

Some Outline Thoughts for the Harvard Meeting on ICTs and Poverty Reduction

Keith Bezanson
Institute of Development Studies

From the beginning of time, technology has been a key element in the growth and development of societies. Entire eras are named for the levels of their technological sophistication: the stone age; the bronze age; the iron age; the age of sail; the age of steam; the jet age; the computer age. But technology is much more than jets and computers. It is a combination of knowledge, needs, techniques, concepts, social organization and, most of all, it is people. The cultural, historical and organizational context in which technology is developed and applied is the key to its success or failure. In short, technology is the science and the art of getting things done through the application of skills and knowledge.

Yet attempts to craft and apply technology strategies are complicated and fraught with dangers. This would appear to be more so today than in prior periods. For ours is a deeply paradoxical age. It is, on one side, an age of global integration, driven by the new information and communications technologies, that puts all human beings in contact with each other, exempting few from vulnerability to global forces. On the other side, it simultaneously maintains deep fissures and establishes new ones between different groups of countries and between peoples within countries. Future historians will almost certainly look back on our age as a hybrid era, one caught somewhere between bronze and computers, between sail and jet engines; one in which quality has become confused with quantity, and means with ends. For poorer countries, it is a time of immense technological opportunity and optimism. It is also a period of unimaginable poverty and hopelessness. It is a time of unprecedented flows of information and of speed of technological change. And it is unlike any other period in history; for today, in addition to artisans and artists, farmers, machinists and dreamers, the direction of technology is influenced and fashioned by politicians, bureaucrats, economists, far-away corporate planners, aid agencies and charities. Never before in history have so many non-technical people exerted so much influence on the advancement, retardation and movement of technology.

It is in this context that the current, conventional development mantra is urging even the very poorest of developing countries to accord the highest of priorities to the acquisition of new information and communication technologies; not to do so, it is asserted, will consign these countries to continuing marginalisation and increasing poverty^{*}. The conventional narrative proceeds, in general, on the basis of the following propositions:

- The new information technologies, especially those based on the combination of telecommunications and the internet, are cheap and costs will continue to decline.
- This combination is changing fundamentally the structure of global markets, altering the factors of comparative advantage and opening up unprecedented opportunities for those who will seize them.
- ICT's are 'neutral tools' that adapt to and that can be adapted to any circumstance.
- Benefits will accrue more or less automatically to those who avail themselves of the technology (i.e. there is a high degree of technological determination).
- The task of the state is to ensure an enabling policy environment for the new technologies and the required investment will follow from the private sector.

The recent collapse of the dotcom bubble may have muted somewhat the certainty with which these propositions are espoused, but the essence of the discourse remains intact. There is good reason for this and the underlying logic of the argument ought not to be dismissed either completely or lightly. The history of development efforts over the past forty years in many countries gives some credence to the

^{*} For example, the World Development Report of 1998, argued that the development returns to acquiring information technologies would be greater than for alternative investments because"the balance between knowledge and resources has shifted so far in the direction of the former that knowledge has become perhaps the most important factor determining the standard of living...Today's most technologically advanced economies are truly knowledge based."

argument, for it has shown the high economic costs that can be paid by those left entirely behind in technological advances. But the same history shows that inappropriate technological choices can be just as damaging. Most significantly, the historical record shows that while technological acquisition may be an important factor in development, it has proved to be anything but a sufficient condition.

Manuel Castells has argued for over a decade that, whatever their economic importance, the networks created by the Internet are defining themselves increasingly in sociological terms. His most recent book (*The Internet Galaxy*, 2001) takes this one step further and refers to the Internet as 'the fabric of our lives.' Whether or not one is fully persuaded by this claim, if the new networks are indeed the fabric of our lives then people living with it must have the freedom to achieve the lifestyles they want[•]. Without the literacies required to attain such freedom, individuals will not have the capabilities to improve their own lives or express their own opinions about what they value. This can only result in problems of alienation, poverty, ignorance and indeed of terrorism. Castells argues that strategies based on Internet technologies are now the most effective means for the exercise of power on the world stage. Democratic processes, constructed around capabilities for media literacy, he claims, are essential if people are to achieve the things that they value. With electronic information now embedded in and mediating the lives of so many, appropriate policies over networks like the Internet is, as Castells, says, perhaps the most fundamental international political issue of our time. If the interests of poorer countries are to be served, such policies will need to go far beyond issues of improved access or even content per se. They will need to demonstrate a commitment to ensuring that the Internet becomes a space of opportunity for people to acquire their own capabilities for reasoned choice.

For the most part, that is not happening. A recent review by Robin Mansell of Internet intermediary web sites geared to non-commercial life (e.g. in health, education, environmental protection, globalisation and anti-globalisation) found that the sites are run by established (mainly Northern) institutions and that while they generally provide highly structured, authoritative information, only a very few are they set up so that citizens can contribute their own information or indeed acquire the capabilities for deciding how the provided information should be valued or acted upon. A 2001 study by the London School of Economics of the web sites of both small and large organisations that claim to represent civil society reached similar conclusions. With few exceptions, it seems that both publicly sponsored sites and those of civil society organisations are designed mainly as providers of authoritative information and not as spaces where the majority of people might acquire the kinds of new capabilities that are required for living and for choices[•] in the Internet Age.

In addition, the current state of 'official' development approaches to the Internet and developing countries does not appear to be much changed from the technology transfer approaches of a much earlier period. In the same way as development thinking on technology transfer in the 1960s and 1970s focused on machinery and the logistics of getting hardware from rich to poor countries, a lot of today's development dialogue on knowledge and development is dominated by assumptions that the main task is to transfer information technologies and knowledge from one place to another. Such thinking is not only misleading, it is dangerous. Martin Bell makes this point forcefully:

"The main to recognise is that getting access to technology is less than half the problem. What happens after that will usually be much more important. Indeed, the vigorous dynamic assimilation of what was previously imported may become an increasingly necessary basis for getting access to 'vintages' of imported technology. And... closer to the international technological frontier... access to the foreign technology may depend as much on being able to exchange technology as being able to pay for it. What you get depends on what you've got."[•]

[•] A very helpful way of thinking about such matters is to draw from Amartya Sen's notions of capabilities as a basic human right.

[•] 'Freedom' in the sense employed by Sen.

[•] See Bell, Martin, 1997, *Technology transfer to transition countries: are there lessons from the experience of the post-war industrialising countries?* In **The Technology of Transition, Science and Technology Policies for Transition Countries**, D. Dyker, ed., Central European University Press, Budapest.

The point is that it is learning, organising for learning and social choice that matter in acquiring technology. It is necessary to evaluate and to decide upon the capabilities that any person is entitled to, that this is the issue for policy. As Sen argues, the evaluation process is a social choice exercise, requiring public discussion and a democratic understanding and acceptance. Developing countries do need to gain access to the modern technologies of information and also to global information, but that is by far the easier part of any link between knowledge and development. Moreover, it is not access to the technologies or to information itself that makes the difference in terms of development. What does make the difference is the capacity for and the process of absorption and ongoing learning. The research on technology transfer and the processes through which new knowledge is incorporated demonstrate that the central requirements for success are organisational and cultural change. Learning to learn and creating organisational structures that facilitate learning and social choices are the critical components for the transfer of technology and knowledge.

ICTs and poverty reduction: two conceptual approaches

Stephen Browne
United Nations Development Programme

There is already a substantial literature on the subject of information and communication technology (ICT) and poverty (see Adeya, 2002 for a good sample). It is a reflection of the enormous interest in – and continuing uncertainty about – the extent to which the much touted new knowledge revolution might be impacting on the most fundamental of all development goals.

I am not going to enter this debate here. Others have done this better, and in my case, like many self-respecting economists, I probably belong on both sides of it! My purpose is only to suggest some parameters by which the ICT-poverty relationship might be assessed.

Most attempts to examine the relationship between ICT and poverty reduction tend to slice poverty as a phenomenon into a series of different measurable proxies: income, health, education and other indicators. Then the impact of ICT on these different outcomes is discussed, from which we have received the coinage of e-enterprise, e-commerce, e-schools, e-health and so on. This approach follows the way we have chosen to identify and measure poverty, as I examine below. I am going to suggest that there is an additional perspective - not superior, but different - which helps to understand the conditions in which ICT could be expected to contribute to poverty reduction.

What is poverty?

Conventionally, poverty has been defined in money metric terms and quantified through a measure of the ability to meet a minimum number of calories or a minimum level of income to satisfy needs. A “poverty line” defines this minimum level and the poor constitute the number of people (headcount) whose incomes or calorie intake are less than this. A commonly used measure for purposes of international comparisons of income poverty is the \$1 or \$2 per day measure (purchasing power equivalent to \$1 or \$2 in the US in 1993). The often-quoted World Bank data have determined that there were 2.8 billion people living on less than US\$2 per day, and 1.2 billion or one-fifth of the world’s population living on less than US\$1 per day at the end of the last decade.

Concepts of poverty and deprivation that go beyond measures of income can be traced back to Adam Smith and the classicists. More recently, the concept has undergone further modification with the incorporation of non-monetary aspects such as isolation, powerlessness (Chambers (1983) and others), vulnerability, lack of security on the one hand and, on the other, with a focus on capacities and capabilities to experience well-being (Anand and Sen, 1997).

Broader measures of poverty are much more recent. In the 1970's, the International Labour Organization (ILO) defined poverty as the inability to meet a range of basic needs. In 1997, inspired by the work of Amartya Sen, the UN Development Programme introduced measures for progress and for deprivation that focus on poverty from a human development perspective. "Human" poverty is viewed as a denial of choices and opportunities for living a tolerable life. A human poverty index (HP) was constructed for each country, using statistical proxies for deprivation in terms of longevity, education and economic provisionings. While there is a relation with income and human development indicators and thus between conventional and human development measures of poverty, there are also important divergences.

Since 2000, development practitioners have begun to concentrate on the targets contained in Chapter 3 of the UN Millennium Declaration, which is the inspiration for the eight Millennium Development Goals (MDGs). Part of Goal 1 is on income poverty. The remaining goals are related to hunger, health, HIV/AIDS, education and the environment, (and there is a goal on international partnerships). As a set of comparative measures of development outcomes, the MDGs can be a useful monitor of progress in a conventional sense. They have given a more concentrated focus to development financing and assumed the status of development success criteria. Even when measured at disaggregated levels by gender and geography, however, the MDGs – like UNDP's composite Human Development Index - are an imperfect proxy for poverty.

In reality, poverty cannot be reliably measured. Income poverty is only part - albeit a critical one - of deprivation. The indicators included in the Human Development Index and the Human Poverty Index provide important additional dimensions. The 40 indicators which have been designated as proxies for the Millennium Development Goals give an even broader picture (although many are bound to correlate), but they cannot capture those critical and subjective factors that contribute to an individual's or community's sense of powerlessness, voicelessness, insecurity and marginalisation. Nor can they take into account the dimension of vulnerability and the factors which can cause sudden changes in the fortunes of individuals, families and communities.

Poverty and capacity

Earlier, we referred to the importance of 'capacities and capabilities' in the concept of poverty. A focus on the more subjective concept of capacity is closely aligned to the definition of human development. Since 2000, UNDP has been undertaking a large programme of research under the title 'Reforming Technical Cooperation for Capacity Development', resulting in a considerable body of discussion papers and a series of three books (Fukuda Parr, 2002; Browne, 2002 and Lopes and Theisohn, 2003). Like earlier work on aid effectiveness, the programme provided a critique of the nature and orientation of technical assistance. Perhaps more original, however, have been the findings about the centrality of capacity to the development process (which helps to identify the key yardsticks for determining the role of technical assistance in development effectiveness.)

Building on the work of others, UNDP has defined national capacity as "the ability to perform functions, solve problems and set and achieve objectives". In this perspective, development progress can also be determined by the extent to which countries have acquired the sustainable capacity to meet their main development goals, including the reduction of poverty.

Whose and what capacities? In the development context, capacity development (or capacity building) has traditionally tended to focus on training at the individual level and on organisational strengthening. But this two-dimensional perspective is now considered too narrow. The development process is synonymous with the development of capacities, but these capacities are not just the sum of a country's individual skills and exercise creativity. Capacity development also takes place between individuals, in the organizations, communities and networks that they create - facilitated by the 'social capital' that holds societies together.

Thus, we now prefer to conceive of capacity development in at least three dimensions.

First is individual human ‘capacitation’ which goes beyond passive and institutionalised learning processes and which encompasses a wide range of skills and empowerments. Existing knowledge and skills should be built on and extended to enhance the capacity of individuals to improve their own lives.

Second is organisational strengthening, which encourages change from within rather than through the importation of external blueprints and solutions. Again, existing capacities should be the basis of change and the process should be pervasive and participatory.

Third, there is the ‘societal’ dimension. Capacity development is also important at the level of communities, governed by the nature of interaction and the cohesion of societies in terms of gender, geography, ethnic group and other factors.

(A fourth dimension is the global one; the capacity of countries is enhanced or impeded by factors that lie entirely outside their individual influence. But there is not the scope in a short paper to elaborate further on this dimension.)

Through this definitional lens of capacity development, the importance of the quality of leadership, at the national, community, organisational and other levels, is clearly critical. Enlightened leadership helps to create the conditions within which capacity development can proceed in all three dimensions. Leadership needs to be strong and consistent and it must preside over the transformations that are demanded by capacity development while retaining its popular legitimacy. Good leadership provides high standards and norms and it fosters a policy environment which can facilitate human and societal creativity and interaction.

Implications for ICT

Reducing poverty means overcoming the powerlessness of individuals and communities. Capacity development is an essentially organic process whereby societies as a whole acquire the ability from within to set and meet their development goals. We have defined capacity in a general manner. There are also specific capacities that go with meeting development goals - capacities to plan, execute, monitor etc. (Browne, 2002).

ICT can assist in creating the general conditions that facilitate capacity development in its three dimensions, as well as enhancing the specific skills required to develop the range of different capacities to meet development goals.

In the former case, ICT can facilitate the access of individuals to sources of learning and information. ICT can enhance the efficiency and effectiveness of organizations and vastly expand communication throughout societies. In the latter case, ICT can assist in the collection and processing of data to facilitate goal-setting; can be used to draw up, disseminate, implement and monitor plans... and so on. A huge number of different applications are suggested, which I will not attempt to list in this brief note.

Building sustainable capacity to enable countries to meet their poverty reduction goals, however, also implies the observance of some very important conditions and principles. Or put another way, the examples of ICT-for-development failure which are cited by the skeptics can usually be explained by the fact that some or all of these conditions have not been respected. I shall end by citing just 7, which are suggested by the foregoing:

1. ICT needs to facilitate access to information in formats and languages that are locally comprehensible
2. ICT should foster voluntary learning, with the accent on the acquisition, rather than the transfer, of knowledge
3. ICT solutions cannot be imposed from the outside; they must be compatible with the level of skills and comprehension in the specific context in which they are applied
4. ICT solutions must respond to needs perceived by the users; these needs must be properly articulated and understood

5. ICT needs to be locally managed and owned by beneficiaries and not utilised to exacerbate and shore up constrictive hierarchies of power
6. Positive incentives need to be established in applying the use of ICT; users need to see the individual and collective dividends
7. All capacity development takes time; there are no rushed solutions. Nor are they linear. The application of ICT can involve much trial and error.

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ICT4HEALTH Lincoln Chen

To bring out specifics, this note focuses on ICT and health, a key aspect of poverty and development. I argue that while ICT will contribute to overall health improvement, whether ICT will advance health equitably especially among the poor is unresolved.

A century of experience has demonstrated that good health is knowledge-based and socially-driven. The knowledge base is not only new biotechnologies like drugs and vaccines but also education and information that enable people to produce their own health. Social organizations and institutions help people to collectively achieve health through health care systems, public health programs, NGO action, and social health movements. ICT powerfully impacts on these knowledge and social bases of health.

The innovative projects categorized by Randy Spence and his IDRC colleagues illustrate the richness of ICT4Health potentialities. Knowledge management through health information, distance learning, virtual training, and connectivity for diagnostic and therapeutic decision-making all greatly facilitate the production, distribution, and application of knowledge. ICT can also improve the performance of social organizations through such advances as management information systems, the tracking of immunization of poor children, and the efficient processing of medical records, insurance claims, and payment records. ICT can help monitor, track, and control infectious outbreaks like the recent SARS epidemic.

Despite these potentialities, the central challenge remains whether ICT will advance health equitably especially among the poor? To do so, several opportunities will have to be exploited.

First, many if not most health challenges of the poor demand action well beyond ICT4H. In other words, ICT is not a panacea. Controlling the HIV pandemic, for example, requires political commitment, prevention through changing behavior, and the daunting task of providing antiretroviral treatment. ICT can facilitate some of these tasks, but technology is not the primary or only solution.

Second, many health benefits will be realized through ICT actions beyond the health sector. Advances in primary education will have major health consequences. A connectivity infrastructure accessible to the poor can transform health programs. Well-recognized, for example, is the control of maternal mortality requiring urgent surgery for obstetrical emergencies in facilities with transfusion capacity.

Access to Grameen phones in Bangladesh's villages can arrange emergency transportation for women to access emergency surgical services. Rapid communications in this case can transform maternal health care, but such connectivity is worthless if there is no medical infrastructure able to respond.

Third, as the private market is the primary engine driving technological innovation, ICT4H for the poor must grapple with market failure. Most ICT4H applications naturally concentrate on high-tech curative medicine to service those with purchasing power. The poor also participate in private markets but their purchasing power is limited. The poor are often compelled to purchase services, where available, but these are of low quality. The market failure of distributionally imbalanced benefits requires counterbalancing forces.

Realizing the potential of ICT4H for the poor, therefore, will require not simply innovative experimentation but investment capital, social institutions, and human leadership. Just as for-profit venture capital provided the angel or seed capital for market-based ICT innovations, socially-driven venture capital is needed to support ICT4H innovations to achieve scale of impact among the poor. Social financings including private philanthropy and effective social institutions are necessary for achieving innovation, scale, and sustainability of ICT4H for the poor. Leadership will be key to fashioning these investments and institutions for ensuring a more equitable distribution of ICT4H benefits.

Has the Digital Revolution Reduced Poverty or Exacerbated It?

Marty Chen
Harvard University, WIEGO

We simply do not know whether the digital revolution has reduced or exacerbated poverty overall or for specific groups of the poor. Better understanding of causal pathways and more precise data – and, perhaps, more time for the effects to play out – are needed to understand the impact of the digital revolution on poverty overall and on specific groups of the poor. This workshop offers an important opportunity to think collectively about the causal pathways between information technology and poverty outcomes.

This note is premised on the notion that gainful employment or work – both its quantity and its quality – is a key path to poverty reduction, or at least the reduction of income poverty. As such, this note considers the linkages between ICTs and poverty reduction from the perspective of the working poor.

Access of the Poor to Knowledge -

Much of the discussion of these linkages focuses on the access of poor people or poor communities to ICTs: that is, on **connectivity** per se. Some of that discussion raises the important related point of **what kind of knowledge** is accessed by being connected: is the knowledge currently being disseminated relevant to the needs of the poor?

The larger questions related to connectivity are a) to what degree, and in what ways, is lack of knowledge an important determinant of poverty; and b) to what degree, and in what ways, does the digital divide contribute to the lack of relevant knowledge. From the perspective of the working poor who are self-employed, two types of knowledge are of critical importance: knowledge of appropriate technology relating to their production processes; and knowledge of markets, especially new expanding markets, for the goods and services they produce. From the perspective of the working poor who are wage workers, especially who do not work in a so-called “standard” workplace such as casual day laborers or industrial homeworkers, two other types of knowledge are of critical importance: knowledge of their rights as workers; and knowledge of other workers and of worker organizations.

From my perspective, lack of knowledge more generally – and the digital divide more specifically – are at best only partial explanations of persistent poverty. Hence, narrowing the digital gap, even assuming

the knowledge gained is relevant, is only a partial answer to poverty reduction. In addition to **knowledge of**, the poor need **access to** appropriate technology, markets, workers' rights, and worker organizations. Knowledge alone, especially if acquired digitally, does not necessarily lead to access.

Finally, of course, there is the nagging concern that to access knowledge via ICTs requires literacy and, very often, knowledge of English. In the absence of intermediaries to access knowledge on their behalf, a large share of the working poor would not be able to access knowledge via ICTs even if they had access to computers.

Dissemination of Knowledge about the Poor -

A related question, that is asked less frequently, is whether knowledge of the poor (and their circumstances and needs) is being disseminated through ICTs. Some organizations are beginning to use ICTs to help the working poor voice their demands and needs, to disseminate data and information on the working poor, and to advocate for appropriate policy changes. These pilot efforts are an important dimension of the potential positive impact of ICTs (see Impact of ICTs on Institutions below).

Impact of ICTs on Markets -

While the number of pilot efforts to connect the poor with ICTs has grown significantly in the last decade or so, the use of ICTs by more dominant stakeholders to restructure markets has grown far more rapidly with, at least to date, more far-reaching effects. Using ICTs, companies have been able to decentralize the production process in both the manufacturing and service sectors, within and across national boundaries.

Consider the use of ICTs (both barcodes to track inventory and the internet to place orders) to decentralize production in traditional manufacturing sectors – such as garments and footwear - thereby creating another type of digital divide: between lead firms based in developed countries and their workforce dispersed across one or more developing countries. Available evidence suggests that industrial outworkers who produce from their homes for global value chains earn very low wages, have no worker benefits, have to absorb many of the non-wage costs of production (equipment, workplace, utilities), and are often subject to delayed payments of anywhere from three to six months as well as severance of work orders without due notice.

Consider also the digital divide between large and small firms, more so micro-enterprises, which positions the large firms to take advantage of expanding markets, especially export markets. Available evidence suggests that many micro-entrepreneurs in key manufacturing sectors – such as garments - are losing their niche in domestic markets (due to imports) and are not able to access export markets. As a result, unless special efforts are made to use ICTs to link micro-entrepreneurs to export markets, micro-entrepreneurs are often forced to start working as industrial outworkers in these sectors.

Of course, the use of ICTs has served to create jobs for the working poor in, particularly, developing countries. But the net impact of ICTs on the employment of the working poor – both the quantity and quality of work (not just jobs) available – is simply not known.

Impact of ICTs on Institutions –

The impact of ICTs on institutions - and on the power balance between institutions - offers a somewhat more positive picture. ICTs are, clearly, a networking tool. Although ICTs have been used to decentralize production and, thereby, isolate workers and distance them from their employers, ICTs are increasingly being used to link workers and to voice their demands. This networking around the issues of the working poor takes several forms, most well-known being the **anti-globalization campaigns** that focus on labor issues and the **fair trade initiatives** led by consumer groups and others. There is a less well-known, but fast growing, form of ICT-networking around issues of the poor: what have been called **global grassroots movements of the poor**. One of these is the fast-growing global movement of slum dwellers called Slum/Shack Dwellers International comprised of community-based

organizations of the urban poor around the world that negotiate both with national governments and multilateral organizations on issues relating to, for instance, housing and urban infrastructure. Another of these is the fast-growing global movement of informal workers, inspired by the Self-Employed Women's Organization in India, that includes two global alliances of workers' organizations – StreetNet (of street vendor organizations) and HomeNet (of home-based worker organizations); a global research policy network called Women in Informal Employment: Globalizing and Organizing (WIEGO); and the individual affiliates and member organizations of these global networks. This grassroots movement seeks to generate knowledge on and promote policies and programs in support of informal workers worldwide. Neither of these global grassroots movements of the poor would have emerged so quickly or so effectively without the use of ICTs to link member organizations/individuals, to share experience, and to disseminate information.

In sum, the net effect of ICTs on poverty reduction will involve a complex interplay of these and other dimensions of ICTs. As I said at the beginning, we simply do not know what the net effect has been on poverty overall or even on specific groups of the poor. I look forward to hearing other perspectives on the causal pathways between ICTs and poverty reduction.

The Role Of Information And Communication Technologies (ICTs) In Reducing Poverty

Edmund Clark
TD Bank Financial Group

Before commenting on the role of ICTs in reducing poverty in developing countries, it might be useful for me to begin by explaining my background, or more accurately my lack of immediate background, on this subject matter. Although my Ph.D. is in development economics, it has been several decades since I have focused on efforts to alleviate poverty in the developing world. I am currently a banker, having had a previous career in the Government of Canada – working in the Finance Department, the Energy Department and the Treasury Board. As a banker, I undoubtedly work in one of the industries most transformed by ICTs. Much of TD Bank Financial Group's wholesale revenue is derived from businesses that did not exist prior to the ICT revolution of the last 20 years. And, TD's retail operations – banking and brokerage – are prime examples of successful internet businesses. ICTs are central to the financial services industry today, because the heart of our business involves selling or processing information, and the massive reduction in transmission and processing costs ICTs have achieved has dramatically altered these activities. But, I feel some hesitation about commenting on how ICTs can help reduce poverty in the developing world, because I am quite removed today from involvement in the questions of what causes economies to grow and what strategies allow that growth to alleviate poverty. Accordingly, I offer the following observations as an interested, but non-expert, participant in this workshop.

In reading through the background paper for this conference, I was struck by the number of issues that have not changed since I published my dissertation on Tanzania. At the same time, I see that the backdrop for formulating economic development strategies has advanced in two ways.

First, we now have several successful models of economic growth to contemplate, along with some continuing failures – both of which academics appreciate, because they give you additional and contrasting data points. When I was studying development economics, we could only postulate what might prove to be a successful model.

Second, a consensus has emerged about the pre-conditions for successful development. Recent history tells us that much can be accomplished in countries where there is relative political stability, openness to technology, and an application of the rule of law sufficient to support investment. Furthermore, growth strategies aimed at broad-based development, which create middle classes and generate income growth among the working classes, are far more likely to succeed than those that concentrate income gains among elites. In particular, expenditures on health care and education are now increasingly – and

correctly – viewed as a long-term investment rather than a short-term cost, because a healthy and well-educated population is understood to be a key engine of economic growth.

So, how do ICTs relate to all of this? From the background paper, I draw the following conclusions.

The diffusion and implementation of ICTs can deliver significant benefits to advanced and developing countries alike. Indeed, the recent ICT revolution is akin to the invention of the Gutenberg printing press – arguably, the most important single innovation in Western history – inasmuch as it facilitates the spread of ideas and the dissemination and preservation of knowledge. By increasing the flow of information, ICTs can boost labour productivity, thereby accelerating economic growth and improving the living standards of those with access to them. They can improve industrial processes, while also aiding the agricultural sector through the dissemination of information on new techniques, market developments, commodity prices and weather forecasts. And, they can enhance the provision of health care and education. Furthermore, access to ICTs can help to empower women and youths, building a nation's human capital.

However, access to new technologies is not evenly distributed across, or even within, countries. A 'digital divide' has opened between developed economies, which are the locus of the ICT revolution, and developing economies, which have been able to import only some of the technological advances. Moreover, while select less-advanced countries that are well along the developmental path have experienced benefits from introducing new technologies, many countries in the earlier stages of development have been left behind. And, in some cases, a similar 'digital divide' has emerged between more-skilled and less-skilled workers within developing countries – often exacerbating existing inequalities between workers in rural and urban areas. So, the key issue is not whether ICTs can be used to foster economic development and combat poverty, but rather how they can be deployed to ensure that the benefits are accessible to everyone.

These observations are neither new, nor groundbreaking. One of the lessons of the last few decades – especially evident in Asia – is that successful economic development strategies have been built on a solid foundation. This applies equally to ICT-based approaches to development. Such a foundation includes many of the factors I alluded to earlier, including good governance, a well-developed institutional structure, and a high level of literacy – with respect to the last point, use and/or familiarity with the English language appears to be particularly helpful. It also includes a basic level of infrastructure (such as the availability of electricity), an openness to international trade and foreign investment, and, in the case of ICT programs, direct government support. At the same time, the very limited progress seen in some countries to date – especially in Africa – highlights the fact that pursuing economic development through technology diffusion in war-torn regions or other areas where people lack basic human necessities, like food and clean water, is clearly putting the cart before the horse. In other words, high-tech investment is not the holy grail of economic development. ICT initiatives are best pursued as part of a balanced and integrated economic development approach that takes into account the economic, political and social realities of the host country.

Now, let me raise several questions that I see as being germane to this workshop and meriting further discussion:

- (1) What are the common characteristics of the developing countries that have benefited the most from ICTs and do these characteristics differ from those of the general model for successful economic development through growth?
- (2) Are there specific ways in which ICTs can speed development in less advanced countries – particularly their struggling rural areas – or are they a general bet on the future, similar to investments in health and education?
- (3) Since the impact of ICTs is greatest in information-intensive industries and the benefits are most easily accessed by the more highly educated, are these technologies inherently likely to widen the

gap between advanced and developing countries? Similarly, will ICTs naturally widen income inequality between groups in developing countries (e.g. Bangalore in India)?

- (4) Is the focus on ICTs rightly placed? While ICTs are transforming the advanced world, are they the most important investment for the developing world? “To plan is to choose”, so a focus on ICT necessarily implies less attention and resources for other areas. Given this, what takes a backseat to ICT strategies?
- (5) Are ICT development strategies worth pursuing solely because of their impact on creating a more open society and because they force political developments that are, in the end, more conducive to economic growth?
- (6) Do ICTs carry a “political” cache that will attract additional donor dollars? If so, is it possible to design an integrated ICT-health-education development strategy that would have the indirect effect of boosting foreign investment in the latter two areas, which are crucial to economic development but lack the appeal that ICT investment has for western donors.
- (7) Do ICTs represent a way to get the advanced world re-interested in economic development, or are they a diversion? It seems clear that the greatest lift to the developing world today would come not from ICT investment but from trade reform, elimination of agricultural subsidies, and a firm commitment on the part of donor countries to direct aid to performing developing countries that are genuinely in need, rather than to those countries that are seen to be strategically significant. Would industrialization through ICT investments help focus energy on the more general goal of economic development, or would it divert energy from this objective?

I look forward to hearing more qualified people than myself discuss these issues.

An experiment in the use of ICTs in bringing scientific information to bear on the reduction of poverty

**David Dickson
Director, Science and Development Network (SciDev.Net)**

It is widely accepted that the appropriate and effective use of scientific information is a necessary – although by no means sufficient – condition for the successful reduction of poverty in the developing world. It is also recognised that the Internet has revolutionised the provision of access to such information (indeed, as is widely known, the world wide web started as an information distribution system between particle physicists).

Nevertheless substantial barriers remain to meeting the full potential of ICTs in this field. Some of these barriers (such as a lack of access to high-speed links) are determined by limitations in the hardware. Some are the result of commercial considerations (such as the high prices charged by some scientific journal publishers for electronic access to scientific papers appearing in their publications). And many result from broader cultural factors, such as the difficulty of translating the results produced by research laboratories into a form that the potential beneficiaries of such results can easily comprehend.

The Science and Development Network (SciDev.Net) was set up in 2001 to explore ways of using the Internet to increase access by developing countries to information about science and technology, through explicitly addressing the second two of these challenges. At the heart of our activities is a constantly-updated website (www.scidev.net) that provides news, opinion, authoritative topic-based ‘dossiers’, and announcements of topics from jobs to grant programmes.

We have been set up with the support of the world’s two leading science journals, Nature and Science, both of whom provide us with free access to a limited number of selected articles and papers every week. And a significant component of our activity has been in organising capacity-building workshops

aimed, for example, at teaching journalists the skills needed to make effective use of the Internet to research and communicate information on science-related issues.

SciDev.Net already has almost 7,000 registered users around the world, and receives 15,000 visits every week. It was set up on the assumption that improved access to authoritative information about science and technology (including both their positive and negative social consequences) must be a central component of any effective poverty reduction strategy. It is also committed to the idea that ICTs provide an unprecedented opportunity to do this effectively.

The main challenge that we currently are currently addressing through, for example, the creation of regional networks and local activities, is how to turn the potential into reality. Our aim is to use electronic forms of communication to enable researchers, journalists, decision-makers and civil society explore together how science and technology, if appropriately used, can help reduce poverty, improve health and raise standards of living around the world.

Richard Fuchs

Director, Information, Communication, Technologies for Development at IDRC

There is little question that Information and Communications Technologies (ICTs) affect poverty outcomes. In the post-industrial economies of the Americas, Europe and Australasia, 25 years of digital economic transformation has led to many changes in labour markets, the nature of commerce and the components of national wealth. For example, women's participation in the labour force, in business and in science and technology related training and employment has increased dramatically. On the down-side, the male blue collar worker, without certification for skills, has lost-out to an economy that was both more credentialist and technology-driven.

While the digital technologies that enabled this transformation in the north have created the capacity for globalization, they have yet to establish a reciprocal economic benefit to most developing countries. With some exceptions, (most notably India, Brazil, South Africa, Korea, Singapore, Taiwan, and Malaysia) this transformation has only reached a small segment of elites in most developing countries. Will the developing world be by-passed by the Information Revolution as they were by the Industrial Revolution? Perhaps more importantly, is there a digitally induced economic transformation that will play-out in the developing world very differently than it has in the North?

ICTs are both an enabler of social and economic productivity and they represent an economic sector unto themselves. Will small elite markets in the developing world become simple consumers of northern ICT products and services? Alternatively, will there be related economic production in the developing world that services local demand and engenders an increasing share of an expanding global market?

At IDRC our assumption is that the latter is both possible and desirable. Our strategy is to introduce ICTs in sectors of the society and economy that deal with issues of poverty. At the same time we help to awaken the policy process to the new realities of how these technologies can be integrated into national, regional and municipal policy and practice. Our hope is that this creates new capacity, new awareness, new markets, new entrepreneurs and new production in the developing world.

Our experience has been that all of the foregoing does, in fact, occur. Those institutions, people and communities which interact with ICTs make the transition to integrating these tools sooner, become more productive and make digital progress more than those who wait for "market" forces to include them. Our work is that of social investment. We are consciously accelerating the innovation process in the societies where we work.

What remains unclear to us is the paradigmatic models of policy change, market development and economic transformation which build on real experience and might assist in better planning.

Essentially, the question relates to what are the optimum ways to engender awareness, demand and use of ICTs within poverty reducing sectors of the society.

Digital Technologies & Poverty Reduction: From Access to Capacity Building and Appropriation

Envisioning the ways in which new technologies can stimulate poverty reduction is a challenging endeavor, particularly if we attempt to do this with knowledge of the field and of the difficulties that arise when trying to establish projects of this nature. The following are some initial reflections on the *when, where, and how* to incorporate these technologies. There are also some references to *which* and *why* for in my view; they are still central.

1. A time of pervasive misconceptions:

We face a period of pervasive misconceptions. Not so long ago, experts and international agencies considered the introduction of new technologies to developing countries something too costly and inadequate. The prevalent linear view of development usually mandated that, in order to be able to profit from technological innovation, countries had to overcome most of their social and economic ills. Furthermore, clear proof of impact was always required in order to allocate resources. Today, however, and almost without clear transition, we are confronted with the rather widespread belief that poverty and ignorance can be easily overcome by new technologies, particularly the Internet. This new discourse has been quite massively accepted by politicians and experts alike. Proof of impact is no longer required. Technology is now being conceived as a new *deus ex machina*. Information seems to be the key. We are told that we live in an "Information Society." Governments are therefore required to provide infrastructure for connectivity first and to later become concerned about issues of content. All of a sudden, the Internet has become *the* distribution channel. Little or no attention is paid to capacity building, to technological appropriation, to meaningful use, to the understanding of digital technologies and their potential to improve quality of life and living conditions. The individual, the user, the learner seems to be absent from this new technology-based development equation.

2. Etymological, Epistemological and Practical Difficulties:

From the point of view of development and poverty reduction, nobody can seriously question today the importance of digital technologies, even of ICTs. However, the information broadcasting paradigm in which they are being conceived and introduced is, in my opinion, one of the greatest obstacles that have to be surmounted in order to be able to profit from their potential. Digital technologies are much more than information and communication technologies. They do much more than transmit information. They are clearly being introduced within the context of a reductionist paradigm. McLuhan had warned us about this: we imagine uses for new technologies by looking at them through the rear view mirror. As Paul Levinson (2001) has stated, this tendency has a highly negative distracting effect that does not allow us to see what is crucial and new about them.

The emphasis on information magnifies this problem. Information and knowledge are not synonymous as is frequently believed. Availability of information, does not guarantee understanding or capacity to use it or apply it to different situations in productive or create ways. New technologies involve multimedia, interactivity, robotics, networking, simulation telepresence, to name only a few. As is obvious, the words we use to describe these technologies define the way we understand them, and, therefore, conceptualize their applications and use. Most of the present applications of digital technologies are today still technocentric and extremely limited in their applications. They usually do not consider its more empowering dimensions.

3. Beyond issues of connectivity and content

A more clearly people centered approach is necessary, one that focuses on capacity building and empowerment. This, however, will not be the result of spontaneous generation. It will not be created through the provision of access to connectivity and content, as is usually implied. The poor will not become less poor because today they have more access to information. They will not become less

ignorant either, because they will be able to log onto the Internet, which is frequently conceived as the universal library. Information is no doubt important. The Internet is an extraordinary resource. But reduction of poverty and increased development cannot be seriously considered unless a conscious and well-planned effort is made to develop the cognitive, creative, expressive and technological skills necessary to appropriate and master digital technologies in productive ways. Furthermore, mastering these technologies involves the increased capacity to read, write, analyze and communicate that has been fundamental thus far. The challenge has become greater. As Christian de Duve has clearly indicated, the greatest threat that humanity faces is the unlimited growth of knowledge. On the other hand, the information overload forces us to develop greater skills in selecting, analyzing, generating synthesis, validating.

4. From Technocentric to People-Centered Approaches:

For this very reason, capacity building and people-centered approaches have to transcend the still common focus on “computer literacy”. A command over certain computer applications will never be enough. A better understanding of the digital phenomena must be made effective through technology fluency and capacity to adapt to rapid changes in technological trends and resources. Capacity building involves also transcending the idea that technology for the poverty reduction is really using technology to improve delivery of services. Improving the management and delivery through technology is, no doubt, necessary, but this does not necessarily lead to meaningful and productive appropriation. This distinction is fundamental in the developing world. Complying with the first, however, does not mean breaking new ground in the second as is evident from the following comparison.

<p align="center">Digital Technologies for Management and Provision of Services for the Poor</p>	<p align="center">Digital Technologies for Capacity Building and Empowerment: <i>People Centered Approach</i></p>
<ul style="list-style-type: none"> • Focus on provision of services in more direct and efficient ways • Improvement in control, accountability and transparency of services • Increased possibility of focusing on populations with greater need. • Generation of an ethical dilemma: The danger of stigmatization through the inclusion in databases of poor individuals and communities 	<ul style="list-style-type: none"> • Focus on providing the poor with opportunities to appropriate technology for meaningful personal use • Focus on technology fluency and access to job market • Improvement of personal and collective efficacy • Impact on equity and productivity • Impact on socio-economic development

An additional clarification must be made: Capacity building is not necessarily achieved through traditional technical training programs which are frequently conducted by instructors with technical expertise but no knowledge of the interpersonal skills necessary to reach individuals in marginalized situations. Furthermore, they frequently have a focus on the application being taught and not on their use in work settings or everyday life situations. It is fundamental that these links be made explicit. Problem solving and empowerment must be stimulated through meaningful appropriation and use.

5. Grabbing the Digital Opportunity to Close the Digital Divide:

Investments in technology appropriation require much more than investments in hardware, software and content. They are normally costly and need to be persistent. The idea that new technologies are “faster, cheaper and better,” can frequently be misleading. Closing the digital divide and grabbing the potential of digital opportunity implies focusing on stimulating individuals, fostering their talent and capacity to tackle their problems in new ways. This is better achieved through programs oriented to the young, so that an understanding be developed early on and that they may be prepared for the challenges ahead. Furthermore, children and youth are frequently excellent facilitators for older generations. They have a clear interest in technology, even in poor communities, and they frequently take on a leading role.

Designing programs to profit from new technologies requires careful thinking, clear knowledge of the technologies themselves, and adequate understanding of the needs of those who will be using them. Unless we take time to understand the characteristics of the new digital culture and of knowledge-based economy, projects and initiatives launched will run the risk of missing the challenge. What is central is focusing on the establishment of mechanisms to increase literacy, to stimulate thinking and problem solving, elements that frequently do not characterize the educational systems of developing countries. In this digital technologies themselves can have a pivotal role. Properly used, they can be excellent tools to foster learning and productivity

6. Consideration of Values and Digital Ecology:

The use of digital technologies for poverty reduction necessarily involves also addressing problems associated to equity and values. We need to think of the digital world, also, in terms of the use of resources and the establishment of balances. There are, therefore, issues of digital ecology that need to be addressed. As in the case of natural resources, digital resources are scarce. They need to be shared and administered in equitable terms both in highly developed nations and in developing countries.

Today sustainable development involves equitable access not only to education but fundamentally to learning. Digital technologies can contribute in significant ways to create new learning environments. Poverty reduction cannot happen unless we progressively become committed to overcoming inequities in access to learning opportunities and to technological resources that can increase productivity of individuals, communities and nations.

Transforming Telecom Reform For Development

Alison Gillwald

Witwatersrand University, South Africa¹

1. Introduction

The ideas in this paper reflect the concerns that led to the establishment of a nascent African ICT research network with International Development Research Centre (IDRC) support earlier this year. At present, research in the field of ICT and development in Africa is limited, fragmented and typically undertaken as isolated and disconnected projects. Most of the understanding of the information age comes from the theory and experiences gained in the developed world. Africa produces little in the way of independent, primary research feeding into the ICT policy and regulatory processes. Unlike other parts of the world committed to participatory policy formulation processes, there are few independent local agencies contributing to public policy processes in the broader public interest on the basis of rigorous applied research. Strengthening African institutional capacity for research, analysis and debate in developing countries is an indispensable element in the construction of knowledge societies. In the absence of innovative organic policies, international models become the default development strategies for developing countries, with serious consequences for developing countries as this paper demonstrates.

Though it has been convincingly argued that trying to reform African national policies is futile or will take too long, this paper argues that without the development of informed, integrated and appropriate national policies, the role that ICT can play in development will be limited. This is evident in the initiatives that have deployed ICTs to alleviate poverty to date. In most cases these have been small-scale projects or pilots that are often not scalable or sustainable and have often only been made possible by donor intervention, whether to source infrastructure or to cover the high usage costs. Often successfully demonstrating the applicability of ICTs to development, the outcomes of these endeavours tend to be localised and at best can only be ameliorative. Connectivity projects in particular, that are made possible by policy exemptions to utilise a technology that makes connectivity possible for

¹ Research ICT Africa! seeks to strengthening institutional capacity for research, analysis and debate in African countries. See www.researchICTafrica.net

individual institutions or development projects do not produce the economies of scale that wider deployment in a more enabling policy environment would. While the connecting of a project or institution that would not have been connected otherwise must be viewed as a positive development, such an approach needs to acknowledge that it is dealing with symptoms rather than causes. Of course such ameliorative efforts might also be conducted within the context of broader efforts to deal with the more fundamental determinants of circumstances, such as restrictive policy, which would be more likely to have more positive developmental outcomes in the longer term.

National and multilateral projects, on the other hand, have been preoccupied with large-scale infrastructure expansion, with little consideration for what will happen at the end of the line, and which have generally not been integrated into broader developmental policies. The arising argument however, that access isn't useful without applications and content, while of course correct, can just as easily be turned around. Applications and content aren't very useful without access either.

It is for this reason that the central public policy challenge facing African decision-makers responsible for information communication technology (ICT) remains ensuring affordable access to services. This has to be achieved however, while creating the conditions for the development of the information infrastructure - which includes the seamless integration of networks, services and content - needed to operate a modern economy. While there may well be tensions between these objectives at various points in the development of a modern ICT sector, they should not be viewed as contradictory as they often have. Without an integrated strategy to achieve both developmental and growth objectives, neither will be achieved. The opportunity costs of not developing an appropriate policy and regulatory framework are high and are globally evidenced in what has been termed the digital divide. Countries that are unable to take up the challenges posed by global technological and economic trends are increasingly marginalised, not only from the global network economy, but also in their ability to deliver on their own developmental objectives.

2. *International reform agenda*

It was an awareness of this new reality that drove the telecommunications reform process that has swept the globe over the last three decades. Reform mechanisms of privatisation, competition, and independent regulation have been hailed as having resulted in price decreases, improvement in service quality, faster roll-out of infrastructure and new technology, and more choice for consumers. On the basis of this telecom reform has been sold to African countries as a mechanism to transform their communication infrastructures and integrate their countries in the global economy. The outcomes of the first phases of telecom reform in Africa have had far more mixed outcomes, however, and in some cases have had a negative impact both on affordable access and sector development.

There is considerable evidence to suggest that a broadly competitive macro policy environment is an important contributing factor in increasing the provision of ICT infrastructure, maximising its impact and in generally reducing what has become known as the digital divide. The reform project has been very unevenly and expediently applied in Africa, however, usually focusing on privatisation at the expense of other reform drivers.

The reform model that emerged for developing countries from multilateral agencies in fact consisted of three integrated components. These included the usually partial, privatisation of the incumbent fixed line operator through the extension of the monopoly; the introduction of network competition in the mobile segment of the market and service based competition in the value-added network services (VANS) market; and finally the establishment of a sector regulator to implement policy; create a transparent and certain regulatory environment for investors and consumers and contribute to building a stable and well-functioning market.

In practice the reform agenda prioritised privatisation which was perceived as the mechanism that would most rapidly redress the dismal outcomes of grossly inefficient state provision of telecommunications services which had left Africa at the start of the reform process in the nineties with a continental teledensity of around 1%. This meant the critical role of introducing competition, into what are often perceived by decision-makers as the elite components of the market, was often sidelined.

More importantly, while inducing the opening up of markets to foreign trade and investment, insufficient emphasis has been placed on the need for strong institutional arrangements to deal

effectively either with the regulation of the private monopoly in a partially competitive market and to counter market failure likely to arise in such imperfect markets. This has probably been the most undermining factor of reform efforts in developing countries. While effective regulation has been a cornerstone of competitive markets in many of the developed countries calling for open access to developing country markets, it has not sufficiently accompanied the introduction of competition policies, often expediently implemented by developing countries to offset debt or secure aid. Privatisation, without the regulatory capacity or political will to manage a private monopoly or the competitive framework, can be entirely counterproductive to the achievement of the very goals intended by liberalisation.

3. *Privatisation*

Common then to those countries where the gains of reform are not evident, appears to be the privatisation of the incumbent through an extension of the fixed line monopoly. This was the funding model proposed by international financing agencies in the nineties order to attract investment in the light of the generally poor state of infrastructure and the minimal customer base of most developing countries operators. The rationale for this was that often indebted monopolies needed the injection of capital and skills and the technology transfer to meet the challenges of expanding and modernising the usually minimal and outmoded network and preparing for competition by introducing cost efficiencies into the company.

While formally concerned with policies to achieve affordable access, these models in themselves represented a compromise between the market access desires of multilateral agencies and the reluctance of developing countries to lose a major source of income generation, ineffective as it might have been in providing public services. As they have played out in licence negotiations they have tended to focus the optimisation of the value of the state asset in exchange for increased rights and opportunities to generate revenues by the privatised entity, rather than on broader policy objectives of affordable access and sector development.

This has often resulted in incumbents securing the rights to the other areas of restricted competition, either mobile, VANS or ISPs. Very often to further protect the revenues of the privatised incumbent - ostensibly to roll out services - players in the competitive market segments have also been required to acquire their facilities from the incumbent.

The resulting vertically integrated dominant operator provides the basis for what has become the standard market structure that has accompanied the opening up of markets. It is also at the core of the failure of the reform project in developing countries. The anti-competitive incentives that arise in a market structured around a vertically integrated national company, with a monopoly on its upstream activities but which competes downstream against rival firms are impossible to counter without constant checking and adjusting of the integrated entity's behaviour. This problem is compounded where rival firms are required to acquire their non-competitive facilities from it in order to operate as required in many developing countries. Similar structural forces come into play for other networks having to interconnect in order for their customers to access the historically larger number of subscribers on the incumbent's network. This creates anti-competitive incentives for the incumbent to deny access to its network to rival firms, whether through delays or pricing strategies.

Historically, the regulatory response to this market structure, which tends to arise wherever a former public utility enters into a competitive market, is access regulation. At its broadest this can include retail tariff regulation, either through a Price Cap Model or through a rate of return regime, to ensure affordable access to the service by end-users. On the wholesale side this type of regulation focuses on ensuring access through the setting of wholesale tariffs for facilities and compelling cost based interconnection. All of these regulatory mechanisms depend on relatively complex costing models that are particularly onerous to enforce, especially when the former public utility's accounts are not clearly separated and there is not a sense of what constitutes real costs. Even once costs are realistically allocated there are inherent information asymmetries that disadvantage the regulator, as the incumbent operator will always have better knowledge of its own costs than does the regulator.

This resource intensive regulatory approach arising from this market design places an enormous regulatory burden on any country seeking to ensure affordable access through the creation of a fair

competitive environment and requires experienced and skilled regulatory staff to apply the access regulation regime effectively. Countries with far more experience in regulation and with far greater skills and finances than most African countries have struggled, and continue to struggle, to implement access regulation successfully. Expecting newly established, under-resourced regulators, often established in the absence of political will, to fulfil this task would appear to be setting them up for failure - and regulatory failure in such highly interventionist regime, means system failure.

The primary mechanism then of sector reform in many developing countries - privatisation of the fixed line incumbent through the extension of its monopoly - has had a demonstrably negative impact both on affordable access and on market development in some countries. South Africa is a case in point. The privatised incumbent has indeed become far more efficient, which has allowed it to extract monopoly profits, now repatriated, unconstrained either by competition or effective regulation of the monopoly. In South Africa the partially privatised and foreign controlled incumbent, Telkom, has retrenched over 20 000 workers, cut off two million people who could not afford to pay for services, and benefited from over 160% increase in tariffs in the last five years, way beyond what was anticipated by rate rebalancing. Far from privatisation resulting in the doubling of the network during the period of exclusivity as anticipated through the licence conditions, with the private monopoly's focus on the corporate market, there are probably fewer residential lines now than in 1997 when Telkom was privatised. South Africa is now one of the few countries in the world with a declining number of fixed lines subscribers.²

During the same period mobile services have gone much further in expanding universal service in South Africa; with the number of mobile subscribers at 14.5 million standing at almost triple that of the fixed network. Most commentators now agree that the means by which voice telephony universality will be achieved in South Africa and throughout the rest of Africa is through mobile services. However, the potential of mobile to close the gap on basic voice communications should not happen at the expense of the continued expansion of the more affordable fixed network, without which the digital divide will increase between those with access to voice communications only and those who are able to participate in the economy and society due to their access to enhanced services.³

4. Regulatory challenges

It is for this reason that an environment conducive to investment needs to be created. Reducing regulatory risk is a critical aspect of this as is demonstrating that investors will receive a decent return on investment, particularly at the time that they are required to reinvest in the expansion of the network. Stimulating investment in network roll-out, particularly after the heady dot.com days of the nineties and the subsequent recession in the telecom industry, may be one of the greatest challenges facing the African continent. So, while independent regulation may be a necessary condition therefore of policy success in order to create the transparency, certainty required for sector growth, it may not be a sufficient condition. In order to deal with the extraordinary developmental challenges facing Africa regulators will need, in addition, to regulate innovatively, strategically and appropriately to the very different conditions that exist in African markets.

A case in point is precisely that of price regulation. One of the most critical issues in regulating a developing country market is getting services cost based, if access objectives are to be achieved. A complex political and economic process in any regime, the regulatory rationale for price regulation is quite different in a developed and developing economy and uncritically adopting the rationale of developed markets may not contribute to achieving national objectives. While regulation in developed countries tends to focus primarily on the consumer and the keeping of tariffs as low as possible, to fulfil the primary national objective in most developing countries, the rationale for regulation may well be on securing access for those citizens who do not receive services at all, but compelling those that already have services to pay a cost based charge that includes getting services out to those who do not. In most developing countries those who already receive service tend to represent a small and usually influential

² Gillwald, A and Kane, S (2003) South African Telecommunications Sector Performance Review, LINK Centre Public Policy Research Paper no. 5, University of the Witwatersrand, at <http://link.wits.ac.za/research>

³ See Melody, WH (2001) Preparing the Information Infrastructure for the Network Economy, World Telecommunications Markets: International Handbook of Telecommunications Economics, Vol. III for fuller argument on the importance of fixed line expansion to avoid increasing the digital divide.

elite, usually who have been the beneficiaries of cross-subsidised services. Without regulatory clarity, the effect of their resistance to cost based price increases could result in reduced infrastructure expansion either due to investment not being attracted in the first instance because of the inability of investors to receive a reasonable rate of return or to telephone companies already invested in the country not being able to generate sufficient revenues to invest in network expansion.⁴

Of course while charges for access services remain high, ICT diffusion will be constrained. Currently, between 70 and 80% of all ISP and VANS costs are incurred from the obligatory acquisition of the facilities required for them to operate. For this reason consumer tariffs and interconnection charges must be brought in line with costs. This is a key to the efficient allocation of resources within the market and for creating the conditions for fair competition.

When this is applied in a developing country context with a history of a single provider it is also likely to challenge certain practices and indeed myths about costs and where they are incurred. Traditionally, largely due to monopoly provision and the send and receiver being on the same network, costs have failed to recognise both origination costs and termination costs. However, as markets have been opened up and calling and pricing charges have become more cost based, the reality of the differential costs in the provision of services has become apparent. An interconnection regime that recognises the asymmetrical cost of terminating calls in high-density, low-cost urban areas and low-density, high-cost rural areas, together with cost effective new technologies can make rural services viable. In most African countries however, these innovative mechanisms of reaching rural areas cannot be introduced due to the existence of state or private monopolies on basic services.

5. *Transforming African telecommunications*

Clearly an entirely new approach to reforming the telecommunications sector in many developing countries is needed. There is now considerable developing country evidence that demand for communications services can be innovatively met through regulated market forces. The lesson from the exponential growth of relatively high cost GSM mobile telecommunications in Africa is that with flexible access, billing and payment mechanisms communication needs of low income subscribers can be met. The access opportunities created through the licensing of small operators using cost effective wireless technologies to provide services to remote areas of developing countries that have not regarded as unprofitable, read unserviceable, by national telecos, provides another example.

The rationale for protected monopolies or duopolies has been undermined by new, low cost technologies and applications and invariably ineffective regulation of the private monopoly. The conditions that have accompanied privatisations have prevented the deployment of cost effective access technologies and applications, had a chilling effect on the expansion of the competitive segments on the industry and caused a drag on the economy more generally.

While lifting these constraints on the market through increased liberalisation of the market seems an obvious solution and while some pent up demand would certainly be met by doing so, this is unlikely to achieve competitive and developmental objectives without effective regulation.

Without a change to the vertically integrated market structure described above this would result in an increased regulatory burden on already overstretched and incapacitated regulators. As described earlier, where the market structure provides the incumbent with anti-competitive incentives the major function of the regulator becomes the constant monitoring and adjustment of the anti-competitive behaviour of the incumbent in relation to its competitors. Simply increasing the number of competitors requires increased access regulation which most developing countries are already unable to provide with a limited number of competitors. It also fails to deal with the inherent information asymmetries faced by the regulator.

A more fundamental solution lies in the structural separation of the vertically integrated entity. This creates entirely different incentive. It also makes it far easier to set tariffs for non-competitive essential facilities due to the separation of the component parts and therefore the accounts. With a tariffed fee structure sufficiently above cost, and no business unit to protect in the downstream market, an incentive

⁴For more detailed argument of this positions see Samarajiva,R (2001) Making Regulation Pro-Poor at www.itu.int/TELECOM on 19 July 2002

is created for the network operators to encourage as much access to the network as possible at the set price. While structural separation can remove the efficiencies of scope and scale that accompany integrated firms, these efficiencies very often do not exist in monopoly operators and even if they do this needs to be weighed against the total cost to the industry of the resource intensive regulatory required to enable fair competition in the competitive segments of the market. This will allow for the more efficient allocation of resources in the market that are likely to drive down costs and drive up quality of service.

A market structure and regulatory framework of this kind should create the conditions for bulk of the demand for communication services to be met through market mechanisms. This will relieve the demand on state subsidies and the need for public provisioning for the majority of the population, which no nation can afford. This will allow transparent subsidies or public access points, to be targeted at those who most need them, rather than applied, where they do exist, on the current scattergun basis.

Ideally this regulated market strategy could be accompanied by the innovative deployment of universal access levies. These should be used to stimulate investment in areas that remain unserved under the reformed market structure. This could be done through independent operators or rural networks or co-operatives Evidence from other parts of the world suggest that these are more likely to succeed if they are supported by competitively allocated state funding mechanism, a flexible low transaction costs regulatory regime, asymmetrical interconnection agreements and a technology neutral licence.

Policies and strategies of this kind are more likely to create the conditions conducive to the development of an information infrastructure needed to develop a modern economy and provide affordable access to it by the majority of the population.

Rohinton Medhora
Vice-President, Programs and Partnerships, IDRC

As an IDRC insider, I should keep my comments short, and organize these into four parts.

1. ICTs get at poverty through all of the principal components of well-being:

Education - distance learning, schoolnets
Governance - e-government, civil society mobilization
Health - tele-health (and nanotechnology?)
Livelihoods - e-commerce,
Natural Resource Management - disaster prediction/prevention

This list is not inconsistent with the 9-point organization of Part IV of the paper, but the more aggregated categories might be more useful for what follows. The extent to which lessons may be derived from the case studies of Part III might be seen to depend on whether the investments in ICTs were [a] in the right direction (that is, targeted at the component of poverty where the marginal return is highest); and [b] of the right sort (meaning the mix between specific interventions and systemic/policy changes.) This is not a very intellectual approach, rather it is a practical one, suited, ultimately to helping an organization like IDRC make programming decisions, but I am suggesting that we might think in terms of picturing a matrix, with the components of poverty along one side and groups of countries (by level of income or social development) along the other. Do patterns emerge when the cells are filled with information about the size and nature of intervention, and the key players? (Should we expect one to emerge?)

2. I find the discussion (throughout the paper, for example, early in Parts II and III, and IV.7) on how ICTs change the structure of markets compelling, and find this a useful advance on the more focused debate in finance on whether or not program trading and “hot money” contribute to market/currency/macroeconomic volatility. But it is not at all clear to me how the change in the dimension and structure of markets will impact developing countries. This is a different question from the more commonly asked one, about how this or the other developing country might benefit from e-

commerce or the new economy. But I do think it needs to be addressed prior to the market studies. And, being a public good sort of question, chances are it is not going to be adequately addressed by market players alone.

3. The speed at which developments occur in the ICTs area suggest tremendous possibilities for both, technological leapfrogging and technological obsolescence. The latter is clearly a bad, but the former might be too, if the leapfrogging is not properly planned and implemented. I am thinking of the gains that were to accrue to newly emerging economies from directly moving to advanced paperless financial systems. The results in many countries are, at best, modest, mainly because the governance and infrastructural platforms on which the advance was supposed to occur was not compatible with the vision of the planners. It might be useful to understand just what the potential for leapfrogging is, and what the costs of rapid obsolescence are likely to be.

4. The discussion on the use of ICTs in enhancing social and political openness (mainly Parts IV.3 and IV.9) is most interesting. My take (subject to revision) is that ICTs are neither a necessary nor a sufficient condition for success in this area. On the former, successful movements for democratization have existed long before ICTs came on the scene. ICTs have significantly reduced transactions costs, but presumably this benefits all sides, including the forces of darkness. On the latter, is there evidence that ICTs can create a climate for openness and change where none exists? Or must that climate already exist for ICTs to make a difference? Many investments in the ICTs-openness area depend on a convincing answer to this question.

The potential of policy and action for strengthening the links between ICT diffusion and poverty reduction in developing countries : Some thoughts.

**Swapna Mukhopadhyay
ISST, India**

The following paragraphs put together some thoughts on a few selected dimensions of the issue, such as

- The likely distributional impact of diffusion of ICT;
- The potential of ICT as an engine of 'relatively' egalitarian growth;
- The potential of ICT for meeting 'strategic gender needs' ;
- Some policy implications.

Most of these thoughts are situated in the context of a large developing country like India and may be inappropriate for very small or very poor nations.

The likely distributional impact of ICT

Technological changes have rarely been distribution-neutral. It is very likely that the current changes in Information and Communication Technologies sweeping through the world, and indeed through large parts of the developing world, will also be so. The Industrial Revolution wiped out the livelihoods of hundreds and thousands of small producers. Those that could not change fast enough, could not adapt to the new circumstances and opportunities for one reason or another, perished. But it also created new opportunities, new ways of earning livelihoods, and of prospering, for many more.

There is not much systematic evidence as yet on the impact of ICT on income distribution or on poverty levels in developing countries, although there is an emerging (largely theoretical) literature on its likely impact on patterns of growth, especially in industrialized countries. As for distributional effects, one could perhaps say that ICT diffusion and trade liberalization together may have been instrumental in the emergence of a small but growing segment of very high incomes at the top echelons of the distribution, thereby raising, ceteris paribus, income inequality, but its impact on poverty levels is hard to surmise.

In many developing countries (such as India), the initial years of ICT diffusion had triggered widespread fears of job loss and resultant protests, especially by formal sector workers. The fact that this period in many instances also coincided with the onset of liberalization and reforms, only served to reinforce these anxieties. Many did lose their jobs, for one reason or the other, but many also relocated themselves. By and large these workers were not part of the poverty population to start with, and to what extent they did fall below the poverty line due to changes in work organization brought about by the diffusion of ICT, is something on which there is not much empirical evidence.

The fact is that given the high degrees of segmentation of the wage labour markets in these countries to start with, it is more than likely that the direct impact of introduction of ICT would have been to increase the inequality of incomes across formal and informal sectors of the market, rather than raising levels of absolute poverty. To the extent the self-employed segment within the informal market largely catered to the needs of informal sector workers, it would have felt the pinch through reduced demand for its products and services. ICT diffusion may have brought about a degree of mobility in the market, but once again, evidence on this is thin at best. It is very likely that given the low access of the poor to ICT literacy and ICT infrastructure, a very significant proportion of the population continue to be insulated from the potential beneficial effects of ICT diffusion. However there is no way of pinning down numbers or forecasting patterns of change.

The point to note is that there is a large uncharted area of research that needs to be addressed urgently.

Characteristics of the new technological revolution as compared to the old

There are features of the new technology that invest it with the characteristics of a potentially powerful engine for relatively more egalitarian growth.

Unlike the old, the new technology is silent, and clean. It does not conjure up visions of noisy machines, polluting smoke and an exploited underclass.

Also, the new technology, like nothing before, thrives on connectivity. Widespread poverty and social exclusion is bad for the growth of ICT.

The larger is the size of its clientele, the more profitable it would be for the managers of the technology to operate it. A cut-up, un-integrated, hierarchical, exclusive society is not a good conduit for the spread of ICT.

Here is a case where higher poverty levels, by virtue of inducing lower connectivity, reduces the potential for technological development. Under the new technological regime therefore, poverty alleviation strategies may be looked upon not as competitors but complementary to strategies for growth.

Potential of ICT for meeting strategic gender needs

Continuous adaptation to a fast changing environment is essential for reaping the benefits of rapidly changing technologies. There may be many bottlenecks in the process. But with some ingenuity, these can be worked upon and may even be utilized to turn around long-entrenched socially constructed inequalities.

An example can be drawn from the situation of women in South Asian societies. The average South Asian household continues to mete out unequal treatment to its women. The household is more likely to spend on ICT training for its young males as compared to the girls, independent of their relative merits or inclinations. Yet if this bias can be corrected, an opportunity may be created to address not merely the 'practical' but also the 'strategic' gender needs of women. Training in ICT skills could unleash the latent talent in women to confront these issues and change the socially entrenched perceptions that put women behind men in all walks of life.

Policy implications

There is a clear need to introduce a research component to each one of these action projects to glean whatever generalizable insights one can gain from them so that the such insights can be pulled together to inform policy making.

New opportunities need to be made available to the poor and access to new technologies need to improve substantially. Along with it a concerted attempt needs to be there to supplement these changes with changing mind-sets about new opportunities.

Many innovative action programmes are being tried in different parts of the developing world to harness the new technology to address the needs of the poor as documented in the background document by R. Spence. These are largely pilot action projects, and are pointers to possibilities Exciting as they are as pilots, there is an urgent need to formulate policies at the macro level and to expand the reach of public action.

The difference between the times of the Industrial Revolution and ours, is that the environment within which widespread changes in technology are taking place is now substantially different. From the point of view of the potential of poverty reducing policies, one can cite at least two. First, contrary to earlier times, the developing world is now free, at least politically free, and in principle free to design strategies to make the most of the opportunities. The other major change relates to the developments that have taken place in the area of public policy and public action in addressing issues of poverty and distributional inequality.

Summary of notes for discussion in ICT4P

Carlota Perez

My message accepting the invitation, said that the spread of ICT in the developing world was, from my point of view, a positive-sum game in terms of also helping overcome the recessionary trends in the advanced countries. It seems to me that the most appropriate contribution to make in these notes is to develop that idea. I hope it can provide some contextual elements to the discussion.

I apologize for not having had the time to make it shorter. To make up for the length, subtitles were introduced to facilitate reading and the main ideas are formulated in this cover page (though not in the same order as they appear in the text):

1. ICT can serve as the **"bridge" between pro-poor and pro-development policies** (given that they have to be pursued simultaneously with radically different yet eventually convergent and coherent actions).
2. The **ICT paradigm**, as opposed to the homogenizing character of the previous mass production paradigm, can cater to and foster a great **diversity of lifestyles**. This means that cultural and religious identities could be preserved and enhanced with modernization and development. ICT can act as the mesh that makes those differences peacefully and effectively compatible
3. History has a lot to teach us at this difficult juncture. This complex period in the world economy is similar to the post-bubble phases of previous technological revolutions. The recessionary trends, the extreme poverty, the migrations and the violence have taken place in similar periods. The most recent parallel is the 1930s after the 1929 stock market crash. Historical experience shows that to be effective in such periods **proactive policies**, such as the New Deal, are needed.
4. Anti-poverty and pro-development policies are a **positive sum strategy** benefiting both the North and the South. As such they should be designed and defended, not only as benign charity. In particular, overcoming the **premature market saturation of the ICT industries**, which are the only engines of growth the world can count on, is indispensable to build a new phase of prosperity.

5. The development of "**appropriate**" ICT (high tech-no frills) for the great masses of the South would be good for both the economies of the South and those of the North. But for such development to lead to profitable cheap products, demand has to be already huge. Jump-starting the process through publicly funded demand (from national and international sources) could contribute to break the vicious circle, unleashing a self-sustained process.
6. The ICT paradigm is globalizing by its very nature. To be successful, growth and development policies need to involve true globalization. But globalization need not be neo-liberal, need not be only the free movement of trade and finance. **Pro-growth and pro-development globalization of production** is the way to a mutually beneficial solution.

Some thoughts on the historical context for the use of ICTs for Poverty reduction

Carlota Perez

The imperative of the information revolution and its globalizing nature

The devastating results of some of the neo-liberal policies on the economies and societies of the majority of non-East Asian developing countries, have led many to blame globalization, seeing it as the source of the ills and as the trend to be eradicated.

However, an analysis of the characteristics and the specific potential of the ICT revolution leads to understanding that intangible technologies, products and services transferred through intangible networks are transparent to frontiers and therefore supranational by nature. Equally, the scale of markets capable of being served using the new technologies is several times larger than was possible with mass production and the scale of firm that can be efficiently managed with a flat network structure and ICT is also infinitely greater. This means that national spaces, even the largest of them, may be insufficient for exploiting the full potential of the technologies involved. In other words, this *techno-economic paradigm*⁵ is global by its very essence, but there is no reason to hold that it should also be neo-liberal.

Much to the contrary, what is needed now, for the good of both the South and the North, is a full redesign of globalization for it to go far beyond trade and finance, to embrace the true globalization of production, growth and development.

The historical parallels of post-bubble recessions and the role of the State

Such an ambitious goal can be envisaged more easily and believed to be more likely, when comparing with other equally difficult moments in history, which can be considered as equivalent in their fundamental nature.

As I have argued in my recent book,⁶ the frenzied 1990s are historically parallel to the "roaring twenties"; the collapse of the NASDAQ –and the drainage of stock market values after that– are equivalent to 1929; while the ensuing recessionary trends of today are similar in nature (if not yet in intensity) to those of the 1930s.

One of the recurring features of these major bubbles⁷ is the acute process of regressive income distribution they provoke by attracting all available savings into the financial whirlpool and creating a growing chasm between the new and the old, the rich and the poor. This time around, because of globalization, the chasm is not within the countries but mainly between countries.

⁵ The concept of a techno-economic paradigm represents the best practice model for taking maximum advantage of each technological revolution. As the new technologies diffuse a new set of common sense technical and organizational principles begins to guide the decisions of engineers, entrepreneurs, managers and financiers for both innovation and modernization. The application of such new principles allows making the most of the wealth generating potential of each technological revolution.

⁶ C. Perez, *Technological Revolutions and Financial Capital: The Dynamics of Bubbles and Golden Age*, Edward Elgar 2002

⁷ For a discussion of the other features and structural tensions characterizing such major bubbles, see C. Perez, op. cit. 2000, Chapter 10.

To overcome the depression in the 1930s, a major redesign of the role of the State in the economy was necessary leading gradually to Keynesianism and the Welfare State. But there were also projects such as those of the New Deal, like the Tennessee Valley Authority, for example, which brought electricity⁸ and jobs to deprived areas or the subsidies and various forms of protection provided for the hard-hit farmers⁹, the heritage of which has lasted to this day.

Yet, in the USA, the New Deal was fiercely opposed by the business world, seeing it as leading to communism or fascism because those were the main historical examples of State intervention in the economy at the time. The progressive forces of today may be suffering from a similar misunderstanding, when rejecting globalization thinking it can only be neo-liberal.

World poverty and the obstacles to globalization

The consequences of income polarization in equivalent historical periods have involved different forms of violence, massive migrations to wherever jobs can be found and a desperate seeking for messianic leaders that will offer salvation to those who “belong”.

The present threats of terrorism, serious health hazards (especially AIDS) and popular anger and resentment create a very hostile social environment for the safety of the networks of global corporations in many countries around the world. This puts a very strong brake on the globalization drive. But, even if companies were to retrench in the few successful countries, without alleviating the present desperate levels of world poverty, they would still have to confront growing migratory pressures and the spread of terrorist activities into the very heart of the system.

The parallel with the passage to the Post-war boom from the 1940s

While internationally, the Bretton Woods agreements and the various world institutions (IMF, WB, UN) created a mesh of safeguards for sustained growth, on the national level the different forms of State guidance of the economy favored the expansion of demand. The Welfare State and its policies of income redistribution, unemployment insurance, farm subsidies, government services and employment, veteran’s compensation, government demand for industrial and military products, for highway building and electrical coverage were, after the war, followed by the Marshall Plan in Europe. All these policies guaranteed that market demand for mass production would be truly massive, including the workers and the lower middle classes. Yet, anybody, who in the 1930s had predicted –or proposed policies leading to- full employment and to increasing salary levels so that workers (and small farmers!) could own houses full of electrical appliances and with a car at the door, would have been considered an unrealistic dreamer.

Historically, the social policies and the imperial expansion of the Victorian boom played an analogous market expanding role, as did, during the Belle Époque, the State sponsored naval construction and great engineering works.

Overcoming the present recessionary trends in the advanced countries will require a manifold increase in the demand of the products for the ICT industries. These are the only industries that can serve as the engines of growth of the advanced economies and of the whole world. Their markets are prematurely saturated (as has happened historically with every major technological bubble), due to the regressive trends in income distribution. Their innovation drive is in the direction of the luxury top of the pyramid market, where it is already merely a replacement market. They can produce no real bread and butter products because there aren’t enough bread and butter consumers to provide the necessary huge scale to make them both profitable and cheap. Effective demand at the bottom of the pyramid (BOP)¹⁰ would

⁸ Electricity had an infrastructural role in the mass production revolution similar to that played by telecommunications in the present one.

⁹ The initial impact of the mass production revolution was felt in manufacturing, so the productivity and price differential with agriculture impoverished the farmers. Nevertheless, the subsidies survived (with changing purposes) the later gigantic rise in agricultural productivity.

¹⁰ Prahalad and Hamond’s challenging paper ‘Serving the Poor Profitably’ provides several examples of successful and profitable cases of private firms catering to the massive BOP world markets: (http://www.digitaldividend.org/pdf/serving_profitably.pdf).

have to multiply several times to bring forth all the simplifying and cost reducing innovations to span the whole world with “appropriate” ICT products¹¹.

There is of course much scope still in the advanced world for expanding the coverage and increasing the intensity of ICT penetration. This will depend on the many factors determining the shape of income distribution. But really mammoth demand cannot come forth without a successful relaunching of development, including the ex-socialist countries. (Two or three “Chinas” are needed to fuel a new surge of world growth). Meanwhile, the political forces in the world could jump-start the process by funding early demand for such BOP products –for educational purposes, for instance– and promoting their development and testing.

ICT as a bridge between pro-poor and pro-development policies

It is generally accepted that poverty can only be overcome when development succeeds. Yet, the process of deterioration in many developing countries has gone so far that life-saving action needs to be directed to the critically poor. Thus, there is a widespread consensus on the need for a dual action approach.

Can something be done to ensure that those two sides will truly belong to the same coin? In today's world -and especially in tomorrow's- ICT is the basic technological platform for almost any economic activity. Even if it is only in terms of access to information and markets, the lack of ICT infrastructure, capabilities and knowledge is a tremendous handicap for any firm, any government or any community. This means that whatever the development goals or strategies, ICT needs to be part of them.

This may not be the case with anti-poverty policies, many of which aim at simple survival rather than generating wealth. Nevertheless, there are many possibilities of gradually incorporating ICT into the life of poor rural communities, and especially of the urban poor.

Just as in the previous development drive, access to electricity served as a potential connection to what was then the modern world, so ICT can prepare the poor to join in with the rest of the economic and social environment, profiting from its opportunities, as the local capabilities – individual and collective– are enhanced in each community.

The ICT paradigm as a platform for development with cultural diversity

The mass production paradigm, which shaped the particular version of import substitution industrialization applied with varying degrees of success or failure in the 1960s and 1970s, was of a fundamentally homogenizing nature. From Ford's dictum ‘you can have any color as long as it is black’ to Mao Tse Tung's single blue uniform for everybody,¹² the basic principle of maximum productivity was mass production for mass consumption of identical products. The consequence was an attempt to iron out national and religious identities in order to promote basically standardized patterns of consumption and of production across all developing countries.

The fact that since the 1980s the “American Way of Life” has dissolved into a kaleidoscope of different life-styles is a direct result of the present paradigm shift and points to the possibility of diversified patterns of development within and among countries. The ideal for best practice is no longer *mass production* but *flexible production for segmented markets*, allowing both *mass customization* (diversity on a very high volume platform) and *multiple niche production* (catering to specialized low volume markets through giant flexible commercial networks). This means that homogenous consumption styles are no longer necessary for productivity and profitability: enormous diversity can characterize both life styles and production profiles.

¹¹ By “appropriate” products I mean a combination of very high tech solutions to the specific limitations of the less developed countries with very basic no-frills configurations. This could mean, for instance, wireless Internet combined with the simplest of computers. See also in this respect the Prahalad and Hamond article cited above.

¹² Historically there were four main socio-political systems using the mass production paradigm: Sino-Soviet socialism, Nazi-fascism, Keynesian democracies and State Developmentalism (in the so-called Third World), obviously with fundamental differences in most other terrains and with enormous variety within each group.

This is the basis for what has been termed *globalization*¹³ and for the much wider validity of the ecologist's advice: "think global, act local".

In my view, development policies could now combine two complementary strategies. On the one hand, specializing in one or a few globally competitive sectors, capable of propelling the national economy and connecting it with the world. On the other hand, an infinite number of local economies, each defining its economic potential and concentrating on generating wealth for increasing the quality of life of the community, while safeguarding its culture, values and identity. The public sector would facilitate the multiple connections between the two worlds (including 'migration' of people from one to the other) and it would assume as a central concern guaranteeing the quality and coverage of the infrastructures (physical and information) and of the education system for all.

The platform for this modernized diversity is ICT. It is information and telecommunications technologies that will make it possible for all this diversity to have strong multiple links to the rest of the country and of the world. It is through those links that a very special product from a faraway community can reach the Swedish ecological stores, or that an intelligent young man in a shantytown in Africa can get a university degree by Internet or that a farming community in Paraguay can get advice from an expert in Australia.

In relative terms none of that is more far-fetched than it would have been in the 1930s to predict widespread political independence among the colonies (when Germany was desperately looking to build an empire), or to predict full-employment in the midst of depression (when the new technologies in both industry and agriculture were shedding more and more personnel) or to imagine that electricity would span the whole world and reach the farthest recesses or that transistor radios could bring wireless information even to the few areas without electricity.

Any successful effort to construct the future requires getting rid of the old ideas that act as drag chains and taking advantage of emerging potentials and opportunities. At this particular juncture it is essential to reach a deep understanding of the ICT paradigm, which is bound to shape the next few decades, and make the best of its possibilities.¹⁴

Positive sum solutions: The time is right for bold initiatives

The success of anti-poverty and pro-development action across the world will translate into more prosperity for everybody, including the advanced world. Yet, if we don't make it clear that this is a positive sum-game, the struggle will be uphill all the way.

If the model and the hypotheses I have been working with are good approximations to the way in which technological revolutions propagate and are assimilated by the economic and social system, then this particular phase in the diffusion of ICT is the time for bold policy initiatives. During the financial bubble (a phenomenon which recurs with each technological revolution) the feeling of prosperity among those involved tends to glorify the powers of the market, to hail those who have been successful at it, to look down upon the "unsuccessful" and to reject any public intervention in the economy. After the collapse, when the many fraudulent activities are laid bare, when many of those who put their life savings into the financial casino have borne dramatic losses, when hyper-inflated paper values come down towards their values in the real economy, when the growing chasm in income distribution becomes dangerously evident and threatening, when the erstwhile centers of prosperity fall into recession and the expected results do not come from the policies applied... then is the moment to begin pushing for imaginative and effective policies. As conditions get worse, which unfortunately they will, unless radical policy changes are made and applied to overcome the structural tensions underlying the recession,¹⁵ there will be a growing disposition to hear and to experiment in untried directions.

¹³ As far as I know, the first person to use this term was the French researcher Marc Humbert precisely in the sense of identifying the special characteristics of the producing locality to use them as comparative advantages to reach global markets. More recently the term has been moving towards adapting production to the peculiarities of local demand. Both senses are useful and they can be seen as complementary

¹⁴ I have argued the need to look to the next phase for successful development policies in "Technological change and opportunities for development as a moving target", *Cepal Review* No. 75, December 2001, pp. 109-130.

¹⁵ About the three structural tensions behind the post-bubble recession, see C. Perez, op. cit. 2002, Chapter 11 and Epilogue.

Any initiative that contributes to intensify globalization in the direction of spreading production capacity across more territories, incorporating more regions, will increase the rooting of more populations, decrease the threat of migration, diminish the growth of violence, help reduce the spread of illness and create the conditions for the strengthening of self-esteem and identity on the road to real human development, while it expands world markets.

Any initiative that solves a social or economic problem by strengthening the markets of the ICT industries or by widening the networks of digital telecommunications will have favorable repercussions across the world economy. The much derided phrase of Charles E. Wilson, the President of GM, “What’s good for America is good for General Motors and what’s good for General Motors is good for America” was true inasmuch as the growth of the automobile market in the post-war boom was a sign of the growing welfare in society, which allowed more and more people to have access to an automobile (whatever one may think of this as a welfare symbol). In a similar sense, one could paraphrase Wilson today saying: “what’s good for the world economy is good for the ICT industries and what’s good for the ICT industries is good for the world economy”.

The efforts being promoted at this sort of meeting could, in my view, benefit from developing and spreading arguments that convince the people, the business community and the politicians in the North that they have a lot to gain by helping relaunch development in the South and by contributing to alleviate world poverty.

Today, precisely because we are in the midst of a stubborn recessionary phase requiring structural solutions, is the right time to bring forth very bold positive-sum policy initiatives. The time will soon come when they will be listened to and possibly acted upon.

ICT for Poverty Alleviation

Onno W. Purbo (onno@indo.net.id)
A Common Indonesian

Disclaimer

I am an engineer, not an economist nor a social scientist. Although, I spend most of my active life in community based ICT development in Indonesia, I might wrong in the assumptions, the observations and bias to Indonesian experiences. As an engineer, I tend to simplified & extract the most strategic / main aspects.

Acknowledgement

I would like to acknowledge International Development Research Center (IDRC) in Canada for supporting this work.

Bottom Up Self-Finance Community Based Approach

I strongly believe that poverty alleviation can only be done through education processes. It may not be a formal education. In fact, mostly informal education process that encourage individual within the community to be a knowledge producer and share it to one’s community and ignite a bottom up self-finance community based development process to alleviate poverty. One’s value highly depends on the benefit received by ones community.

Having spent 10+ years in helping the Indonesian to build people own Internet infrastructure with minimal (if not no) support from the government, World Bank or IMF. ICT is basically only a communication tool to accelerate the knowledge sharing processes. My experience shows that it is NOT the technological superiority or the financial dominance that matters in a bottom-up self-finance community based ICT development.

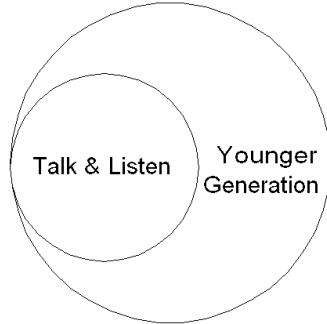
Most community has some money; the bigger the community the larger amount of money can be accumulated. ICT technology enables multi-tasking, multi-user, and resource sharing. It, in turn, enables lower operational cost per individual in large communities, e.g., 10-50 US cents/student/month for 24 hours e-mail / Internet access with Return of Investment (RoI) within 1-2 years time in most schools is quite affordable for any poor communities. US\$10-30/month for 24 hours WiFi Internet access in urban household is quite affordable for mid income families.

The major stumbling block is mainly in knowledge on ICT. Awareness, skill to build and run ICT infrastructure would be the main aspect in a bottom-up self-finance community based approach.

Keep in mind that most modern ICT equipments require the ability to read & write. Communities' mode of communication would be important in deciding the appropriate ICT technology as well as community development strategies.

Stereotyping Poor Communities

If I may stereotyping poor communities, I will likely divide the communities into two (2) major categories, i.e.,



- Those who would speak and listen only. They might be an older generation, uneducated or primary school dropped out. They will likely more resistance to change especially the one introduced by aliens.
- Those who are having some enthusiast on new things / new technologies. They might be a younger generation & have some sort of education above primary school level.

The younger generation may easily adapt the new ICT technology. However, to reach larger audience within the communities voice communication mode should be implemented as well.

Proposed Basic Strategic Approach

The basic strategy is to encourage the individual within the community to become a **knowledge producer** and **sharing the knowledge** to their community or surrounding other communities. Knowledge must not be in written form. It may be in audio form to reach larger audience in poor communities specially the older generation.

Example ICT in Tactical Plan

Community radio broadcasting, which affordably costs US\$50-100 each, would be the most strategic tool for knowledge sharing of older generation as well as the young in the communities. Encouraging people to be part of broadcast programming will in turn encourage individuals to be a local knowledge producer. It guarantees information diversity and minimizing information colonialism by national broadcasters.

For younger generation, focused on ICT on schools. It may affordably cost only 10-50 cents/students/month. We are looking at millions of country's future generation ICT literate. Curriculum wise, we need to focus these students to be a knowledge producer rather than consumer. These young generation would likely to influence their parents, their families, and, in turn, their surrounding communities. It takes a longer path, a longer time, but it guarantees a change in a long run.

Community based telecommunication / ICT infrastructure using WiFi and VoIP would facilitate many transactional processes. It is 24 hour connected to the Internet. Expanding the Telecenter concept into Neighborhood Net Infrastructure. It investment costs US\$ 80-100/house; operating costs US\$ 15-30/house/month. If voice only communication is of interest, VoIP investment costs US\$ 25-35/handset vs. US\$ 1000/handset by Telco. VoIP operating costs US\$ 15-25/month unlimited including unlimited long distance calls. The technology may be freely downloaded from <http://sandbox.bellanet.org/~onno/>.

As a result after 10+ years, we are looking at 4+ Million Indonesian Internet Users; 2500+ WiFi outdoor installations; 2000+ CyberCafes; 1500+ schools on the Internet. Mostly are self-finance with no government, World Bank & IMF funding.

Michael Spence
Stanford University

I have included a short biography and so will not repeat that here. For my entire career as an economist I have been interested in the informational structure of markets. I worked along with

Akerlof and Stiglitz on asymmetrical and private information, signaling and screening, moral hazard and adverse selection.

The arrival of broadly available network based information technology in the 1990's began in my judgment a several decades process in which the informational structure of markets is being transformed. We are in the very early stages of that process. Having thought about it as an economist and been around the technology as an investor, I have come to believe that if one steps back from the technology itself, the key driving force is the potentially dramatic reduction over time of a subset of costs commonly known as transaction costs. The reduction of these costs will alter the structure of markets, change the boundaries of markets, increase the efficiency of supply chains globally, increase the value of tangible and intangible assets globally, and alter the balance of benefits and costs in the outsourcing arena in favor of outsourcing thereby altering the equations that set boundaries between organizations and markets. That is a short summary without the argument which I would be happy to provide.

Certain kinds of transaction costs historically tend to be a convex rising function of time and distance and variables correlated with these two. Because of the nature of network-based information technology, costs associated with information, search and related activities are essentially insensitive to time and distance, as distance doesn't really matter and time delays are largely compressed out of the system. This suggests that the largest absolute and relative reductions in transaction costs should occur at the longer time-distance dimensions, that is in the global economy. One way to say this is that transaction cost reducing network-based information technology is the infrastructure and platform on which the promise of the global economy is likely to be realized. One important consequence of all this is that the values of tangible and intangible assets (human capital for example), are likely to rise over time as the transaction costs that partially truncated those values are lowered.

By a sequence of not very complicated steps this leads naturally to the subject of economic development and its intersection with forces that alter the structure and functioning of the global economy. I began on this course thinking about the building of the requisite infrastructure, with question like how fast should it be built in various developing countries and regions, with what mix of public, private and international investment. It is perhaps not necessary to say that like most investments in and around information, there are numerous large externalities, most positive and some negative. My brother is a development economist with a current focus on poverty, and my interest in all this comes from talking with him. I know know a lot less about economic development than Randy does, and I suspect I could say the same thing about myself in relation to the rest of the participants in the conference. And I certainly do not want to masquerade as an economist with a research track record or practical experience in the area of poverty.

So I come at this hoping to contribute with some knowledge of the analysis of the informational structure of markets, with a perspective on the economic forces that are at work in the global economy, and with some knowledge of ICT and it's potential applications in creating new markets, moving the boundaries of others, increasing the liquidity of others, and of the application of ICT and software in automating business processes.

ICTs and Poverty Reduction: 'Start with women, start from the bottom and do it right'

**Nancy Spence
Commonwealth Secretariat**

'Start with women, start from the bottom and do it right' is not my quote, but it came to mind as I was reading the background paper for the Boston meeting. It begs many questions, including what is 'right.' Before addressing these, I should admit that I am neither a techie nor an ICT specialist. My experience

is in the gender, education, youth and more recently health dimensions and initiatives of development and poverty reduction.

It may be generally true that ICTs initially reduce equity (digital divides) but don't increase absolute poverty, in the sense that they make some richer, but don't in themselves make the poor poorer. But I believe that gender relations provide a broad area of exception. Gender equality is fundamentally a matter of power and empowerment, and if ICT diffusion increases the gap between men and women, it disempowers women, and will contribute in many culturally specific ways to more absolute poverty among poorer women. So my first priority, a broad one, *is familiarity, training, access and use of ICTs for poor women*. Experience of the last decade shows that women grasp opportunities when possible, and do so on a large scale in many instances like Grameen lending and village phones.

Livelihoods are fundamentally important to women for gender equality and poverty reduction. Experience shows several ways in which ICTs can contribute directly to livelihoods in poorer communities - agricultural information and marketing, e-commerce, cutting out middlemen, availability of financing, and telework. At the same time, there are a range of conditions and services important to livelihoods, including education and training, health education (including HIV/AIDS), networking and contacts (and the empowerment this can encompass). ICTs can contribute a lot in all of these areas, IF the access and content are developed. So a major push for familiarity, training, access and use of ICTs for poor women should I believe take the form of *multi-purpose (community) access, with livelihoods central and services combined*. *There is in fact a good case for targeting women and girls* in multi-purpose access, not to the exclusion of men and boys, but energetically and consistently.

The use of ICTs to expand *girls education* is appealing, as many present educational systems are failing poor girls and boys badly and, it appears, will not soon revive. Teachers are often absent or poor quality, libraries and materials pillaged or non-existent. ICTs could be of major importance IF, again, access and content are developed. Developing good local-language content will need to enlist and expand all capabilities available in education, NGO, telematics and public sectors. For some communities, technologies like radio will be most appropriate. Internet-based education can open up horizons if done well - not only through the more structured distance learning, but also through access to a growing share of the world's knowledge. As above, I would argue for targeting the poorest and targeting girls - not to the exclusion of boys, but always with the main focus on girls. The case for girls education is well established, and there are consortia supporting it. Adding distance learning - 'starting at the bottom and doing it right' - could give a big boost to poverty reduction.

I am not going to talk about the more 'systemic' investments in ICTs, mentioned in the background paper. But I would like to say that where health systems fail, the results are catastrophic. HIV/AIDS is devastating in many countries, and in too many it is becoming a 'war against women.' In these countries, any contributions ICTs can make *to better aimed and better managed health systems* are, to me, of highest priority.

Connectivity, livelihoods, education, health, empowerment and other innovative uses by poor women are all linked. And their success will depend on approaches and efforts now related to ICTs. But I think that ICTs have an important mobilizing and strategic role. And in each area, 'start with women, start from the bottom and do it right' has a lot of appeal. 'Doing it right' will have to be worked out by the experts across several fields, but will need serious and sustained effort and funding from donors. Perhaps it is time to try *'trickle up'* along with the plodding and never certain *'trickle down.'*

ICTs for Poverty Reduction: When, Where and How?

**Randy Spence
IDRC**

This note draws a lot on the background paper, but I also have the advantage of having read many other 'two-pagers.' Given the applied focus of this meeting on ICTs and poverty reduction, and the reading I've done, I tend to accept the following:

1. Development is a necessary but not sufficient condition for poverty reduction; pro-poor development is needed to hasten reduction and eradication of poverty.
2. ICTs are highly pervasive, and highly positive in their potential, in large part due to their basic characteristics, especially; reducing transactions costs, integrating global and local markets, untrapping human resources, increasing the value of human capital, empowering people.¹⁶
3. ICTs have created digital divides, but have not increased absolute poverty, and the extent to which their potential will be realized for poorer populations will be determined by how ICTs can be brought to use by and for these populations.
4. In the current environment of PRSPs and MDGs, it is not possible to conceive of poverty reduction and eradication with some substantial share of humanity cut off from the knowledge, or access to knowledge and knowledge-economy/information-society benefits, of everyone else.
5. Poverty will not be eradicated by ICTs, but it will also not be eradicated without them; they are part of the arsenal, and poor people increasingly know and want access; ICTs often create or support a positive dynamic for poverty reduction.
6. All countries are different; there are no blueprints, but the experience of the last two decades says a *lot* about the important questions - when where and how?

Surveying the experiences of developed countries, and of more and less advanced developing countries, has led me to the following views concerning when, where and how:

- Bringing **access and use of ICTs to poor populations**, despite large challenges, has worked in rapidly advancing countries, and in a host of pilots in less advanced countries. Livelihoods, education, health and empowerment uses have been prominent. Given 4. above, the challenge is scaling up. This requires, in particular, and depending on country context:
 - infrastructure development¹⁷, including an enabling policy/regulatory environment, which is still lacking in many developing countries - which continue to protect vested interests;
 - expansion of community development capacity and organizations, along with telematics and local language/context content-producing sectors;
 - technical and social innovators, with sufficient support; the competitive grants mechanisms created by the ICT4D community have proved excellent as modalities¹⁸ for the piloting stage of the 1990s, but also need expansion for scaling up.
- Bringing ICTs more to the **benefit of poorer populations - indirectly via systemic improvements** - has also worked in more and less advanced countries. Key areas of application have included (small) enterprise development, basic governance (efficiency and public accountability), targetting and management/delivery of public services - notably education and health, natural resource management, and broader (especially gender) empowerment. Increasing the poverty reduction impact of these more systemic ICT investments requires, in particular, and depending on context:
 - infrastructure development - policy/regulatory, physical/technical, content, literacy - which must also underpin the direct ICT-poor communities efforts;
 - scaling up of strategic e-government applications in, particularly, education, health services, economic and budget management, poverty monitoring, public accountability frameworks;

¹⁶ They are more pervasive than earlier revolutionary technologies - steam engine, printing press, electricity, combustion engine.. largely because every area of economic, social and political activity has an information structure, and ICTs permeate and change these. Biotech, the next technology revolution, has much greater systemic risks and downsides; it will be at least equally transformative, but for basic organisms and entities rather than economic / social / political interaction, and is bound to and carried by ICTs.

¹⁷ Both 'physical/technical' infrastructure - policy/regulatory regimes, technical supplier/provider industries, hardware and software/applications - and knowledge and networking infrastructure - content providers and content, knowledge networks/networking, ICT literacy

¹⁸ They are generally not government-to-government, with Southern government agencies involved where they are progressive, and are supported by multilateral rather than bilateral donors..

- additional funding and human resource development for the bulk of poor countries, which simply lack the resources, in spite of the investments and 'business case' being solid and attractive; and
- a national game plan, integrated with development and poverty reduction strategies; these are emerging in most countries, but need a push, in most, on quality and integration.

These views, in turn, lead me to propose three major *connected* areas of consolidated/increased initiative for countries, donors, corporations and consideration in the WSIS:

- **ICT4P - Accelerated pro-poor access and utilization**

A next step for the ICT4D community, (operating responsively and largely outside bilateral/governmental channels) would be to intensify efforts to bring ICT access and beneficial uses to poor communities. More it is suggested that global ICT4D fora, including the WSIS, develop an explicit ICT4P platform which includes concerted efforts on:

- support for low-cost technology development and application, aimed at poor-community access;
- support for improvement and scaling up of key applications and services for poor communities - within countries and internationally:
 - bringing together essential partners, eg organizations specialized in development and community organization, gender equality, education, economic development and poverty reduction..
 - funding well conceived initiatives at a scale much larger than current ICT4D pro-poor access initiatives - eg district-level pilots to understand and demonstrate scaling up needs;
- support for some leading-edge ICT-pro-poor initiatives, in areas of global focus for poverty reduction, eg girl's primary education where there are active global consortia.
 - focus on countries which have created or will build enabling policy/regulatory regimes.

- **PRST - Poverty Reduction Strategies and Technologies**

At the same time, the effectiveness of governments and bilateral government-to-government cooperation in ICT4P investment could evidently be improved by co-ordinated country initiatives, for poorer/poorest developing countries, which included:

- elaboration of ICT and knowledge economy game plans, integrated with overall development and poverty reduction strategies, and the policy and regulatory regimes needed¹⁹;
- serious additional funding for infrastructure development, notably physical and technical, where a solid economic case exists, but many countries simply lack the means;
- elaboration of ICT application in government services strategies, notably education, health, macroeconomic and budget management, gender equality and poverty monitoring;
- support for the implementation of these strategies, once elaborated, including long-term support for the public goods component of ICT infrastructure development, especially content and literacy/use.

- **ICT4P and PRST Research Support**

Both of the initiatives above would need research support including:

- more, more frequent and better synthesis of technical knowledge, and lessons/good practices, including country by country ICT4D/ICT4P reviews across sector and issue areas;
- research support for connecting and building coalitions among ICT, community development, gender, livelihoods, education, health etc oriented organizations internationally and within countries;
 - more synthesis of experience on the integration of ICT and knowledge-economy strategies with poverty reduction and overall development strategies;

¹⁹ Some countries may have game plans oriented mainly to education and capacity development, but there are good examples of ICTs making valuable contributions to conflict prevention and resolution, and to peace building and reconstruction. So strategies start from country circumstances, but 'wait until later' is seldom if ever a good plan.

- microeconomic analysis and evidence on the main ICT-centred and supported applications which are central to both the private and the public-services sectors important to poverty reduction.

Can this be done? This would be a particularly good time in the current processes of globalization, in which ICTs are playing a major role, for a large tangible demonstration of the benefits. We all acknowledge that globalization creates losers as well as winners, and this would be a particularly good time for evidence of a willingness to compensate or assist the losers, at least to the extent of assisting poorest populations. If we fail to put powerful technologies squarely into poverty reduction efforts, the realization of failure will sour many aspects of international relations and security for decades to come. Bringing ICTs to poor people and to poverty reduction is no less difficult than many other approaches, but it is ultimately essential, appropriate, visible and exciting. And it would be wrong to just say 'resources are limited and there are other priorities.' Most donors have continually fallen far short of their ODA commitments, since the 1970s, and there is a very good case for initiatives like ICT4P and PRST to be *additional* millennium responses to the world's poorest people.

Creating Instruments for a Knowledge Revolution in Rural India

M S Swaminathan

The onset of the Industrial Revolution in Europe marked the beginning of a serious technological divide, leading to increasing rich-poor divide both among and within nations. With explosive progress in many areas of technology, like information and communication, space, bio- and nano-technology, this divide is increasing. The challenge now is to enlist technology as an ally in the movement for economic, social and gender equity. Therefore, the M S Swaminathan Research Foundation (MSSRF) chose the imparting of a pro-nature, pro-poor and pro-women orientation to technology development and dissemination as its main mandate when it started functioning in Chennai in 1989. In order to assist in the articulation of concepts, opportunities and operational strategies which can help to reach the unreached in knowledge, skill and technological empowerment, an annual inter-disciplinary dialogue is being organised since 1990, under the generic title, "New Technologies : Reaching the Unreached". The first in this series related to Biotechnology. The emphasis in these dialogues has been on the standardisation of delivery systems which can ensure social inclusion in terms of access to relevant technologies. The recommendations made at this Dialogue resulted in the organisation of Biovillages.

The 1992 Dialogue was on Information Technology, which gave birth to the Information Village project in the Union Territory of Pondicherry, with financial support from the International Development Research Centre (IDRC) of Canada. Since information, to be of value to rural women and men, should be location and time specific, the term Knowledge Centre was used to stress the need for converting generic into location specific information and for training local women and men in adding value to information. Value-added information is appropriately referred to as knowledge and "Rural Knowledge Centres" can generate opportunities for educated youth in villages to take to a career in knowledge management and dissemination. We should train at least a million Rural Knowledge Managers during this decade.

MSSRF's experience in bridging the digital divide in rural India has provided some basic guidelines such as the following for harnessing this powerful tool to bridge social, gender, genetic and technological divides.

- Connectivity and content should receive concurrent attention
- Constraints must be removed on the basis of a malady-remedy analysis; for example, wired and wireless technologies could be used where telephone connections are not adequate or satisfactory. Similarly, solar power can be harnessed where the regular supply of power is irregular. The approach should be based on the principle that there is an implementable solution for every problem.

- The information provided should be demand driven and should be relevant to the day-to-day life and work of rural women and men. Also, semi-literate women should be accorded priority in training to operate the centre, since this is an effective method of enhancing the self-esteem and social prestige of women living in poverty.
- The Knowledge Centres should operate on the principle of social inclusion, thereby presenting a win-win situation for all. Also, semi-literate women should be accorded priority in training to operate the centre, since this is an effective method of enhancing the self-esteem and social prestige of women living in poverty.
- The programmes designed to empower rural families with new knowledge and skills should be designed on the **antyodaya** model, where the empowerment starts with the poorest and most underprivileged women and men.
- The local population should have a sense of ownership of the Knowledge Centre. It should be client managed and controlled, so that the information provided is demand and user driven.
- The local population should be willing to make contributions towards the expenses of the Knowledge Centre, so that the long-term economic sustainability of the programme is ensured. Contributions in cash or kind generate a sense of ownership and pride.
- To be effective, the following linkages will have to be developed
 - a. **Lab to Lab** : This will involve organising a consortium of scientific institutions and data providers.
 - b. **Lab to Land** : This will involve symbiotic linkages between the providers of information and the users, so that the information disseminated is relevant to the life and work of rural families.
 - c. **Land to Lab** : There is considerable traditional knowledge and wisdom among rural and tribal families concerning the sustainable management of natural resources, particularly water. Therefore, the technical experts should not only learn from traditional knowledge and experience, but also take steps to conserve for posterity dying wisdom and dying crops.
 - d. **Land to Land** : There is much scope for lateral learning among rural families; such learning has high credibility because the knowledge coming from a fellow farm woman or man would have been subjected to an impact analysis from the point of view of its economic and social relevance to the population.

Rural Knowledge Centres based on an integrated application of new communication technologies, like the internet and cable TV as well as conventional ones like the community radio and the local language press, can become effective instruments for harnessing the power of partnership among professionals, political leaders and public policy makers, the general public and the rural families. Such partnerships alone can help to bridge the growing gap between scientific know-how and field level do-how.

Based on the above “learning” by MSSRF scientists, the application of ICT techniques to meet the food and water security as well as livelihood needs of the rural families is being intensified and extended through a Virtual Academy for Food Security and Rural Prosperity (abbreviated as VARP) with support from the Tata Social Welfare Trust and a wide range of data generators. Agriculture, comprising crop and animal husbandry, fisheries, forestry, agro-processing and agri-business is the backbone of the livelihood security system of rural areas, where more than 70% of India’s population live. A considerable proportion of this population have no assets like land, livestock, fishpond or any commercially viable skill. The poor are also often illiterate, a majority of them being women. Therefore the Virtual Academy will place particular emphasis on fostering sustainable livelihood options both in the farm and non-farm sectors. The emphasis will be on promoting job-led economic growth in villages. In addition, the five foundations of sustainable development identified at the World Summit on Sustainable Development held at Johannesburg in 2002, viz., water, energy, health, agriculture, biodiversity and ecosystem management (WEHAB) will receive particular attention. Rural and Tribal women and men who constitute the Knowledge Management Corps will be the Fellows of VARP.

Water quantity and quality will be the most serious constraints to agricultural advance in the coming years. Hence, all aspects of water conservation and sustainable and equitable use will be dealt with in the programmes of the Virtual Academy in great detail. Community water banks and rural “Low Water Demonstration Parks” will be promoted. The Low Water Parks will be based on attention to the following three major components.

- Mulching to promote the retention of soil moisture
- Rainwater harvesting and the conjunctive and efficient use of rain, surface and ground water as well as treated effluents, and in coastal areas, sea water.
- Cultivation of high value but low water requiring crops like pulses and oilseeds.
- In addition to water, weather information will receive high priority. We have considerable capacity in short, medium and long range weather forecasting. Such information will have to be converted into a functional meteorological package. Functional meteorology, like functional genomics, places emphasis on the action to be taken on the basis of meteorological forecasts.

During the last few years, I have been pleading for harnessing modern information and communication technologies through structured organisations like Virtual Universities / Colleges in order to leapfrog in our quest for bridging the digital divide. As a result, the following Virtual Universities have either already come into existence or are in advanced stages of development.

1. Virtual University for Agrarian Prosperity in Maharashtra
2. Virtual University for the Semi-Arid Tropics set up by the International Crops Research Institute for Semi-Arid Tropics, Hyderabad.
3. Virtual University for Agricultural Trade in Kerala

I hope many more initiatives of this kind will soon come up, so that, along with the Indira Gandhi National Open University, we can organise a national grid of institutional structures which can help to reach the unreached in terms of knowledge and skill empowerment. MSSRF’s experience also shows that bridging the digital divide is a powerful method of bridging the gender divide in rural India. We find that the self-esteem of poor women managing computer-aided knowledge centres has gone up speedily and significantly. This is another reason why we should accelerate our efforts to achieve technological leapfrogging in the field of ICT. The experience now being gained in the country in the area of fostering a self-help revolution based on micro-enterprises supported by micro-credit offers an excellent opportunity for initiating community owned and managed Rural Knowledge Centres which can be linked together in the form of a Virtual Academy using a hub and spokes model of organisation. Sustainable Self-help Groups require reliable and remunerative market linkages. The Knowledge Centres are in a position to foster such producer-purchaser linkages.

Rural India is in urgent need of knowledge empowerment in areas like genetic literacy (Genetically Modified Organisms and new technologies), quality (*codex alimentarius* standards and sanitary and phytosanitary measures) and legal literacy (implications of the Plant Variety Protection and Farmers’ Rights Act, Biodiversity Act, Intellectual Property Rights, etc.). A national grid of Virtual Universities / Colleges devoted to harnessing in an integrated manner the internet, cable TV, community radio and the vernacular press for reaching every woman and man in our villages can play a critical role in triggering a knowledge revolution in rural India. To achieve this goal, however, the Virtual Universities should be structured as 21st century organisations designed to link professionals with everyone in rural and tribal areas, whether man or woman, and irrespective of level of literacy and extent of ownership of assets. The MSSRF – Tata Virtual Academy for Food Security and Rural Prosperity is designed to serve as a Resource Centre for all such initiatives.

India is a land of smallholdings. A small farm is ideal for sustainable intensification through eco-agriculture. A small farmer however suffers from many handicaps including access to technology, credit and remunerative markets. It is only by helping small farmers to overcome their handicaps, that small farms can become instruments for an ever-green revolution, characterised by enhancement of productivity in perpetuity, without associated ecological harm. The smaller the farm, the greater is the need for marketable surplus to derive some cash income. Our farm families can face the challenges of

the new global trade regime only by achieving revolutionary progress in the areas of productivity, quality, diversity and value-addition. They have amply demonstrated through the green revolution that they are ready to help the country, if they are empowered to do so. The single most important step we need to take in bringing about such empowerment is the initiation of a Knowledge Revolution in rural India through the effective and meaningful use of modern information and communication technologies.

Some thoughts on ICT for poverty reduction

Ichiro Tambo
OECD

Having attended several conferences/meetings on the theme of ICT for Development or for Poverty Reduction, something always troubles me, that is one basic question" What is the mechanism? Or, how do ICTs (usage/deployment/investment) influence other components in the economy?" This may be a naive question or even too generic but it remains my principle concern.

If science goes through a process of a) classification, b) correlation, and c) cause-and-effect, then we seem to be in the stage of b) correlation. We collected data and classified them. We are now in the stage of searching for correlation among variables. We often hear that Variable A, positively or negatively correlates with Variable B, if the fluctuating factor C to Variable A is adjusted accordingly to such measures, etc. Now is the time to elaborate the cause-and-effect model or mechanism which explains the phenomena of an ICT deployed economy. A concrete/simple model or mechanism is needed, something along the lines of the MM theory in finance. 2. New Issues Identified by the Follow-up Study of OECD Growth Study.

Excerpt from a recent OECD publication on "Seizing the Benefits from ICT in a Digital Economy" presented at the Meeting of the OECD Council at Ministerial Level 2003. Policy makers will also be required to examine a range of thorny, yet unresolved issues, some of which may require better statistics if they are to be correctly assessed. There is a major knowledge gap regarding which impact, if any, ICT has on the functioning of the markets, e.g. in reducing transaction costs and changing the respective market power of different parties. This may be particularly important in the development of markets for products and services that can be delivered digitally. A better understanding of ICTs impact on innovation is also essential as long-term growth prospects will depend on the future pace of innovation. ICT has emerged over the past decade as a key technology that can transform economic and social activity. However, its full potential remains unknown, requiring continued monitoring of its impacts and the appropriate policies to seize its benefits. 3. Thought on the Development Perspective. How can we effectively transfer our OECD experience in ICT to developing countries?

Although we do not know the mechanism of cause-and-effect in economy, thanks to all the research and analysis, we broadly come to understand what policies need to be changed to what set of new policies. We do not know "how to cause the change," especially in the context of developing countries.

Information And Communication Technologies For Poverty Reduction: When, Where And How?

F. F. Tusubira
Makerere University

1. The key questions we want to answer, based on the acceptance that we do have a patient – the majority of the world population existing in poverty (some philosophical turns of mind might argue that there is no patient):
 - a. Do we have good doctors and nurses?

- b. Is the disease properly diagnosed, the cause correctly identified?
 - c. Do we have an effective prescription – is the patient responding to treatment?
 - d. Is the treatment affordable?
 - e. Does the patient have the will to get better?
 - f. What is the prognosis?
2. ICT4D, ICT4P, ICT4X – new buzz words or a rallying call? How many of the doctors and nurses are real, and how many are quacks seizing a new international opportunity to exploit the patient and well-wishers? To me, it is a rallying call I have been responding to.
3. The cause of the disease (or are they symptoms?) – prioritized according gravity
- 3.1 Lack of awareness about the opportunities and potential of ICT as a platform or enabler for societal transformation and human development and, more critically, lack of appreciation of the hazards of being left out (or living at the fringes) of the knowledge society. This is probably the greatest challenge of the LDCs.
 - 3.2 Lack of skills to use, manage, maintain, exploit and generate ICT based resources and opportunities. The key concern of generation of content, having something to sell in the market place, is included here.
 - 3.3 Lack of enabling environments
 - 3.4 Very low rates of basic literacy and numeracy.
 - 3.5 Very limited penetration, and in many cases total absence, of ICT infrastructure.
 - 3.6 Limited and disproportionately expensive bandwidth for linking into the global highway.
4. A common prescription:

*Put in place the pre-conditions necessary for poor countries/people to join the knowledge society. **This appears to be a sure way of sustaining a widening gap.***

A better prescription?

Given that we cannot rapidly put in place the accepted pre-conditions for joining the knowledge society, develop a strategy to ensure that poor countries join the knowledge society regardless.

In bridging the digital divide, we need ingenuity in the face of overwhelming odds. We must go against all conventional wisdom that currently makes up the “laws” of ICT. The gravity created by the challenges we face must not make us fall down: ***we must instead fall upwards.***

By rethinking strategy, those of us in the developing countries, working with development partners like IDRC, have the potential to establish successful methodologies (and are indeed doing so already). *Success will not be achieved through simple external prescription but through home grown solutions assisted by the international experience and participation of our development partners.*

A necessary pre-requisite to success is recognition of the challenges our (LDC) countries, and consequent putting in place policies that create a better environment as well as commitment of national resources. The patient must have the will to get better, to survive. A corresponding co-requisite is that the world community works with developing countries to create a measure of equity in all these issues if our efforts to contribute to the ultimate goals of human development as well as world understanding and peace are to succeed.

5. Prognosis?

Positive signs of recovery, provided ineffective treatment and prescriptions are eliminated. And they will be. Unfortunately, measurement of progress is based on the benchmarks of the developed (in some aspects) world: If you are used to traveling by jet, a car is very slow. If you are used to walking, a

bicycle is very fast. Just perspective, but not hiding from reality. A positive attitude in itself enhances chances of success.

6. Some action points?

- 6.1 *Conduct research to establish clear and **objective rather than subjective** linkages between investment in ICTs and human development, and repackage the awareness message to our opinion and political.*
- 6.2 *Link international/ multi-national support for initiatives that promote access to knowledge to demonstrated national ownership, including an acceptable level of financial commitment that will ensure sustainability.*
- 6.3 *Support capacity building models (capacity to use, manage, maintain, exploit and generate ICT based resources and opportunities) that do not lure expertise away from LDCs; that enhance the expertise of researchers in LDCs, and focus on areas with nationally defined development relevance and priority. Promote formulation of solutions by the countries and communities that want to fight poverty.*
- 6.4 *Support for cross-national movements that are working towards the growth of open source copyright as a critical transition stage in the promotion of content generation in LDCs; and support the ongoing debate on open source with support for objective research into current advantages and disadvantages of alternative approaches to IPR*
- 6.5 *Support and funding for the penetration of the optical fibre internet backbone into the African continent.*