
- Financial capital - communication with lending organizations, e.g., for micro-credit
- Human capital - increased knowledge of new skills through distance learn ing and processes required for certification
- Social capital - cultivating contacts beyond the immediate community
- Physical capital - lobbying for the provision of basic infrastructure

To cite an example, India Shop is an Internet-based virtual shopping mall selling Indian handicrafts. Established by the Foundation of Occupational Development (FOOD) in Chennai, India Shop involves e-marketers who promote the goods over the Internet, through chat-rooms and mail lists. They work from a computer, either at home or in a cyber café, and draw commissions on the sales that they achieve. The e-marketers respond to sales enquiries and liase with the craftspeople, typically exchanging multiple e-mails with clients before sales are closed. There are more than 100 people marketers, earning between Rs2,000-Rs10,000 per month.

In Gujarat, computerized milk collection centres using embedded chip technology are helping ensure fair prices for small farmers who sell milk to dairy cooperatives. The fat content of milk used to be calculated hours after the milk was received; farmers were paid every 10 days and had to trust the manual calculations of milk quality and quantity made by the staff of cooperatives. Farmers often claimed that the old system resulted in malfeasance and underpayments, but such charges were difficult to prove. Computerized milk collection now increases transparency, expedites processing, and provides immediate payments to farmers (World Bank, 2002).

Indeed, small-scale entrepreneurs in developing countries, especially women, have shown the ability to harness ICTs for developing their enterprises. For example, a group of ladies in Kizhur village, Pondicherry decided that they wanted to start a small business enterprise manufacturing incense sticks. They began as sub-contractors but their confidence and enterprise grew from utilizing the local telecentre. As a result of some searches by the telecentre operators, they were able to develop the necessary skills for packaging and marketing their own brand name incense. The ladies were quickly able to develop local outlets for their products and they are confidently using the telecentre to seek out more distant customers.

ICT and e-commerce are attractive to women entrepreneurs (who in many developing countries account for the majority of small and medium-size enterprise owners), as it allows them to save time and money while trying to reach out to new clients in domestic and foreign markets. There are many success stories in business-to-consumer (B2C) retailing or e-tailing from all developing-country

regions, demonstrating how women have used the Internet to expand their customer base in foreign markets while at the same time being able to combine family responsibilities with lucrative work. However, in spite of the publicity given to e-tailing, its scope and spread in the poorer parts of the world have remained small, and women working in micro-enterprises and the informal sector are far from being in a position to access and make use of the new technologies. Moreover, B2C e-commerce is small compared to business-to-business (B2B) e-commerce and thus benefits only a small number of women (UNCTAD, 2002).

Improving poor people's health

Health care is one of the most promising areas for poverty alleviation with ICTs, based largely as it is on information resources and knowledge. There are many ways in which ICTs can be applied to achieve desirable health outcomes. ICTs are being used in developing countries to facilitate remote consultation, diagnosis, and treatment. Thus, physicians in remote locations can take advantage of the professional skills and experiences of colleagues and collaborating institutions (DOI, 2001). Health workers in developing countries are accessing relevant medical training through ICT-enabled delivery mechanisms. Several new malaria Internet sites for health professionals include innovative "teach-and-test" self-assessment modules. In addition, centralized data repositories connected to ICT networks enable remote health care professionals to keep abreast of the rapidly evolving stock of medical knowledge.

When applied to disease prevention and epidemic response efforts, ICT can provide considerable benefits and capabilities. Public broadcast media such as radio and television have a long history of effectively facilitating the dissemination of public health messages and disease prevention techniques in developing countries. The Internet can also be utilized to improve disease prevention by enabling more effective monitoring and response mechanisms.

The World Health Organization and the world's six biggest medical journal publishers are providing access to vital scientific information to close to 100 developing countries that otherwise could not afford such information. The arrangement makes available through the Internet, for free or at reduced rates, almost 1,000 of the world's leading medical and scientific journals to medical schools and research institutions in developing countries. Previously, biomedical journal subscriptions, both electronic and print, were priced uniformly for medical schools, research centres and similar institutions, regardless of geographical location. Annual subscription prices cost on average several hundred dollars per title. Many key titles cost more than US$1500 per year, making it all but impossible for the large majority of health and research institutions in the poorest countries to access critical scientific information.

Apollo Hospitals has set up a telemedicine centre at Aragonda in Andhra Pradesh, to offer medical advice to the rural population using ICTs. The centre links healthcare specialists with remote clinics, hospitals, and primary care physicians to facilitate medical diagnosis and treatment. The rural telemedicine centre caters

to the 50,000 people living in Aragonda and the surrounding six villages. As part of the project, the group has constructed in the village a 50-bed multi-speciality hospital with a CT scan, X-ray, eight-bed intensive care unit, and blood bank. It also has equipment to scan, convert and send data images to the tele-consultant stations at Chennai and Hyderabad. The centre provides free health screening camps for detection of a variety of diseases. There is a VSAT facility at Aragonda for connectivity to Hyderabad and Chennai. The scheme is available to all the families in the villages at a cost of Rs.1 per day for a family of five.

In Ginnack, a remote island village on the Gambia River, nurses use a digital camera to take pictures of symptoms for examination by a doctor in a nearby town. The physician can send the pictures over the Internet to a medical institute in the UK for further evaluation. X-ray images can also be compressed and sent through existing telecommunications networks.

Across Sub-Saharan Africa, the Internet is used to report daily cases of meningitis to monitor emerging epidemics. When threshold levels are reached, mass vaccination is required and the Internet is used to rapidly mobilize medical personnel and effectively coordinate laboratories and specialist services.

In Andhra Pradesh again, handheld computers are enabling auxiliary nurse midwives to eliminate redundant paperwork and data entry, freeing time to deliver health care to poor people. Midwives provide most health services in the state's vast rural areas, with each serving about 5,000 people, typically across multiple villages and hamlets. They administer immunizations, offer advice on family planning, educate people on mother-child health programs and collect data on birth and immunization rates. Midwives usually spend 15–20 days a month collecting and registering data. But with handheld computers they can cut that time by up to 40 percent, increasing the impact and reach of limited resources (World Bank, 2002).

Strengthening education

The growth of distance education is being fuelled by the urgent need to close the education gap between poor and rich nations. According to the United Nations Educational, Scientific and Cultural Organization (UNESCO), only about three percent of young people in sub-Saharan Africa and seven percent in Asia attend some form of postsecondary education. This compares with 58 percent in industrialized countries as a whole, and 81 percent in the United States.

Developing countries see investing in distance education programmes as a way to educate more people for less money. UNESCO and the World Bank have reported that in the world's 10 biggest distance education institutions, the majority of which are in the Third World, the cost of education per student is on average about one third the cost at traditional institutions in the same country. In China, where only one out of 20 young people receives higher education, distance learning is helping the education system move from elite to mass education because

traditional universities cannot meet the demand. China Central Radio and Television University has 1.5 million students, two-thirds of them in degree programmes. The university caters to working adults. It broadcasts radio and TV lectures at fixed times to students at 2,600 branch campuses and 29,000 study centres, as well as at workplaces.

Distance education seems a natural pre-cursor to on-line education, but the two are not the same, and the transition from the former to the latter can be a challenge. Even the pioneering British Open University still bases its course work on hard copy material, using the Internet for the support aspects of education, such as student and tutor interaction. Initial enthusiasm for the idea of a virtual university has been slow to materialize and there are still very few fully accredited degree programmes that can be taken entirely on-line. Some of the difficulties arose from the slow emergence of understanding about what ICTs contribute to the pedagogical aspects of the teaching-learning process. Other barriers to e-learning include the time and cost required to prepare digital learning materials.

On-line distance education is better suited to adult learners and there are now many organizations opening virtual universities to cater for them. The element of flexible timing for learning appeals to adults who are employed and who realize the value of life-long learning in a changing work environment.

Most developments in e-learning benefit the already privileged. Nevertheless, examples of pro-poor learning indicate the possibilities for the less privileged. It is almost a universally observable phenomenon that children seem to take to computers naturally, and in a unique experiment in India, this has been turned into a new mode of education called minimally invasive education. In 1999, Sugata Mitra of NIIT Ltd. placed an Internet-capable personal computer behind a glass screen in a wall of his office building that looked out to a piece of land occupied by street kids. In what became known as the “Hole in the Wall” experiment, the children very quickly learned an impressive range of computer skills without any tuition at all. As one child learned something new from experimentation, he/she passed it on to the next child. The experiment has since been repeated in half a dozen locations, and Mitra is making plans for 100,000 kiosks to create 100 million computer literates in five years.

In primary and secondary education, radio and television are increasingly important means of reaching the rural poor. In Mexico, over 700,000 secondary-school students in remote villages now have access to the *Telesecundaria* program, which provides televised classes and a comprehensive curriculum through closed-circuit television, satellite transmissions and teleconferencing between students and teachers. Studies have found that the program is only 16 percent more expensive per pupil served than normal urban secondary schools, while students benefit from the much smaller student-to-teacher ratios. Rural students enter the program with substantially lower mathematics and language test scores than their counterparts at traditional urban schools, but by graduation, they have equalled

the math scores of those in the urban schools and cut the language score deficit in half (de Moura et al. 1999).

Further evidence that the impact of the Internet need not be limited to higher education or wealthier students can be found in Brazil's urban slums. The Committee to Democratise Information Technology (CDI) has created 110 sustainable and self-managed community-based Computer Science and Citizenship Schools using recycled technology, volunteer assistance and very limited funds. CDI schools train more than 25,000 young students every year in ICT skills that give them better opportunities for jobs, education and life changes. CDI also provides social education on human rights, non-violence, the environment and health and sexuality. CDI cites many cases of participants developing renewed interest in formal schooling, resisting the lure to join drug gangs, and greatly increasing their self-esteem. Also, many of the program's graduates are putting their computer skills to work in various community activities, including health education and AIDS awareness campaigns. Most teachers in CDI schools are themselves graduates of the program who have embraced technology and want to continue CDI's work in their own communities (InfoDev).

Promoting trade and e-commerce

It is in the Asia Pacific region that e-commerce is spreading most quickly among developing countries. The region's enterprises, particularly in manufacturing, are exposed to pressure from customers in developed countries to adopt e-business methods and are investing to be able to do so. China's population of Internet users is already the world's third largest.

M-commerce, defined as the buying and selling of goods and services using wireless handheld devices such as mobile telephones or personal data assistants (PDAs), is likewise growing at a rapid pace. In the last four years, growth in the number of mobile telephone users worldwide has exceeded fixed lines, expanding from 50 million to almost one billion in 2002. This rapid growth stems from the cost advantage of mobile infrastructure over fixed-line installation and from the fact that mobile network consumers can simply buy a handset and a prepaid card and start using it as soon as the first base stations are in place, without having to open a post-paid account. The introduction of wireless communications has also brought wireless data services, which are essential to conducting m-commerce, to many developing countries. If the convergence of mobile and fixed Internet and ICTs continues, first access to the Internet for a significant part of the world will be achieved using mobile handsets and networks. Wireless technologies have made inroads even in relatively low-income areas, where prepaid cards allow access to people who cannot take out a subscription because of billing or creditworthiness problems. Developing Asia is the leader in this area (UNCTAD 2002).

The main areas of m-commerce use are in text messaging or SMS (short messaging service), micro-payments, financial services, logistics, information

services and wireless customer relationship management. Text messaging has been the most successful m-commerce application in developing countries, where rates of low fixed-line connectivity and Internet access have made it an e-mail surrogate. Operators in China and other Asian developing countries are gearing up for m-commerce applications for financial services in particular. However, difficulties in making electronic payments and concerns over the security and privacy of transactions are limiting the conduct of m-commerce. It may have to wait for third-generation wireless technologies and fully Internet-enabled handsets.

ICTs have been widely touted as windows to global markets for small-scale developing country producers. However, there are significant barriers facing artisans in the developing world who are trading directly with consumers (business to consumer) via the Internet. Apart from anecdotal stories, there is little evidence of craft groups successfully dealing direct with end consumers on a sustainable basis. Business-to-business e-commerce offers the greatest opportunities for artisan groups to enhance the service given to business customers (exporters, importers, alternative trade organizations, wholesale and retail buyers etc). This is likely to be much more fruitful and cost-effective for artisans.

PEOPLink is a non-profit organization that has been equipping and training grass-roots artisan organizations all over the world to use digital cameras and the Internet to market their wares while showcasing their cultural richness[4]. Between 1996 and 2000, PEOPLink developed training modules and used them as the basis for on-site workshops and on-line support for web catalogue development by 55 trading partners serving more than 100,000 artisans in 22 countries. PEOPLink offers a tool-kit to communities that enable them to create a digital catalogue of their handicrafts for posting onto a web site. It also provides additional services such as on-line trend reports, product development and feedback tools, as well as providing logistical support and services such as payment collection, distribution and handling of returns. Many new jobs were created for hundreds of poor artisans in isolated Nepalese villages. The Rockefeller Foundation, which commissioned a strategic plan for PEOPLink, found that “Internet commerce is essential for third world artisan and SME development and PEOPLink can be a leader [in this area].”

However, while some reports suggest that PEOPLink is generating substantial revenue, with daily sales ranging from US$50–500, other reports indicate that PEOPLink has achieved very low sales. There seems to be little evidence to suggest that these operations are selling a significant amount of craft goods direct to consumers. According to a Department for International Development (DFID) report, PEOPLink has had a disappointing level of sales, with no producer contacted having sold any products through its site (Batchelor and Webb, 2002). PEOPLink is now focusing on its CatGen system, software to assist in the creation of on-line catalogues to enhance B2B (business-to-business) operations.

One area of e-commerce that shows potential is the promotion and marketing of pro-poor, community-based tourism. Pro-poor tourism aims to increase the net

[4] http://www.peoplink.org/wto

benefits for the poor from tourism, and ensure that tourism growth contributes to poverty reduction. It is not a specific product or sector of tourism, but a specific approach to tourism. Pro-poor tourism strategies unlock opportunities for the poor, whether for economic gain, other livelihood benefits or participation in decision-making (Ashley et al., 2001). Early experience shows that pro-poor tourism strategies are able to 'tilt' the industry at the margin, to expand opportunities for the poor and have potentially wide application across the industry. Poverty reduction through pro-poor tourism can therefore be significant at a local or district level. Moreover, the poverty impact may be greater in remote areas, though the tourism itself may be on a limited scale (Roe and Khanya).

Poor communities are often rich in natural assets—scenery, climate, culture and wildlife. Community-based tourism is closely associated with ecotourism and is regarded as a tool for natural and cultural resource conservation and community development. It is a community-based practice that provides contributions and incentives for natural and cultural conservation, as well as opportunities for community livelihood. Community-based tourism provides alternative economic opportunities in rural areas. It has the potential to create jobs and generate a wide spectrum of entrepreneurial opportunities for people from a variety of backgrounds, skills and experiences, including rural communities and especially women.[5]

Tourism and e-commerce are natural partners (UNCTAD, 2001). Tourism is highly information-intensive. During the intermediary period, the tourism product exists in the form of information only (reservation number, ticket, voucher). Value added by international tourism intermediaries, who are often no more than marketers and information handlers and who rarely own or manage physical tourism facilities, can be as high as 30 percent or more, which gives them control over terms and conditions throughout the whole value chain. Although it is the destination's socio-economic, cultural and geographical content that forms the fundamental tourism product, it often happens that with each intermediary party taking a commission, little income remains for the destination at which the product is consumed. Electronic commerce for tourism (e-tourism) can disintermediate and deconstruct the tourism value chain, driving income closer towards the actual providers of tourism experiences. But the lack of on-line payment facilities, which are fundamental to closing sales, and the lack of local financial and technological infrastructure that is typical of rural and remote locations in developing countries, regularly force e-businesses to establish external subsidiaries and accounts, thereby perpetuating dependence on established intermediary operations.

Supporting good governance

E-governance is an area of ICT use that shows rapidly increasing promise for alleviating the powerlessness, voicelessness, vulnerability and fear dimensions of poverty. Where national or local governments have taken positive steps to spread democracy and inclusion to the poor, ICTs have dramatically demonstrated how they can be used to facilitate the process. The effect can be to break down

[5] See Proceedings of the Conference on Community Based Ecotourism in Southeast Asia, Thailand, 27 February - 8 March 2002, http://www.recoftc.org/download/CBT_discussion/CBETconf_summary.pdf

traditional patterns of exclusion, opaqueness, inefficiency and neglect in public interactions with government officials (Bhatnagar, 2002).

In the Bhoomi project of online delivery of land titles in Karnataka, India, the Department of Revenue in Karnataka has computerized 20 million records of land ownership of 6.7 million farmers in the state. Previously, farmers had to seek out the village accountant to get a copy of the Record of Rights, Tenancy and Crops (RTC), a document needed for many tasks such as obtaining bank loans. There were delays and harassment and bribes often had to be paid. Today, for a fee of Rs.15, a printed copy of the RTC can be obtained on-line at computerized land record kiosks (Bhoomi centres) in nearly 200 *taluks* (districts) or at Internet kiosks in rural area offices. The Bhoomi software incorporates the bio-logon metrics system, which authenticates all users of the software using their fingerprint. A log is maintained of all transactions in a session. This makes an officer accountable for his decisions and actions. Previously, requests for changes to the records could take months to process and were subject to manipulation by the officers. Now, farmers can get an RTC for any parcel of land and a Khata extract (statement of total land holdings of an individual) in 5-30 minutes from an RTC information kiosk at the *taluk* headquarters.

There are plans to use the Bhoomi kiosk for disseminating other information, such as lists of destitute and handicapped pensioners, families living below the poverty line, concession food grain cardholders and weather information. The response of the people at *taluk* level has been overwhelming. Queues can be seen at the kiosks, and 330,000 people have paid the fee without complaint. When asked what single factor contributed most to the success of this project, the manager unhesitatingly replied, “political will”.

In Kerala, the state government is sponsoring the *e-shringla* project to set up Internet-enabled information kiosks throughout the State. The concept grew out of the state government’s experiences with a bill-payment service called FRIENDS, (Fast, Reliable, Instant, Efficient, Network for Disbursement of Service), which operates as a one-stop service centre equipped with computers for paying bills as well as for obtaining applications and remitting registration fees. *E-shringla* is the next logical step from FRIENDS. It networks with a variety of government departments and providing Internet access, enabling online services and e-commerce facilities for citizens. The Karakulam Panchayat has developed a Knowledge Village Portal as an example of a community portal system that delivers a range of government and community information.

Since January 2000, Gyandoot, a government-owned computer network, has been making government more accessible to villagers in the poor, drought-prone Dhar district of Madhya Pradesh. Gyandoot reduces the time and money people spend trying to communicate with public officials and provide immediate, transparent access to local government data and documentation. For minimal fees, Intranet kiosks provide caste, income, and domicile certificates, helping

villagers avoid the common practice of paying bribes to officials. The kiosks also allow small farmers to track crop prices in the region's wholesale markets, enabling them to negotiate better terms for crop sales. Other services include on-line applications for land records and a public complaint line for reporting broken irrigation pumps, unfair prices, absentee teachers and other problems. Kiosks are placed in villages located on major roads or holding weekly markets, to facilitate access by people in neighbouring villages. The network of about 30 kiosks covers more than 600 villages and is run by local private operators along commercial lines (World Bank, 2002).

Building capacity and capability

The meaning of the term capacity building seems to vary according to the user, but there appears to be no doubt that ICTs can help achieve it. Capacity building refers to developing an organization's (or individual's) core skills and capabilities to help it (him/her) achieve its (his/her) development goals. This definition suits the context of ICTs well as it assumes knowledge of the existence of development goals without which ICTs are unlikely to be of much value. Hans d'Orville, Director of the IT for Development Programme, Bureau for Development Policy, United Nations Development Programme, puts it simply: "The full realisation of the potential of ICTs requires skills, training, individual and institutional capacity among the users and beneficiaries".

But the key question for poverty alleviation seems to be whether ICTs can build the capacity of the poorest people to achieve whatever goals they may have. If you are illiterate, destitute, disabled, malnourished, low caste, homeless and jobless, will ICTs help? The most likely scenario is that these very poor people will receive assistance from organizations and institutions that use ICTs and whose programmes specifically target them as beneficiaries.

ICTs in the form of multimedia community centres/telecentres, especially at the rural level can act as a nodal point for community connectivity, local capacity-building, content development and communications, and serve as hubs for applications, such as distance education, telemedicine, support to small, medium-sized and micro-credit enterprises, promotion of electronic commerce, environmental management, and empowerment of women and youth. Where such services have a pro-ultra-poor strategy, then the benefits of ICTs can be directed to them.

The Village Information Shops in Pondicherry, India have adopted such a programme. They have used ICTs to build awareness in poor communities of the government programmes and entitlements that are available for their assistance. They have a database of more than 100 such entitlements. Moreover, they have acquired the list of ultra-poor people that the government maintains, and made it available through the centres. The staff proactively notifies the people on the list that they are entitled to claim certain benefits (the government officials had not been well known for promoting these schemes), and they provide assistance in

submitting the claims, contacting the appropriate bureaucrat and moving the application forward. As a result, every household in one fishing village is now in receipt of the housing subsidies to which they are entitled, whereas previously none of them were.

Capacity building also relates to the accumulation of social capital, which refers to those features of social organization such as networks, norms and social trust that facilitate coordination and cooperation for mutual benefit. The establishment of networks for mutual benefit can be nurtured and extended through the use of ICTs. ICTs can help create and sustain on-line and off-line networks that introduce and interconnect people who are working toward similar goals.

Many organizations in the women's movement recognize this potential and have projects that provide support for ICT to be used as an advocacy tool. ICTs can also enable certain individuals, especially early adopters, to spark catalytic change in their communities. For example, one very resourceful lady in a small Mongolian town who single-handedly runs an NGO supporting women's micro-enterprises used the local telecentre to contact a donor agency in the UK and received an award of US$10,000, a huge sum in that context, to help her in her work.

The 220,000 women members of India's Self-Employed Women's Association (SEWA) who earn a living through their own labour or through small businesses have started using telecommunications as a tool for capacity building among the rural population. SEWA uses a combination of landline and satellite communication to conduct educational programs on community development by distance learning. The community development themes covered in the education programs delivered include organizing, leadership building, forestry, water conservation, health education, child development, the Panchayati Raj System and financial services.

Enriching culture

ICTs can simultaneously be a threat and an opportunity to a culture. On the one hand, ICTs threaten to engulf indigenous minorities in the relentless processes of globalization. On the other hand, ICTs can be used as tools to help indigenous minorities to engage positively with globalization on their own terms. The concern at this stage is that the former is more likely to happen than the latter. ICTs alone will not achieve cultural diversity. As with all successful applications of ICTs, adaptations in the behaviour of individuals, groups and institutions are necessary before significant cultural benefits can emerge from the deployment of ICTs.

Existing institutions such as libraries and museums can help in the process of democratizing ownership of cultural assets, provided they face up to the limitations of their traditional roles. The Internet has made the conventional role of libraries and museums obsolete. Yet such institutions have major roles to play in mobilizing communities towards a more open and dynamic approach to the assembly and preservation of indigenous culture. Libraries and museums can facilitate a more

dispersed pattern of ownership and custodianship of cultural artefacts that can be increasingly represented digitally. Networks that connect digitized cultural artefacts to the communities from which they were derived can be used to foster a wider appreciation of their value and importance as well as a more inclusive approach to how they are used and interpreted.

Studies of indigenous communities regularly point to the importance they place on their cultural heritage. But they also highlight the almost complete lack of control or participation such communities have in how their culture is collected or represented. The Kelabit people in Sarawak, for example, do not feel that they exercise ownership rights over their own cultural heritage. They are concerned that outsiders are able to more easily gain access to both the records and the artefacts related to their cultural heritage than they are. They are also concerned that this can give rise to misinterpretation of the meaning of their cultural heritage. They feel powerless to present to the outside world a picture of themselves, their history and achievements, which they themselves would wish to have known. They see the situation getting worse rather than better, as technology empowers a few people to engage with information relating to their heritage, while depriving the majority of an equal opportunity.

On the other hand, ICTs can be used to help rural indigenous and minority communities achieve custodial ownership and rights of interpretation and commercialization over their own cultural heritage. The Kelabit people of Sarawak are in fact starting to use their telecentre to redress this imbalance by recording their oral histories and genealogical records.

UNESCO is currently formulating a charter and guidelines for the preservation of digital heritage. Digital heritage is that part of all digital materials that has lasting value and significance. New strategies need to be developed to ensure that they are saved for posterity. Digital heritage is either ‘born digital’ where there is no other format, or created by conversion from existing materials in any language and area of human knowledge or expression. It includes linear text, databases, still and moving images, audio and graphics, as well as related software, whether originated on-line or off-line, in all parts of the world. The preamble to the UNESCO charter states that the intellectual and cultural capital of all nations in digital form is at risk due to its ephemeral nature. Thus, the charter details the need for digital preservation principles and strategies to ensure that this heritage is available to all now and into the future.

Aside from digitization of indigenous cultural artefacts, ICTs provide a means for cultural communities to strengthen cultural ties. To cite an example, the Internet is a means to unite the more than five million Assyrians who are scattered all over the U.S., Europe and Australia. The Assyrians are the direct descendants of the ancient Assyrian and Babylonian empires. The Internet is finally uniting Assyrian communities, regardless of their geographic, educational, and economic backgrounds (Albert).

ICTs can either homogenize cultures or provide an opportunity to celebrate the diversity of culture. Whichever outcome prevails depends on how ICTs are used. Among the few experimental ICT projects involving ethnic indigenous people, short-term thinking and the pressure for tangible results (deliverables) cause donors to focus on poverty alleviation outcomes alone. However, when you talk to members of the communities themselves, it is easy to find considerable interest in using the technology for preserving and strengthening their cultural heritage.

Supporting agriculture

Research suggests that increasing agricultural productivity benefits the poor and landless through increased employment opportunities. Because the vast majority of poor people live in rural areas and derive their livelihoods directly or indirectly from agriculture, support for farming is a high priority for rural development. ICTs can deliver useful information to farmers in the form of crop care and animal husbandry, fertilizer and feedstock inputs, drought mitigation, pest control, irrigation, weather forecasting, seed sourcing and market prices. Other uses of ICTs can enable farmers to participate in advocacy and cooperative activities.

To illustrate how useful ICTs can be for farmers, consider the case of farmers in India who in the past were harvesting their tomatoes at the same time, giving rise to a market glut that pushed prices to rock bottom. At other times, when tomatoes weren't available and the prices shot up, the farmers had none to sell. Now, they use a network of telecentres to coordinate their planting so that there is a steady supply to the markets and more regulated and regular prices.

The Maharashtra State government has plans of linking 40,000 villages with Agronet, a specially developed software package for farmers that aims to provide the latest information on agriculture.

Samaikya Agritech P. Ltd. in Hyderabad, Andhra Pradesh operates 18 "Agritech Centres", which provide agricultural support services to farmers on a commercial basis. They are permanently operated by qualified agricultural graduates called Agriculture Technical Officers (ATO) and are equipped with computers linked to the head office in Hyderabad through a modem-to-modem telephone connection. Through these centres Samaikya provides technical assistance to member farmers; inputs such as seeds, fertilizers and pesticide, machinery hire, tools and spares for sale; soil and water analyses; weather monitoring; field mapping; weekly field inspections and field visits by specialists.

Farmers register with centres and pay per growing season (two or three seasons per year) a fee of Rs.150 (about US$3) per acre/crop. A farmer registers by the field and receives support services that are specific to the fields registered. On registration, the farmer provides detailed information concerning his farming activities; the information is kept in the centre's database, providing the basis for the technical support provided. The centre in the village of Choutkur has 53 registered

farmers, covering 110 acres of registered land. This is out of a total of around 1,000 farmers within the centre's catchment area. Major crops include sugar cane, padi and pulses.

Advice from the centres is based on data generated from pre-validated crop cultivation practices adopted in the State and provided by government agricultural services and local institutions. Farming information is up-linked from headquarters to the computers at the centres. If farmers have specific needs for information that cannot be satisfied immediately by the ATO at the centre, then the technician completes an on-line enquiry form on the computer and transmits this via modem to the headquarters. At the headquarters, specialists with more experience and qualifications organize and coordinate replies, which are typically transmitted back to the centre within 24 hours. The database and information systems are operated in the English language. Information is interpreted for the farmer by the ATO. Because some farmers are illiterate, the technicians have to spend time with explanations and descriptions. There is no standard for a computerized Telegu script.

Prior to setting up a centre, Samaikya performs a survey of local farming and cultivation practices and ascertains the political and cultural context of the potential centre. It conducts a pre-launch programme to familiarize farmers with the services. One centre closed down within three months of opening as no farmers registered for the service. This was due to the pressure placed on them by local marketeers, financiers and suppliers of inputs who perceived a threat to their livelihoods from the competing Samaikya services. Farmers were told that anyone who registered with the centre would not receive credit or essential supplies.

Creating employment opportunities

Two areas of employment opportunity arise from the deployment of ICTs. First, unemployed people can use ICTs to discover job opportunities. Second, they can become employed in the new jobs that are created through the deployment of ICTs.

Poor people in rural localities lack opportunities for employment because they often do not have access to information about them. One use of ICTs is to provide on-line services for job placement through electronic labour exchanges in public employment service or other placement agencies. Normally, job brokering is carried out as a closed system involving intermediaries on behalf of their clients. The greater transparency enabled by ICT opens up possibilities for more precise information seeking. Through open job seeker banks, for example, employers can search and directly access résumés, which in turn are linked electronically to job vacancy banks. Tools have been developed to assist employers in screening résumés, or to send e-mails automatically to jobseekers when job vacancy announcements fitting certain pre-selected criteria are posted.

The ILO notes that some developing countries have been able to create employment for thousands of women and men through community-access points

and telecentres. One common option is to purchase a mobile phone through a micro credit program and to earn income by providing low cost phone calls to others (Curtain, 2001). Telecentres can also offer use of ICT facilities for business purposes to small and micro-enterprises that do not have their own private facilities.

In some countries in the region, telecentres are being set up through public and private initiatives in telephone shops, schools, libraries, community centres, police stations and clinics. Sharing the expense of equipment, skills and access among an ever-increasing number of users also helps to cut costs and make these services viable in remote areas. India, for example, has seen rapid growth in cyber kiosks that provide access to social communication as well as business support services for underprivileged groups. The kiosks are often upgraded Subscriber Trunk Dialling booths that are widely found in all parts of the countryside in India. These are small street shops, offering access to public phones for long distance calls. They number about 300,000 and have generated more than 600,000 jobs. Youth unemployment constitutes over 30% of total unemployment in Asia Pacific and young people are particularly well placed to take advantage of such growth areas.

People with appropriate skills, possibly obtained from ICT-based learning facilities, may gain employment as a result of the growth in remote ICT processing facilities that are located outside high-income countries. The facilities provide a range of services, including help lines, technical support, reservations handling, sales, data conversion, as well as voice and data transcription. Other remote processing services are payroll accounting, internal auditing and credit appraisals. High-end remote processing includes creating digitized maps of townships, utilities, roads and other facilities. It is claimed that back office functions that are likely to grow in importance are settling insurance claims and summarizing legal documents, such as witness depositions.

The widespread use of English on the Internet has created the need for local content and applications for non-English speakers. For the poor in particular, the vast amount of information on the Internet requires an intermediary to sift through it to identify what is relevant and then to interpret it in the light of the local context. People with language and ICT skills are well placed to perform this role of ‘information intermediary.’

A related source of ICT-generated employment for young people is through Call Centres. These offer telephone-based services from a central office to customers in a variety of business sectors. Call Centres handle telephone calls, fax, e-mail and other types of customer contact, in live and automated formats. They have expanded rapidly in Europe and are important sources of work in Hong Kong, Taiwan, South Korea, Malaysia and the Philippines.

The Internet can also play a pre-eminent role in a pro-poor tourism marketing strategy by providing information about remote tourist locations, including photos

of key features, and by providing a ready means of low cost communication via e-mail. The Namibia Community-Based Tourism Association in southwest Africa assists local communities to set up tourism enterprises in the previously neglected rural areas of Namibia. The Association has set up a web site with detailed information, including a map about each of the seven regions in rural Namibia and the community-based tourism facilities in each region.

An example of the use of ICT to help bridge the gap between employment in the informal sector and the mainstream economy is India's Self Employed Women's Association (SEWA). Its 220,000 members are women and young women who earn a living through their own labour or through small businesses. SEWA was one of the first organizations in India to realize the potential for harnessing ICT to help women in the informal sector. It has sought to develop the organization's capacity to use computers by conducting awareness programs and imparting basic computer skills to its team leaders, "barefoot" managers and members of its various member associations. Many of SEWA's member organizations have launched their own web sites to sell their products in the global virtual market place.

Reinforcing social mobilization

Social mobilization is a process for harnessing local resources that can foster sustainable forms of community self-development. This was pioneered by the UNDP South Asia Poverty Alleviation Programme (SAPAP), which was established in 1993 to enhance national capacities for integration of growth and poverty alleviation policies and to demonstrate the feasibility of functioning social mobilization mechanisms in each of the participating countries. SAPAP is UNDP's largest regional programme in Asia, with an allocation of $11.3 million. The programme is operating in six of the seven SAARC countries: in the Syangja District in Nepal, in the state of Andhra Pradesh in India, in the Kishorganj Sadar Thana in Bangladesh, in the Kohat District of the North West Frontier Province in Pakistan, in the Nuwera-Eliya District in Sri Lanka and on the Noonu Atoll in Maldives.

The programme's major aim is to help remove the constraints that poor rural communities face in harnessing their potential to develop themselves. To this end, a three-tier strategy is followed, based on social organization, capital formation and human resource development. First, villagers are brought together to discuss local development issues of common interest and to initiate local development initiatives. Second, they are persuaded of the need to save, which after some time becomes an important source for credit operations. Third, they are trained, mainly in management techniques and income generating activities, in order to create the foundation for grass-roots institutional development, to improve sectoral service delivery and to support those who want to undertake socio-economic activities.

What is relevant here is not just that all these activities can be facilitated through the use of ICTs, but that such activities have been demonstrated to be instrumental in helping communities make the most out of ICTs. A study of the Nepal component

III. THE LESSONS OF EXPERIENCE

What lessons can be learned so far?

It should be evident from the examples that where demonstrable results have emerged, it has been because of a clear focus on the development strategy. As the G8 DOT Force states, “Efforts to increase access to ICTs should be rooted in a broader strategy to combat poverty.” From the examples cited, we can make the following observations:

ICTs alone are insufficient for significant benefits to emerge.

If there is no attendant workable development strategy, ICTs cannot be expected to result in optimal outcomes. Giving voice to the poor and helping them apply their knowledge is a key element in combating poverty, and should be incorporated into ICT approaches to poverty alleviation. Directly addressing the needs of the poor and most marginalized, particularly women and girls, is vital.

ICTs will not transform bad development into good development, but they can make good development better.

ICTs act as an amplifier of underlying processes. What makes development work well will be made to work better by using ICTs. On the other hand, if used inappropriately, ICTs add unnecessary costs to the process. Also, users and promoters could get disillusioned when expected benefits from ICT use fail to emerge, which in turn could hinder subsequent efforts to use ICTs appropriately.

Effective applications of ICTs comprise both a technological infrastructure and an information infrastructure.

The information infrastructure includes all that is required to make the ICTs relevant to their context, including all sources of information and its consumers. Mobilizing them into a coherent infrastructure requires methods and skills that are quite different from those required to assemble the technology infrastructure. While ICTs can be effective tools for tackling poverty, the spread of technology should not be an objective in itself. Poverty, not the digital divide is the problem.

In rural settings in developing countries (where the vast majority of poor people live), it is always a challenge to install the technological infrastructure, but the task is relatively simple compared to establishing the information infrastructure.

Developing countries suffer from poor and underdeveloped infrastructures and creative approaches to supplement the existing infrastructure are often necessary in order to achieve connectivity. No single technology is suitable for all needs. Each ICT (old and new) will be appropriate in different circumstances. Solutions can be technically demanding, making it advisable to recruit the best technical people that can be found. However, they should not be put in charge. First, no matter how creative and efficient the technology, its implementation will always be judged by development outcomes. Second, technical people need to devote their

energies and expertise to the technology and should not be burdened with the issues of designing the information infrastructure and mobilizing system users. Generally, the two sets of skills that are required tend to be mutually exclusive.

The application of ICTs in the absence of a development strategy that makes effective use of them will inevitably result in sub-optimal outcomes.

It is important to be able to differentiate between types of outcomes and to balance them against the intentions, aspirations and potential of the technology and its users. At the same time, it is important to recognize that unexpected outcomes can turn out to be more desirable than those that were expected. ICT implementations have their own dynamics, and projects should acknowledge that introducing technology itself changes the dynamics of the problem that the technology is intended to solve. Sub-optimal outcomes are often a product of failing to respond to system dynamics in a way that would have directed the technology more closely towards better development, and failure to adapt to the dynamics of a responsive development strategy.

While ICTs provide opportunities for development, desirable outcomes always arise from the actions of people.

The information infrastructure, and especially the people in it, makes up the key enabling environment that will determine the nature of the outcomes. When the main focus is on technology, there is a tendency to leave the people issues to chance. However, the enabling environment is crucial to providing information and communication services, innovation and entrepreneurship, and free flow of information. Education and skills are key enablers of the effective use of ICTs.

Other studies have drawn similar conclusions. The DFID report concludes, “Information, communication and knowledge are critical elements of poverty reduction and meeting the international development targets. ICTs, used appropriately, can be effective tools to advance DFID’s mission” (Marker et al., 2002). But to succeed, ICT projects must build on an assessment of local needs, as defined by local people. Well-meaning government officials, officers of international aid agencies and workers in NGOs sometimes assume that they know what is needed at the grass roots. Thus, projects are often not based on any real assessment of local needs. Furthermore, they assume a uniformity of needs in distinct localities with different populations, economic bases, cultures, social organization and levels of need. They also take for granted that providing computers and/or web connections will (without additional efforts) provide increased social justice, enable local peoples to sell their products in the world market, feed the hungry, meet unmet medical needs, and so on (Keniston and Kumar, 2000).

What are the key social dimensions to ICTs for poverty alleviation?

Research from Latin America advocates a social vision for using ICTs to eliminate and/or redress the deeply rooted inequalities of modern societies.[6] The vision is based on the following premises:

- Connectivity is important, but it is not sufficient to contribute to development.
- Equitable access, meaningful use and social appropriation of ICT resources are all necessary to take advantage of available opportunities and achieve positive results.
- Certain enabling environments must exist for ICTs to contribute effectively to development.
- Risks and threats exist in the use of ICTs for development and should be avoided or minimized.

In this vision, ICTs are neither positive nor negative in themselves, but they are not neutral either. ICT deployment could end up reproducing and deepening existing inequalities in society. The term social appropriation is used to describe the process that leads to the social transformations that occur as a result of using ICTs. Social appropriation occurs when Internet resources help transform daily life by contributing to the solution of concrete problems. Evidence of appropriation is not found in the use of ICTs, but rather in the changes that they have brought about in the real world.

The social appropriation of ICTs for development can be demonstrated in a number of ways, such as by offering better medical information to patients; improving the quality of education through the use of innovative teaching resources; introducing varied, relevant programming into community radio broadcasting; increasing sales of local products in the marketplace; disseminating the results of local research; and coordinating action among diverse groups with common goals.

One way of achieving social appropriation is the methodology known as **infomobilization**. This methodology is based on socio-technical systems theory, which claims that separate efforts to optimize the technical system and the social system will lead to sub-optimal results, and can even be infeasible. The same information system can be a success in one organization/community but a failure in another, while the same organization/community can experience success with one information system but fail with another. Hence, the information system and its context must be studied, understood and managed together, not separately. Infomobilization applies these theories to rural communities in a developing country.

6 (www.idrc.ca/pan/pppp)

Infomobilization is concerned with the information requirements of communities. It addresses the design, delivery and utilization of community information systems by:

- Defining community information requirements based on needs and priorities that have been expressed by the communities themselves;
- Igniting community aspirations and empowering communities with appropriate skills for fostering local development that is information-based;
- Expanding a community's social capital through enhanced access to communication facilities and information resources;
- Embedding community-based ICT services within existing economic, governance and social structures;
- Infusing enhanced capability for information access within communities;
- Achieving sustainability of financing, service delivery and operating functionality;
- Ensuring that benefits arising are not usurped by existing elites, and are equitably disseminated among the socially and economically disadvantaged groups; and
- Extending and intensifying existing development programmes that carry a significant potential for additional community benefit from enhanced information management capabilities that are based on ICTs.

The methodology consists of the actions necessary to ensure that ICTs have optimal impacts for development within rural communities in developing countries. The process is made up of techniques for-

- Familiarizing communities with their existing use and sources of information as well as with the gaps that exist between existing and desired information resources;
- Alerting communities to the potential application of information to their problem-solving efforts and to their development aspirations;
- Sensitizing communities to the existence and accessibility of abundant information resources and to the capabilities of ICTs for accessing and manipulating information;
- Propelling communities towards the acquisition of the new knowledge they will require in order to exploit the power of ICTs;
- Empowering communities with information literacy, the skills necessary for the mastery of new media, the Internet and multimedia;
- Motivating communities to apply ICTs to the new opportunities that become possible from their relationship with ICTs;
- Encouraging the collection, classification, preservation and dissemination of indigenous knowledge and cultural information artefacts; and
- Fostering appropriate local mechanisms for sustaining the equipment, services and operations of community-based ICTs.

These techniques comprise a community learning system, whereby the community starts by learning about its information needs, and then begins to satisfy those needs and, as a result of the experience, becomes increasingly capable of understanding and satisfying information needs of an increasingly higher order.

How should project implementers engage with communities?

The World Bank's advice regarding a participatory style of community engagement is relevant for ICT implementation methodologies:

- Methodologies for designing and implementing useful information systems should emerge from participatory action-oriented analytical activities
- Data should be obtained using a combination of surveys, direct interviews, workshops and discussion groups
- Useful information systems should be embedded within the needs of the community
- Specific actions are required by both the implementers and the community in order to articulate those needs
- The implementers should learn about life in the beneficiary communities
- The community should learn about ICTs from the implementers
- Community members should perform major portions of the implementation
- The implementers should be able to identify with the community
- As a team, the community-implementers should be capable of critically reflecting on iterative cycles of action in order to achieve beneficial outcomes from the project

Participatory forms of analysis in which community aspirations and development activities are moulded and tracked in a cyclic manner are more likely to achieve desirable results than technology implementation that is predicated on fixed expectations and inflexible assumptions of what outcomes should look like.

What are other project implementation considerations?

Unexpected outcomes

The social dynamics of communities, when combined with the characteristic of ICTs as intellectual (as opposed to industrial) technologies, can lead to unexpected outcomes of ICT implementation. In some cases, these can turn out to be more desirable than those that were targeted, and they are to be encouraged. Figure 7 illustrates a combination of possibilities:

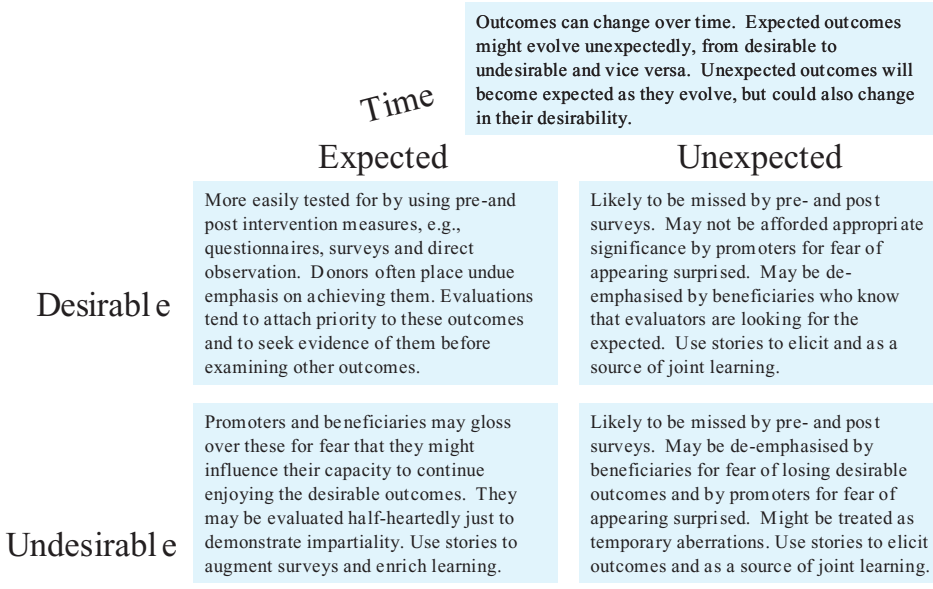

Figure 7. Project Outcomes

Evaluation

Monitoring and evaluation of social interventions tend to be too quantitative. Evaluation can benefit from the richness of qualitative approaches, such as story telling. Stories are based on experience and they represent empirical evidence of events. They capture the richness of events and the circumstances of the people involved in the events, their emotions and perspectives of reality. They also reveal life histories and the connection between personalities and events. In describing how things actually happened, stories offer learning opportunities for understanding causalities and the shifting dynamics that occur between people, events, technology, institutions and the environment. Besides, stories evoke a response from the listener, and this can add depth to the communication that is taking place during the re-telling.

Also, stories can summarize multiple events that are linked in some meaningful way in a cumulative manner that helps to identify trends so that future behaviour can be directed towards desirable outcomes. Hence, stories cultivate social change, becoming part of the intervention rather than being separate from it. As the outcome of story telling is in large part determined by the context of the telling, stories can be re-used within multiple contexts, thereby serving multiple purposes. While it is improbable that statistical analyses would contain stories, it is possible for stories to contain statistical analyses. Moreover, stories collect data that are difficult to represent in statistics, such as emotions, and evidence suggests that such factors are influential in determining community-based reactions to social interventions.

Time scales

Donors and implementers often set the time scales for ICT projects with little reference to the recipient community. In some cases the time scales are determined within frameworks of national or international budgeting that have no bearing on the conduct of the project. Experience suggests that communities will determine for themselves the rate at which they take up innovations, and project implementers should be prepared for this. In the case of the Gujarat Milk Co-operative, implementation efforts spanned 10 years before the full potential of the application was achieved. Sometimes a focus on “deliverables” denies the dynamics of the social context of the project. Even use of the term “project” can be problematic. Projects have definite start and end points, which are important milestones for management, but the activity is often regarded by the recipient community more as a continuous process, with no ending in sight. These different perspectives can create tension between implementers and recipients.

Top-down or bottom-up

ICT deployment tends to fall into one of two categories: top-down projects by central or state governments and bottom-up grass-roots initiatives by local communities and NGOs. Top-down national programmes have difficulty incorporating the specifics of the local context of a rural community. On the other hand, scaling up the successes of focused grass-roots initiatives is also proving to be a challenge.

There is a need for a methodology that will enable field workers involved with ICT projects to mobilize communities towards achieving optimum outcomes from them. If a detailed methodology can be formulated, tested and documented, then large numbers of field operatives can be trained to implement it across many communities. Such a capability would enhance the likelihood of optimal development outcomes from a nationwide implementation, effectively incorporating the benefits of focused small-scale grass-roots projects into a large-scale national programme.

Social mobilization has already been demonstrated to be an efficient means of alleviating poverty on a wide scale, using methods based on the exploitation of

physical assets. An equivalent technique that focuses on exploiting information assets is now required. Methodologies are important for ICT professionals as they bring together simple tools and techniques that are useful in assuring a high degree of success with ICT implementation. Methodologies for the analysis, design and implementation of information systems account for all of the logical processes that need to be considered for an ICT project to achieve, or exceed, its objective. They go beyond the mere installation of technology by addressing the behavioural changes of technology users that are known to be necessary for technology to fulfil its potential. The most useful methodologies are those that can accomplish this aside from being easily taught to operatives who need not be highly qualified. Such methodologies incorporate simple-to-use tools and techniques that are structured together in such a way as to ensure that all aspects of the system problem are properly addressed.

Can ICTs for poverty alleviation be sustainable?

The concept of sustainability in development can be traced back to a 1987 report by the World Commission on Environment and Development (WCED, 1987), known as the Brundtland Report. It states:

> Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs. Sustainable development focuses on improving the quality of life for all of the Earth's citizens without increasing the use of natural resources beyond the capacity of the environment to supply them indefinitely.

Sustainability discourse has since extended beyond issues relating to the irreversible depletion of the environment and the inevitable exhaustion of finite natural resources. Sustainability in development is now more widely regarded as the ability of a project or intervention to continue after the implementing agency has departed, a condition that often has little to do with environmental protection or with the preservation of natural resources. In view of the seemingly common occurrence of project breakdowns after the departure of the implementing agent, sustainability in terms of continuity has become a key indicator of success of development activities, as well as an important criterion in pre-implementation planning for obtaining funds.

In many cases, the sustainability of development projects focuses on the single question, "Who will pay for the project after the implementing agent departs?" A popular response is for project implementers to design interventions that will generate sufficient income so that they will pay for themselves. In these cases, the role of the implementing agent is to provide seed inputs, including, but not limited, to capital that will get the project started and enable it to continue under its own impetus after the implementer departs.

But sustainability is not limited to the need of development to pay for itself. The International Institute for Sustainable Development lists three common characteristics of sustainable development:

- Concern for equity and fairness
- Long-term view
- Systems thinking

Concern for fairness and equity reflects the need for the benefits of development to reach the least privileged, those least endowed with resources and the most vulnerable. The long-term view encompasses the unexpected and undesirable outcomes of development efforts, as well as the tension that emerges between implementers with short-term project orientations and beneficiaries with long-term process considerations. For example, building a bridge is a short-term project, whereas crossing the river is a long-term process. Systems thinking includes multidimensional perspectives, the identification of feedback loops and the consideration of the consequences of actions, acknowledging the complexity of social life everywhere and the inter-relatedness of everything.

Sustainability of ICTs has emerged as a key issue in the debate surrounding their use in development. In most cases, the discussion refers to financial self-sustainability, which is often regarded as a condition for the continued use of the technology. In fact, there are four types of sustainability that apply to telecentres:

- Sustaining financial viability (Hudson, 1999)
- Sustaining staff capability (Baark and Heeks, 1998)
- Sustaining community acceptance (Whyte, 1999)
- Sustaining service delivery (Colle and Roman)

Financial viability refers to the capacity to generate sufficient income to cover costs of operation and/or the cost of initially establishing a telecentre. While this ability to pay for itself generally requires the derivation of revenue directly from those who use the services, it does not preclude the possibility of other continuing sources of revenue, such as funding from government (Hudson, 1999).

Projects that introduce new skills also need to maintain the sustainability of the capabilities developed. This is possible only to the extent that trained people, or their trained replacements, continue to work in the same area and their capabilities are maintained and utilized. Sometimes, trained staff discover a better market for their skills and are lured away from the project (Baark and Heeks, 1998).

It is important to note that a technology's sustainability will be determined by the degree of community acceptance that it is able to generate. For example, the introduction of a community telecentre, if successful, is going to have a major impact on the community—its culture, communication patterns, economy, social structure and future development. Telecentres that are seen as mere technological providers rather than social and cultural community centres have been found to be less

sustainable. The degree of community involvement in, and commitment to, a telecentre is a success factor, and measures of user behaviour and perceptions are at the heart of any evaluation of telecentres (Whyte, 1999).

Sustaining service delivery relates to the continuation of flows of information that communities find useful and useable. But it also relates to sustaining the overall services in terms of adapting to evolving community needs, proactively seeking new sources of useful information, and alerting the community to the value of information. Colle and Roman suggest strategies for technology implementation that foster sustainability of service delivery, namely; having local champions or innovators to mobilize others to accept the vision of an ICT initiative; raising awareness about information and ICTs as a valuable resource for individuals, families, organizations and communities; and focusing on information services rather than on technology to build a local institution that is fully woven into the fabric of the community.

Sustainability of ICTs shines a spotlight on the issue of sustainability in development as it embodies many of the dimensions of the sustainability theme as it has evolved since first coming to the attention of development practice. Of these dimensions, financial sustainability might be argued to be the most critical or even the most difficult to achieve. Despite the plummeting cost-power ratio of computers, their price typically remains many orders of magnitude beyond the average annual incomes of potential users in developing countries. Therefore, the cases in this primer are described from the perspective of financial sustainability. In addition, financial sustainability warrants special attention because of the reassurance required by governments that telecentres will result in net benefits and will not become a drain on resources.

Because most ICT projects are recent and experimental, experience with their sustainability is limited. Many current experiments are more concerned with establishing the social value of ICTs. For instance, few of the Gyandoot kiosks have achieved commercial viability (World Bank 2002), and even though the Village Information Shops in Pondicherry are expanding their operations to new locations, they still require outside financial support. It is commonly assumed, however, that effective rural ICT access requires economic subsidy and financial loss. Others argue that ICTs should be economically viable if they are to gain wide, robust and long-lived usage. One report suggests that there are at least six broad categories that must be considered for economic self-sustainability: costs, revenue, networks, business models, policy and capacity (Best and Maclay, 2002). Best and Maclay (2002) prescribe the following actions for achieving sustainability:

- Keep costs low
  - Reduce capital costs with new devices and wireless applications
  - Use appropriate technologies to reduce recurrent costs
  - Generate revenue from diverse fees and services
  - Focus first on core communication applications
  - Promote gradual growth of other revenue sources

- Create jobs and revenue with remote ICT-enabled services (e.g., transcription of hard copy records)
  - Benefit from network effects, scope and scale
  - Aggregate markets and leverage the benefits of large networks
  - Exploit economies of scale and scope by promoting larger networks
  - Design context-appropriate business models
  - Create rural service providers for Internet, computing and telephony
  - Add telecentres to existing businesses
  - Add businesses to telecentres
  - Promote rural-urban cooperation
  - Guard against potential negative externalities, e.g., location, marketing/awareness, and staff composition

- Support rural access with policy
  - Adapt to the dynamics of rural markets and limited competition
  - Remove regulatory barriers to rural services
  - Promote universal access policies and support incentives
  - Require and enforce interconnection
  - Be wary of time-metered calling charges
  - Use Voice over IP(VoIP) to promote competition
  - End spectrum allocation regimes that punish rural wireless
  - Improve the overall business environment, e.g., for credit
  - Build local capacity

IV. TOWARDS A GENERAL FRAMEWORK FOR POVERTY ALLEVIATION WITH ICTs

What are the policy dimensions relating to ICTs for poverty alleviation?

Telecommunications reform

Most developing countries are adopting policies to break down the monopoly provision of telecommunications services, with rural development as a target outcome. Despite limited understanding of the relationship between ICTs and rural development, as well as deficiencies in key resources, governments are generally enthusiastic about the prospects for rural development through the widespread deployment of ICTs. ICT policy formulation and implementation for rural development at the national level typically involves:

- A high-level authority, often under the direct control of the head of government
- Telecommunications reform
- Expansion of the physical infrastructure
- Focus on e-government and e-commerce
- Revised regulatory environment and legal framework
- Private sector participation
- Universal service arrangements
- Pilot projects

Rural development

The largest numbers of poor people in Asia live in rural settings. Consequently, poverty alleviation is inextricably interwoven with rural development, and urban development without rural development is ill advised. Most rural areas are typified by scattered settlements, villages and small towns, which may be hundreds of kilometres from the nearest major urban centre. Rural and remote areas share some or all of the following characteristics:

- Shortage or absence of public services and health and education services;
- Shortage of qualified technical staff;
- Geographical or topological features that militate against the establishment of a telecommunication network at affordable cost;
- Harsh climatic conditions that impose severe equipment constraints;
- Limited economic activity, centred primarily on agriculture, fishing and cottage industries;
- Low per capita incomes, generally well below those in urban areas;
- Low population density; and
- High levels of traffic per telephone line due to the inadequacy of telecommunication services and the large numbers of users per line.

Accordingly, policy making for rural development must take each of these aspects of rural life into account.

Many of the examples included here demonstrate that ICTs can be used to alleviate the adverse impact of most or all of these negative aspects of rural life. For example, in the majority of developing countries, teledensity (expressed as the number of lines per 100 inhabitants) is low and in some cases very low in rural remote and poorly served areas. One of the prime causes of low teledensity is the high cost of installing equipment in return for low usage. However, new technologies already available or in an advanced stage of development offer scope for marked improvement. Benefits to be derived from the improvement of rural teledensity include the following:

- Integration of the rural population into national economic, social and political life
- Regional decentralization
- Improved effectiveness of government programmes
- Improvements in social welfare

Apart from the disparities between developed and developing nations, the rural-urban divide in most Asian developing countries leaves the majority of poor people at a huge disadvantage. For serious and measurable alleviation of poverty to occur, effective policies that specifically target rural development are necessary. By adopting and promoting ICTs for poverty alleviation, governments can make such policies more effective, increasing their scope of application across broad sections of the population, deepening their impact within narrow sections of the population, and generally making development more efficient.

Is there a general framework describing poverty alleviation with ICTs?

From an examination of the examples quoted here, it is possible to trace events and influences backward from beneficiary to inception and to suggest a framework of ICT implementation that is engaged with relevant processes and principles of poverty alleviation. The framework so derived facilitates an understanding of how ICT can help alleviate poverty.

A pro-poor ICT policy begins with a development commitment that targets poverty alleviation, with government acknowledging its role as a major employer and user of ICTs. This leads to the infrastructure development that will be required to achieve widespread poverty alleviation through local access combined with suitable methods to ensure that access is used to the best effect. Government also encourages institution reform leading to the delivery of effective services capable of exploiting the infrastructure. The services are directed towards and delivered to the local access points of the poor people who need them.

Figure 8 shows such a framework for poverty alleviation using ICTs.

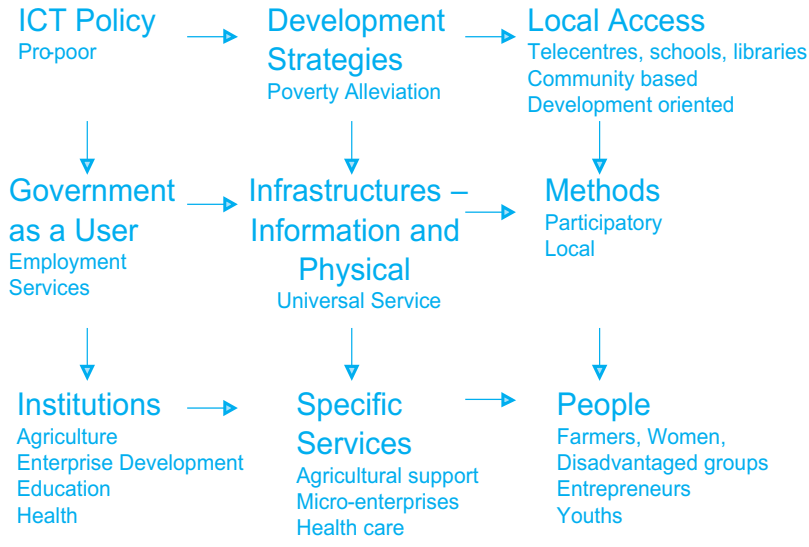

Figure 8. From Policies to People: A Framework for Poverty Alleviation with ICTs

ICT policy

ICT policies should be concerned both with ICT production and ICT use. The concern here is for policies for ICT use that specifically target poverty alleviation, as opposed to e-commerce, e-government, e-learning, and the like. Although these carry the potential for poverty alleviation, they directly benefit better-off citizens and may not necessarily deliver benefits to poor people. ICT policies for poverty alleviation should directly address the causes of poverty.

Development strategies

Specific strategies need to articulate how poverty alleviation will occur, for instance through enterprise development, micro-credit programmes, social mobilization, pro-poor tourism and HIV/AIDS awareness. Priorities reflecting needs that have been articulated by poor people themselves usually result in implementation that is more effective at alleviating poverty than those that are decided by governments or their advisers.

Local access

Access to technologies has to be planned, organized and well managed. This is likely to be some form of shared access, perhaps through existing institutions such as libraries or post offices, or through the creation of new institutions such as multi-purpose community telecentres. Sharing access implies organizational arrangements that are not present when access is predominantly one-to-one, as in the rich countries, which means that modalities for shared access will be exclusively generated in developing countries.

Government as a user

Governments typically control half of the ICT assets in developing countries. They are a major employer and a major supplier of public services. Their role as users of ICTs is critical to the national response to ICT-based opportunities and the rate of ICT adoption. They are also responsible for actually implementing policy, which is different from merely stating it.

Information and physical infrastructures

The physical infrastructure is concerned primarily with the diffusion of telecommunications to rural and under-served populations, usually in some form of universal service scheme. Information infrastructures include existing media that serve to mobilize information within the country. ICTs open opportunities for new forms of information delivery that can be complementary to existing flows, without rendering them obsolete.

Methods

Experience indicates that bottom-up approaches to the design of information systems for community development are superior to alternatives. Development that is demand-driven has a far greater likelihood of achieving its aims, and methods that foster listening to the poor and factoring their wishes into the design of solutions are usually more sustainable and more substantial. Policies have to cater for the inclusion of such methods.

Institutions

Significant returns from ICTs are achieved when institutions adopt transformational approaches to service delivery, which often completely change the nature of the organization and revitalize its purpose and goals. If new technology is used merely as a substitute for old technology, without affecting existing patterns of behaviour, organization and relationship management, then sub-optimal outcomes can be expected.

Specific purposes

Here the concern is what services ICTs are directed at—for example, education, health, and commerce—and how stakeholders are drawn into productive relationships that result in poverty alleviation. Looking at specific purposes includes determining who is responsible for what, and how activities are coordinated.

People

The target population for policy-making for poverty alleviation must be known in relation to each specific service. Service must be capable of differentiating between the poor and the not-so-poor, so that benefits can be directed to their intended recipients.

V. CONCLUSION

Alleviating poverty with ICTs is not as straightforward as merely installing the technology, but it is not conceptually complex either. Provided a few relatively simple principles can be followed, it seems likely that widespread poverty alleviation can be achieved with ICTs. The main challenges are not actually in the technology; they lie in the coordination of a disparate set of local and national factors, each of which can derail efforts if not taken into account.

In summary, the following five principles emerge from the ICT for Poverty Alleviation Framework described above:

- Strategize for poverty alleviation, not for ICT
- Reform telecommunications through privatization, competition and independent regulation
- Promote public access: aggregate demand for sustainability (which is not only financial)
- Reform institutions to achieve transformational benefits
- Develop appropriate approaches for listening to the poor

As a crosscutting multidimensional approach to development, ICTs can stretch implementation energies to the full. They also challenge traditional approaches to development. But they promise substantial improvements in the daily lives of millions of poor people. The framework for poverty alleviation is offered as a tool for guiding efforts towards achieving this potential. The framework allows for a full consideration of the range of relevant critical factors prior to embarking on implementation as well as for post-hoc reflections on outcomes. It represents a first effort, and it is acknowledged that other, similar tools exist. Through a combination and further synthesis of experiences and observations, the framework can become a practical tool for use by planners and policy-makers with general applicability in multiple contexts.

Annex: Case Studies: Applying the Poverty Alleviation Framework

Case Study 1		**e-Bario, Sarawak, Malaysia**
		Universiti Malaysia Sarawak
Reference		http://www.unimas.my/ebario/
Why is it interesting?		The objective is to define opportunities for remote and rural communities in Sarawak to develop socially, culturally and economically, from the deployment of ICTs. The experiment is expected to demonstrate the many ways in which ICTs can be used to improve the lives of marginalized groups, specifically the rural and remote communities in Malaysia. Bario is in the Kelabit Highlands of north Sarawak on the island of Borneo. It is the homeland of the Kelabit people, one of Sarawak's smaller ethnic minorities, with their own language and culture. It is accessible only by air. The local population numbers around 1,000 people, which is about half what it was in 1990. There are around 5,000 Kelabit in Malaysia and elsewhere. The local school was provided with a computer laboratory and a local IT company organized an IT literacy programme for the pupils. Later, a telecentre was established, with Internet connection via VSAT satellite connection.
The approach		This is a research project run by academics but with close involvement and participation by the resident community. The researchers and community spent a long time getting to know each other, and participatory action research (PAR) methods were adopted to help define a development agenda before ICTs were introduced. The school was chosen as the first benefactor because at the time the Government of Malaysia was promoting a "Smart School" concept, which focuses heavily on the use of ICTs for education and administration in schools. Additionally, education in general and the school in particular are strong features in Kelabit culture.
Results		Both the primary and lower secondary schools are equipped with computer laboratories and Internet access. The community telecentre is functional, enabling email exchanges and web browsing. A development agenda has been set with the community for implementation. Priorities include e-commerce for Bario rice (a delicacy) and community-based tourism associated with handicraft trade.
Lessons	**What has worked**	Close association between the team and the community, manifested in part by the local project steering committee consisting of community leaders. The use of PAR as a methodological guide, as well as its extension to incorporate the use of ICTs.
	What has not worked	The IT literacy programme in the school was in English, which was an inhibitor to learning. It is being re-written in Bahasa Melayu. Some of the teaching and learning software borrowed from the Smart School project failed to outperform traditional teaching methods.

Applying the Poverty Alleviation Framework to E-Bario

ICT Policy	Development Strategy	Local Access
Towards community development	Clearly articulated by the community	Shared via a telecentre; Challenging to install

Government as a user	Infrastructures	Methods
Not involved	VSAT, very local, remote	Participatory, action-oriented

Institutions	Specific Services	People
Not at the beginning	Slow to develop	Acceptance but no data about impact
Commentary Government involvement and institutional participation could enhance services. Impact assessment would be helpful.		

Case Study 2		Village Information Shops, Pondicherry, India
		MS Swaminathan Research Foundation, India
Reference		http://www.mssrf.org/informationvillage/informationvillage.html
Why is it interesting?		The installation consists of 10 villages networked within a hybrid wired and wireless network of public telecentres equipped with PCs, telephones, VHF duplex radio devices and email connectivity through dial-up telephone lines, which provide for voice and data transfer. Initial social surveys uncovered a highly detailed picture of the nature of poverty within the villages, which enabled the definition of a meticulous programme for information provision targeting improved well-being. Local volunteers have been instrumental in the acceptance of the telecentres, as well as the principles on which the telecentres are established-community ownership; the telecentres as a development tool, not a technology demonstrator; and the telecentres not being associated with just one group or caste. In-built gender sensitivity has also been instrumental, and the team has implemented an extensive set of information systems that address a wide range of development issues. The project has generated some remarkable development successes that are widely quoted.
The approach		A research project with extensive application of Participatory Rural Appraisal (PAR) techniques. Formal agreements between the project and the community that lay out certain conditions under which telecentres will be established, such as gender and caste equity.
Results		A considerable number of success stories has emerged (see, for example, http://www.mssrf.org/informationvillage/pantlegmissionreport.html). Community benefits include employment opportunities, local entrepreneurial development, health, education, fishing and agriculture support and government entitlements. Many were unexpected outcomes that emerged from newly found empowerment and local activism.
Lessons	What has worked	PAR as a means of engaging with the community and developing relevant information supplies. Insistence on equity, gender and caste has directed benefits to the very poor. Creative deployment of a range of technologies.
	What has not worked	Sustainability, especially financial sustainability, has taken a back seat. The centres generate funds, but the project is driven by the need to demonstrate social viability. Scaling up results will be a challenge.

Applying the Poverty Alleviation Framework to the Village Information Shops, Pondicherry, India

ICT Policy	Development Strategy	Local Access
To reach the un-reached	Poverty alleviation	Networked telecentres with an information hub

Government as a user	Infrastructures	Methods
Not involved	Physical - mix of wireless and landlines. Information - multiple databases	Participatory, action - oriented

Institutions	**Specific Services**	**People**
Low involvement	Range of available information made locally accessible.	Tangible benefits, focus on disadvantaged
Commentary Government and institutional involvement would probably extend and intensify benefits.		

Case Study 3		Thandarai Telecentre, Pondicherry, India
		Foundation of Occupational Development (FOOD), India
Reference		http://www.xlweb.com/food/index.htm
Why is it interesting?		The village of Thandarai in the Union Territory of Pondicherry formerly earned a living from the collection of snakes in the surrounding bush country and the sale of skins. Environmentalists were alerted to the possible extinction of the local snake species. Womankind Worldwide, a British NGO, discovered that the village inhabitants had considerable knowledge of the local herbs: one shepherd youngster could identify 360 separate species of herbs and knew how to use them to treat sheep for a variety of ailments. The village established a telecentre and, with connectivity support from FOOD, used it to learn how to package and market the herbs that they found in the surrounding countryside. FOOD's operations have built-in sustainability due to the entrepreneurial approach adopted by the organization. The head of FOOD is a "venture socialist", which is a way of describing the organization's business-like approach to its mission of creating employment opportunities through the inventive deployment of contemporary ICTs among communities that possess few other technologies.
The approach		A consortium of NGOs effectively re-engineered the village livelihood, using ICTs as a means to help them.
Results		The village now has several buildings that contain the telecentre with a prodigious library on herbs and a burgeoning herbal processing centre. Around 300 women from the surrounding district are engaged in the herb preparation process, and there is a concerted effort to record the local knowledge about herbs, from which a book is being planned. The telecentre service was instrumental in sensitizing the villagers to the value of their knowledge and in stimulating them towards using it as a means of obtaining their livelihood, as well as saving the snakes from extinction.
Lessons	What has worked	Having a clear development strategy from the outset, well grounded within a business and environmental context that matched a local need with a local opportunity. Creative application of wireless technology, radio connectivity in a relatively remote location.
	What has not worked	The telecentre is fully focused on the needs of the herb production and marketing business and no other development activist has come along to mobilize the community into using it for other development opportunities, such as health and education.

Applying the Poverty Alleviation Framework to Thandarai Telecentre, Pondicherry, India

ICT Policy	Development Strategy	Local Access
Focused on a single application	Embedded within community livelihood strategy	Shared

Government as a user	Infrastructures	Methods
Not involved	Wireless link	Prompts from outside agencies

Institutions	Specific Services	People
Not involved	Limited focus on one livelihood strategy	All working members of the community
Commentary A wider range of applications, possibly involving institutions and/or government, could increase the range of benefits.		

Case Study 4		Multipurpose Community Telecentres, Philippines
		Philippine Council for Health Research and Development
Reference		http://www.barangay-mct.org/about.html
Why is it interesting?		This is a pilot project run by the Philippine government to set up four Multipurpose Community Telecentres (MCTs) in rural villages in Mindanao. Started in 1999, the project aims to "set up an Internet-linked multipurpose community telecentre in four barangays (villages) to democratize access to people and information in health, education, agriculture and rural enterprise development". The project also aims to build information resources in partner organizations that are geared for rural communities and develop the communities' capacity to build their own indigenous information. Implementation is by the Philippine Council for Health Research and Development (PCHRD), under the Department of Science and Technology (DOST). PCHRD has a track record of implementing information systems. The MCTs contain two computers, which are hooked up to the Internet, video facilities, a public address system, educational tapes and interactive CD-ROMS. The outcome is expected to lead into a nationwide implementation involving potentially 44,000 villages.
The approach		Essentially a top-down approach to community development with ICTs, with a government agency coordinating national bodies, local line agencies and communities.
Results		By October 2001, the DOST regional director characterized the MCTs as "entertainment centres for the local folks, a place where people can send e-mail to relatives abroad, and a learning centre for teachers." Communities have not progressed beyond surface adoption of the technology, with most using it for amusing but fairly trivial applications.
Lessons	What has worked	A substantial array of institutions has committed to assist the project in the delivery of information to the communities. The project has been able to recruit significant numbers of local volunteers to operate the MCTs.
	What has not worked	Much of the information that has been made available is of doubtful value in terms of the immediate needs of the communities. Information providers do not seem to have any direct contact with the communities. A top-down exercise, the project doesn't seem to have engaged too closely with the communities. Arrangements for delivering connectivity in one location were held up for two years by a dispute between the national carrier and a private supplier, despite having the Department of Transportation and Communication on the team.

Applying the Poverty Alleviation Framework to Multipurpose Community Telecentres, Philippines

ICT Policy	Development Strategy	Local Access
Local development	Not clearly articulated	Multipurpose telecentres

Government as a user	Infrastructures	Methods
Co-ordinating institutions	Based on fragile local telephony	Top-down with consultation and collaboration, little participation

Institutions	Specific Services	People
Mobilised for information provision, in a static format	General information provision	Surface adoption, limited impact
Commentary Closer engagement with the community to mobilize information seeking and focused implementation of specific services would yield deeper impacts.		

Case Study 5		Internet Centres, Mongolia
		Mongolia's Internet and Information Centre
Reference		http://www.intermedee.org.mn/pantleg/
Why is it interesting?		The Mongolian Foundation for Open Society (MFOS), supported by the Soros Foundation, UNDP and IDRC has sponsored Mongolia's Internet and Information Centre to establish two Internet centres in small town locations in Mongolia. MFOS assisted the Internet Centre in helping Mongolian NGOs set up web sites and make good use of ICTs. The Internet, civil society, democracy and the concept are all relatively new to Mongolia. According to its web site, the foundation places greatest emphasis on projects that have the potential to make long-term improvements in the openness, transparency and accountability of key sectors and systems of Mongolia's civil society that promote the active participation of citizens in society, and that encourage tolerance and pluralism.
The approach		The two centres in Choibalsan and Erdenet were established with support from MFOS, were run by the Internet Centre and have been operating in a mix of for-profit and social-responsibility modes of operation. They provide public access to computers and the Internet, for which they charge, although school pupils have subsidized access. Connectivity is achieved via VSAT satellite connection. In Ulaanbaatar, the Centre conducted a survey of 67 NGOs to help develop and improve its services.
Results		The centres have secured support from local organizations-a local mine in one case, and the local government in the other. The provision of computer training has been a priority, with a focus on government staff and teachers, school pupils and local NGOs achieving fairly widespread awareness.
Lessons	What has worked	The early adoption of a business model, with overall support from the agencies, has fostered a focus on financial sustainability. Community support is strong and effective. Training and awareness raising, at least of ICTs, seem effective.
	What has not worked	The absence of proactive community outreach has not fostered a community development, problem-oriented service. Given the focus on NGOs and the development of civil society in Mongolia, it is difficult to assess the extent of achieving their goals. There was a bit of a technology cult, and in one case the location of the centre (the first floor of a hotel) inhibited public access.

Applying the Poverty Alleviation Framework to Internet Centres, Mongolia

ICT Policy	Development Strategy	Local Access
Geographic diffusion	Foster open society, strengthen civil society	Internet centres

Government as a user	Infrastructures	Methods
Not especially	Information - local information seeking and training. Physical - VSAT	Outreach directed at NGOs

Institutions	**Specific Services**	**People**
Local government participation	No definite focus	Unclear benefits beyond facilitated access
Commentary A closer focus on institutions and specific services would increase benefits. Participatory community engagement would help.		

Case Study 6		Keltron Information Kiosks, Kerala, India
		Kerala State Electronics Development Corporation Ltd., Thiruvananthapuram, Kerala, India
Reference		http://www.keltron.org/prerel.html
Why is it interesting?		Keltron Corporation is wholly owned by the Kerala state government but operates as a separate company. They have developed a prototype Community Information Kiosk, e-sringhala, for providing e-government services to the public. The kiosks have been developed following the model of e-seva Andhra Pradesh and Gyandoot in Madhya Pradesh. They provide information on various schemes; downloading of forms for applying for government support, incentives and subsidies; and on-line submission of application forms. There are also modules for counselling farmers on agricultural practices, as well as data on the state census and other electoral data. The e-sringhala kiosks are being set up by Keltron in partnership with local *Panchayats* and other local bodies. Private participation is envisaged and the public will be charged a nominal fee when the kiosks are fully functional. The Thiruvananthapuram Kiosk operates a 64 kbps leased line with 20 terminals, 12 of which are connected to the internet. The centre provides public Internet access to around 50 people daily, charges Rs.25 per hour and has daily revenues of around Rs 1,400. Trained staff are on hand to provide assistance.
The approach		E-sringhala is a government initiative that is being implemented by a wholly-owned state corporation, an arrangement that draws on the flexibility of a highly autonomous for-profit organization combined with the advantages of access to e-government applications that it can readily implement. The scheme for public franchising of the kiosks encourages local governments to participate in setting up centres, but it is also intended to draw in the private sector.
Results		Pilot kiosks are already serving the public with simple e-government information systems and services and access to government databases. Government departments have been alerted to the potential for improving their dealings with the public through the demonstration effect of the early kiosks. Existing kiosks are poised to implement community-based information systems.
Lessons	**What has worked**	The public-private partnership has been instrumental in establishing e-government in Kerala, and seems set to facilitate a statewide rollout of public access centres capable of generating income for local investors.
	What has not worked	It is uncertain whether the very poor will be in a position to benefit from the kiosks without deliberate programmes that will see their needs represented in future planning and rollout of more kiosks.

Applying the Poverty Alleviation Framework to the Keltron Information Kiosks, Kerala, India

ICT Policy	Development Strategy	Local Access
E-government, citizen services	Government services	Public-private partnerships in telecentres

Government as a user	Infrastructures	Methods
Main driver	Physical - local telephone network. Information - based on government databases and services	Promote local investment, but unspecified community outreach

Institutions	Specific Services	People
Government departments	Government services	Benefits remain unclear but are expected to be broad-based
Commentary With government as the initiator, but with local partnerships, wider institutional participation could yield wider benefits.		

Case Study 7		Samaikya Agritech Support Centres, Andhra Pradesh, India
		Samaikya Agritech P. Ltd.
Reference		
Why is it interesting?		Samaikya Agritech P. Ltd was incorporated in 1999 and started operations in June 2000. Samaikya means "coming together for a good cause" in Telugu, the language of Andhra Pradesh. The company operates 18 "Agritech Centres" in five districts in Andhra Pradesh. The centres provide agricultural support services to farmers on a commercial basis. The centres are permanently manned by qualified agricultural graduates called Agricultural Technical Officers (ATO) and are equipped with computers linked to the head office in Hyderabad, through a modem-to-modem telephone connection. Farmers register with centres and pay a fee of Rs.150 (about US$3) per acre/crop per growing season (two or three seasons per year). A farmer registers by the field and receives support services that are specific to the fields registered. Specialists with more experience and qualifications at the headquarters organize and coordinate replies to queries, which are typically transmitted back to the centre within 24 hours.
The approach		Samaikya Agritech P. Ltd has invested about five million rupees (US$106,000) in the agri-centre programme. The company expects the programme to finance itself within the next two years (2002/3). The programme was conceived as a self-financing, profit-making activity from the outset. Its purpose is to maintain a sustained service of agricultural assistance to farmers. Prior to setting up a centre, Samaikya performs a survey of local farming and cultivation practices and the political and cultural context of the potential centre. It conducts a pre-launch programme to familiarize farmers with the services.
Results		At the end of 2001, the company had slightly more than 1,200 registered farmers.
Lessons	**What has worked**	By remaining in operation, Samaikya will demonstrate that development information can be sold and that a potential source of revenue exists for telecentres that provide information services that its customers are prepared to pay for. As a commercial concern, Samaikya respects the demands of its customers. Transactions are conducted on a supplier-to-customer basis because the company knows that if its customers are not satisfied with its service, they will discontinue their patronage. The exchange sits in marked contrast to a typical exchange with a government official in India.
	What has not worked	One centre closed down within three months of opening as no farmers registered for the service. This was due to the pressure placed on them by local marketeers, financiers and suppliers of inputs who perceived a threat to their livelihoods from the competing Samaikya services. Farmers were told that anyone who registered with the centre would not receive credit or essential supplies.

Applying the Poverty Alleviation Framework to Samaikya Agritech Support Centres, Andhra Pradesh, India

ICT Policy	Development Strategy	Local Access
Local networking	Agriculture information	Company-run information centre, not for public access

Government as a user	Infrastructures	Methods
Not involved	Physical - dial up modems	Local agricultural agents as infomediaries

Institutions	Specific Services	People
Indirectly via the company's network of information providers	Dedicated to agriculture support	Farmers receive benefits

Commentary
The centres could be opened up to public access and a wider audience with multiple services, probably as a moneymaking proposition.

Case Study 8		Nepal Telecentre Pilot Project
		His Majesty's Government of Nepal and UNDP
Reference		http://www.undp.org.np/
Why is it interesting?		The project is an expression of the government's policy for rural development through connectivity and intends to implement 15 pilot rural development telecentres. Mechanisms are being installed alongside the technology to ensure that communities are able to articulate and prioritize their own information requirements and implement necessary strategies in order to satisfy those requirements. Based on the pilots, suitable mechanisms and policy interventions are being designed for replicating successes and for achieving a national rollout of rural development telecentres, possibly reaching 1,000 villages. The government has announced priority areas for information provision, including agricultural information, distance learning, tele-medicine, productive economic activities, environment protection and natural disaster mitigation. But the project is taking steps to ensure that recipient communities will be able to define their own information requirements and priorities based on their own development aspirations. Ultimately, the government intends to partner with private sector organizations in replicating telecentres, and the pilot will serve as a test-bed for experimenting with alternative models of achieving this.
The approach		As ICTs are most effective when integrated with already successful development initiatives, close alliances are being forged between the pilot project and such programmes so that information systems that support their aims will be implemented. This is a UNDP-funded activity under national execution.
Results		After the first year, the project has implemented only two centres. An early decision to partner with local authorities significantly held back progress, and has since been modified.
Lessons	**What has worked**	Starting with the development of a national policy for ICTs through a highly local and participatory process, which specifically targeted rural connectivity, the government has increasingly focused attention on the modality of achieving rural development through ICTs by tracking trends in neighbouring countries. The government has also acknowledged the critical need for locally specific knowledge. The pilot seems to be a useful forum in which to understand what it will take to achieve a successful national programme.
	What has not worked	There have been three years of deliberation on setting up pilot rural telecentres, which perhaps highlights undue caution or reluctance to experiment. Local level bureaucracy has hindered progress.

Applying the Poverty Alleviation Framework to the Nepal Telecentre Pilot Project

ICT Policy	Development Strategy	Local Access
National policy to diffuse and infuse ICTs	Poverty alleviation	Telecentres, eventually in franchised network

Government as a user	Infrastructures	Methods
Driving implementations and seeding applications	Physical - fragile telephony, probably unsuitable	Top-down, but accompanied by community engagement

Institutions	Specific Services	People
Limited to government so far	General areas combine with local requirements	Too early, but pro-poor focus
Commentary Local entrepreneurial partnerships will foster sustainability. Government influence can promote institutional participation. Replicable approaches to local innovations are required.		

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