Information and Communications Technologies and Development: Help or Hindrance?

Kamran Jebreili/Associated Press

Iraqi-Kurd Khamoo Haji, 52, listens to a radio as he and about 50 family members take shelter inside a cave yesterday about six miles south of Dohuk, in Kurdish-controlled northern Iraq. New York Times, 27 March 2003 website.

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Executive summary

Can information and communications technologies (ICT) make a valuable contribution to achieving development outcomes? If so, how can this best be done? The use of ICT to improve how goods are produced and services are delivered is a feature of everyday life in high-income countries. The issue, in relation to developing countries, is not whether it is worthwhile trying to make use of ICT. As ICT, used appropriately, has the potential to vastly improve productivity, the issue for developing countries is how best to use ICT to achieve development objectives, given the operating constraints that may apply. These operating constraints vary greatly from country to country. The challenge for the development community, both those designing/administering donor aid programs and those delivering them, is to work out appropriate ways that ICT can be used to provide more leverage for the development efforts now being made.

Great but as yet unrealised potential of ICT in development

Modern information and communications technologies hold great potential for helping developing countries to overcome the tyranny of distance. They are able to do this by providing low cost and accessible means for many people to communicate easily. However, how best to do this is still an open question. The benefits of any new technology stem from how it is applied. Simple applications demonstrate only a small part of a complex technology's potential.

Working out how to use the new technology to respond to the needs of poor countries requires an understanding of two key factors. The first is a good appreciation of how the technology can be used in cost effective ways. The second is a good handle on what are the needs of the poor, particularly in relation to the social dimensions of poverty such as poor health, lack of voice, and lack of information.

A large number of pilot projects have demonstrated to varying degrees the value of using ICT for development. This paper draws on a database of 100 ICT-based projects in developing countries and some in-depth evaluations to identify key lessons. These are distilled into two checklists of good practice.

Broad definition used

The paper uses a broad definition of ICT and distinguishes between the 'old' and 'new' forms of the available technologies. In a development context, older communication technologies such as newspapers, radio and TV offer considerable unrealised potential. The new technologies such as mobile phones and the Internet also have great potential to support the achievement of major development goals. These advantages include interactive forms of communication and low cost access to sources of lifesaving information.

Importance of 'old' information and communication technologies

Part I presents summary data on the use of ICT in the countries that are the major focus of the Australian Agency for International Development (AusAID). The importance of the 'old' technologies in communication such as radio, television and newspapers is shown. Also highlighted is a strong association between per capita income and the use of the new ICT such as computers and access to the Internet.

Determinants of readiness for ICT

This association suggests that countries with low per capita income levels have limited capacity to adopt advanced forms of ICT. Low per capita income also tends to be associated with other barriers in a developing country to the take up of ICT. These barriers include high levels of adult illiteracy, large rural and sparsely distributed populations. Prior assessment of a country's capacity to use new or effective combinations of old and new technologies is an important part of working out how best to use ICT in development.

Two broad approaches identified

Part II suggests two approaches to the use of ICT in development - one where ICT is in the lead and the other where ICT plays a supporting role. The first focuses on ICT as a driver of the development process. The second focuses on the uses of ICT in a supplementary role in development projects. The ICT-led approach usually aims to provide the poor with opportunities to receive up-to-date information or achieve an enhanced ability to communicate with others. These ICT-led development projects such as Telecentres seek to promote economic growth through access to better opportunities to generate income as a means of poverty reduction. This approach, however, has often been promoted with high but often unfulfilled expectations.

In contrast, the second approach places the development objective to the fore and seeks to use ICT to support that objective. The role of ICT in supporting development goals explicitly tied to poverty reduction is explored. This is first done by spelling out an ten point checklist of what an ICT-supported poverty reduction approach might involve.

Barriers to take-up of ICT in developing countries

Part III discusses the barriers to the use of ICT in a development context and outlines reasons for the difficulties encountered. The barriers include not only the obvious such as lack of equipment, poor infrastructure and lack of the required skills. The barriers identified also refer to more hard-to-address issues as the constraints of gender roles, rigid managerial control over ICT access, and inhibitions about using a written form of communication. It was noted that 'socio-cultural issues have an important effect on ICT diffusion…particularly where there is a conflict between local culture and the cultural assumptions within ICT systems'.[1]

Reasons for the failure of ICT projects in developing countries are discussed in relation to three factors. These are: first, the gap between the original system design and the application and second, the importance of 'soft' political realities. Third, key player behind the deployment of ICT in developing countries is often the public sector which often has different operating assumptions to those of the private sector for which they were originally designed.

Key elements of good practice in ICT-based projects

Part IV presents a 10 point checklist of what is suggested to be good practice in relation to ICT-based projects in developing countries. The good practice checklist highlights the

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[1] Kiraka, R; & Manning, K; 2002, 'Getting online: Australian international development agencies and ICT use', *Journal of International Development*, Vol 14, pp 84.

importance of an explicit focus on a contemporary development issue. The utility of the checklist is illustrated by reference to the People First Network project in the Solomon Islands. Its utility is also demonstrated by applying it to an assessment of 100 ICT-driven projects.

Key components of a good practice guide to the design of ICT driven projects in developing countries		
1	Why?	Is the use of ICT-based project aimed clearly at achieving a specific poverty reduction goal?
2	Who?	Is there a clearly specified target group for poverty alleviation?
3	How?	Is the form of ICT to be deployed appropriate in terms of cost, support, maintenance and compatibility with existing information flows?
4	How?	Is the form of ICT to be deployed scalable to enable it to be replicated and expanded
5	How?	Are appropriate intermediaries being used?
6	How?	What scope is there for public private partnerships?
7	What?	Is the content transmitted by the ICT relevant to the audience and is it in a language easily understood by the target audience?
8	How long?	Is the project self-sustaining over what period?
9	How well?	What performance measurement, monitoring and evaluation processes are in place?
10	What risks?	Managing risk: 'What unexpected events or situations might arise?' and 'What should be done to manage these?'[2]

Testing the utility of the checklist

An analysis of the 100 projects shows that only two projects meet the first nine good practice criteria. This indicates that compliance with the checklist in its entirety will be demanding for most current ICT projects. Some 30 projects have poverty reduction as their direct objective such as seeking to achieve a specific millennium development goal. A fifth of the sample or 20 projects have both a poverty reduction objective such as a millennium development goal and an identifiable target group among the poor. The existence of only a minority of projects directed to poverty reduction suggests that there is considerable scope for most ICT projects to adopt a more explicit poverty alleviation focus.

Consistent with their best practice status, nearly two thirds of the projects listed (66) meet the third criterion of appropriate ICT deployment in terms of cost, support, maintenance and compatibility with existing information flows. Some 63 of the projects appear to be in a form that is scalable to enable them to be replicated and expanded beyond their pilot status.

In relation to the use of appropriate intermediaries, the evidence was more extensive, with 76 projects scoring positively. Some 35 projects are involved in public private partnerships,

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[2] Ibid.

defined as a partnership with a private company or international development agency. Use of relevant content and language applied to 88 of the projects listed. Some 48 projects appeared to have evidence that they could be self sustaining.

However, only 23 projects provided information which showed that they had performance measures and evaluation processes in place. The existence of a risk management strategy was hard to assess as there is not enough information about the project's planning documentation. In cases where the project has an international funding agency as a partner, it was assumed that a risk management strategy would have been developed – this applied to 9 of the projects.

Some 36 of the projects relate to education, 13 relate to governance, three to law and justice, 9 to agriculture and rural development, 14 to health, 5 to infrastructure, 3 to the environment, and 2 to emergency assistance. Other categories for project activities include culture, urban business, NGO support and community development.

Steps to mainstream ICT in development

The final part of the paper reverses the focus and looks at the arguments in favour of a role for ICT in mainstream development projects. Integrating ICT into development can be a complex undertaking. It requires of project designers and development practitioners a strong strategic focus and management skills to work out how best to combine different elements of what can be a complex jigsaw. An innovative management approach is more important than the skills required to set up and maintain the technology.

Integrating ICT into a development project involves clarifying the development objectives the project is addressing, and where the best point of intervention is. This will involve identifying the information and communication requirements needed to meet the project's development objectives. Only then is it appropriate to identify the appropriate types of ICT and other technologies than can be used to meet these information and communication requirements.[3]

A series of 11 steps are proposed as a guide to mainstreaming ICT into development projects.

	Key steps for integrating ICT into mainstream development projects
1	Define the project objective: In terms of poverty reduction, what aspect of poverty does the project address? For example, does the project address a specific indicator for a particular Millennium Development Goal?
2	Who are the poor to be targeted by this program? To what extent is it possible to identify the poor in terms of rural/urban location, region, gender, age, education attainment & health status?
3	What are the likely causes, as distinct from the effects, of the aspect of poverty the program is focusing on? Is it possible to rate the likely causes in order of importance? Is poor communication a cause of this aspect of poverty?
4	What types of interventions are most likely to be effective in breaking the causal linkages? Need to distinguish between direct, indirect and supporting interventions.
5	What are the information and communication needs of the targeted

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[3] Heeks, R; 2002, p 7.

	poor in relation to the project's objectives and how important are they to the success of the project?
6	What role can ICT and other media play in delivering the information and providing channels of two-way communication?
7	Is there an appropriate form of ICT which can be deployed in terms of cost, support, maintenance and compatibility with existing information flows?
8	Does an enabling environment exist for the ICT to provide the proposed support?
9	What measures can be devised to assess progress towards the poverty reduction objective?
10	Is there a methodology in place to assess how effective the proposed intervention is in achieving the operational objectives of the program
11	Managing risk 'What unexpected events or situations might arise?' and 'What should be done to manage these?'[4]

Attempt to provide a balanced view

The paper seeks to offer a critical review of the role of information and communication technologies in development. The intention of the author has been to offer a more balanced or realistic view as a counter to the often overly optimistic view of many of the proponents of ICT for development. This requires giving some emphasis to the barriers that exist to the widespread use of ICT in many countries as well as to reporting the shortcomings of current projects.

Nevertheless, it is important to note that the critical or realistic view should not be taken as a negative view of the potential of ICT in development. It is common for new technologies to go through an initial period of widely varying views about its potential, followed by a period of more balanced assessments of what they can or cannot do.

Two cycles in the adoption of new technology

It has been recently suggested that new technologies, from steam and the railways to electricity and steel, have gone through two broad stages.[5] The first has been called the 'installation period' which is one of exploration, experimentation and exuberance about the potential of the new technology. The second stage has been called the 'deployment period'. The emphasis in this period is on bedding down the new technology into everyday processes: 'the emphasis is no longer on the raw technology but on how to make it easy to use, reliable and secure'[6].

The crucial time in this cycle is the turning point from the initial pilot or 'installation' stage to the diffusion of the new technology into all aspects of the production process including service delivery. The turning point requires major institutional change in terms of not only the regulatory framework. It is also requires change in the way that existing institutions involved in the production of goods or delivery of services go about their business. The skills

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[4] Ibid.
[5] Perez, Carlota, 2002, *Technological revolutions and Financial Capital: the Dynamics of Bubbles and Golden Ages.* Edward Elgar, UK, cited in Siegele, L; 2003, 'Paradise lost: a survey of the IT Industry', *The Economist,* 10-16 May, p 3-4.
[6] Siegele, L; 2003, 'Paradise lost: a survey of the IT Industry', *The Economist,* 10-16 May, p 4.

required in the 'deployment' stage are less to do with the technical issues associated with finetuning a new technology and more to do with implementation through coordination and collaboration.

Facilitating the turning point

An EC meta-evaluation of European donor agencies' use of ICT in development has noted that the ICT-dimension of programs in governance, poverty etc, was often subject to the discretion of individual desk-officers.[7] This has meant that incorporating ICT into mainstream programs has been reliant on the individual desk officer's own understanding of the potential of ICT (or lack thereof). This piecemeal approach has led to a highly variable result, restricting opportunities to make good use of ICT in development. The overall effect was a disjointed approach to ICTD by the development organization overall because individual desk officers were unaware of each others' experiences in the use of ICT.

In any new set of institutional arrangements, champions can play a key role in smoothing the introduction of new ways of working. ICT champions are found in most ICT-based projects, helping to adapt the new technology to the development context and facilitating organisational learning. There is obviously scope for ICT champions to pay the same role within donor agencies.

Another way to diffuse new perspectives in an organisational setting is to set up a 'community of practice.' This can be done through face-to-face meetings (such as 'brown bag' lunchtime seminars, for example). However, the obvious way to keep up regular contact is through an electronic discussion list. This can be used to share knowledge, experiences, and ideas amongst development practitioners and others.[8] The discussion list could be kept internal to the donor organisation or it could also be broaden to include practitioners in the field or researchers working on the same issues.

The challenge for the champions of ICT in development is to seek out and highlight the lessons of the initial pilot or 'installation' stage to achieve a turning point for progress to a more synergistic and mature 'deployment' stage. Regular, focused communication needs to be at the centre of any strategy to achieve the turning point.

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[7] UNDP Evaluation Office, 2001, 'Information Communications Technology for Development', Essentials: Synthesis of Lessons Learned. No 5, September, Footnote 18.

[8] UNDP, 2001, ibid, p18.

The world's poorest two billion people desperately need healthcare, not laptops...

Mothers are going to walk right up to that computer and say, "My children are dying, what can you do?" They're not going to sit there and, like, browse eBay or something.

What they want is for their children to live. Do you really have to put in computers to figure that out?

Bill Gates
Chairman and Chief Software Architect, Microsoft[9]

Introduction

The implementation of ICT in developing countries commands major resources. The International Finance Corporation (IFC), a World Bank Institution, has mobilised US$5 billion in private capital over the past ten years in 100 different ICT related projects in development countries.[10] The value of ICT for developing countries has been highlighted in major statements and reports produced by the G7 Governments, the United Nations, individual donor countries and international NGOs.[11]

However, the early enthusiasm about the opportunities offered by the new information and communication technologies (ICT) has waned somewhat since the bursting of the information technology bubble in 2000. Nevertheless, the governments of the Asia Pacific region such as those of India, China, Sri Lanka, Malaysia, Thailand, the Philippines, Indonesia and the countries of the Pacific are still keen to tap the potential of ICT. However, a different, more strategic focus is becoming evident. [12] ICT for development, like India's recently slowing software industry, is shifting its focus from the opportunistic and entrepreneurial to a strategic direction.[13]

At an international level, a more considered view is also emerging. The G7's Digital Opportunities Taskforce in June 2002 called for a more balanced view of the potential of ICTs in low-income countries. However, the Taskforce also noted 'the risk of excluding vast majorities from this potential':

Meeting these particular needs should enable a more fruitful

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[9] Edward Helmore and Robin McKie, 2000, 'Gates loses faith in computers: They can't cure world's ills, admits Microsoft boss' The Observer, November 5, http://www.observer.co.uk/Print/0,3858,4086462,00.html

[10] The IFC's US$887 million in investment in cellular telephony by 2001 has produced 32 million new cellular connections –equal to 20 percent of all of the mobile phones in developing countries at the start of 2000. Mohsen A. Khalil Director, Global Information and Communication Technologies Department, The World Bank Group, December 2002

[11] For example, the G7 Governments' Digital Opportunities Taskforce, 2002, *Digital Opportunities for All: Meeting the Challenge" Final Report of the Digital Opportunity Task Force* and UNDP's Human Development Report 2001 *Making New Technologies Work For Human Development.*

[12] One illustration of this new, more comprehensive focus is the Sri Lankan Government' long-term ICT plan, announced in November 2002, to promote its use and development across the country. Nisthar Cassim, 2002, 'Smart people, smart island' Financial Times (Sri Lanka), 20 November. http://www.dailymirror.lk/2002/11/21/ft/1.html

[13] Manjeet Kripalani & Bruce Einhorn, 2003, 'End of Indian IT party', BusinessWeek, reproduced n Australian Financial Review, 7 May, p 60.

discussion with critics who perceive the issue — in light of the often overwhelming problems of hunger, water scarcity and physical threat — as a diversion from basic development needs. It should also, and more importantly, foster sustainable, bottom-up developments and applications that take advantage of basic and enhanced ICTs to improve the living conditions of all citizens.[14]

Project Brief

AusAID's Virtual Colombo Plan has commissioned this report to provide a global overview of ICTs and emerging trends in their application and relevance for developing countries. The focus is the Asia-Pacific region. The AusAID brief requires that the paper 'identify and critique key ICT strategies, applications and issues related to the achievement of development outcomes'. The survey of trends is to include consideration of 'old' technologies (eg radio) as well as new technologies, and synergies between types of ICTs.

Features of the report are an analysis of summaries of 100 best practice, ICT-based projects and use of in-depth program evaluations to highlight the lessons learned in the use of ICT for development. Of particular focus are the applications of ICT in key sectors relevant to AusAID's aid program as well as the use of ICT to address cross-cutting issues in development. The key sectors include education, governance, law and justice, agriculture/rural development, health, infrastructure, gender, and the environment.

Definition of ICT

Information and communication technologies, broadly defined, facilitate by electronic means the creation, storage, management and dissemination of information.[15] The emphasis in this paper is on ICT as a vehicle for communication rather than as a means of processing information. The focus in the paper includes a range of communication vehicles from: radio (analogue, digital and high frequency two-way), television, telephone, fax, computers and the Internet. Newspapers are also included as they also often now have an electronic form on the World Wide Web.

Two types of ICT need to be distinguished – the old and the new. The former refer to newspapers as well as to radio and television. Their advantages are low cost, requiring little skill to operate and the potential to be highly relevant to the needs of the users in terms of local information delivered in local languages. Their downsides are to do with the often one-sided nature of the communication and potential for censure by governments.

The new, more advanced forms of ICT include networked computers, satellite-sourced communication, wireless technology and the Internet. A feature of these technologies is their capacity to be networked and interlinked to form a 'massive infrastructure of interconnected telephone services, standardised computing hardware, the Internet, radio and television, which reaches into every corner of the globe'.[16]

Four interconnected characteristics of the new, advanced ICTs are worth noting. The first is their capacity for interactivity: the new forms of ICTs offer effective two-way communication

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[14] Digital Opportunities Taskforce, 2002, Team Report: Human Capacity and Knowledge, June 2002, p 4.
[15] Gerster, R & Zimmermann, S, 2003, Information and communications technologies for poverty reduction: Discussion Paper. Swiss Agency of Cooperation & Development; p 4. www.gersterconsulting.ch
[16] UNDP Evaluation Office, 2001, 'Information Communications Technology for Development', Essentials: Synthesis of Lessons Learned. No 5, September, p 2.

on a one-to-one or one-to-many basis. Second, the new ICTs are available 24 hours a day on real time, synchronous or delayed, asynchronous basis. Third, ICT through its interconnected infrastructure, now has a reach over geographic distances not possible even in the recent past of five years ago. The fourth feature of the new ICT that is also highly significant is the continuing reduction in the relative costs of communicating, although this differs by location.[17]

The paper has five parts. Part I presents summary data on the take up of different forms of ICT in mostly the Asia Pacific region, drawing on a more detailed analysis presented in an attachment to the paper. Also discussed in this section of the paper are the obstacles that many countries in the Asia Pacific region face in attracting more private sector investment in ICT. Part II suggests two approaches to the use of ICT in development - one where ICT is in the lead and the other where ICT plays a supporting role. The former approach tends to use ICT as a tool to promote economic growth. The latter approach tends to view development in a more multi dimensional way.

Part III discusses the barriers to the use of ICT in a development context and outlines reasons for the difficulties encountered. Part IV presents a 10 point checklist of what constitutes good practice for ICT-based projects in developing countries. The utility of the checklist is illustrated by reference to the People First Network project in the Solomon Islands. It utility is also demonstrated by applying it to an assessment of 100 ICT-driven projects. The Part of the paper reverses the focus and looks at the arguments in favour of a role for ICT in mainstream development projects. A series of 11 steps are proposed as a guide to mainstreaming ICT in development.

Part I: Access to ICT in the Asia Pacific and obstacles to diffusion

How well served in terms of existing forms of information and communications technologies are the main countries in which AusAID programs have a presence?   A more detailed analysis of the current status of ICT, both in terms of the 'old' and the 'new' technologies is presented in a separate Attachment to this paper.

What forms of ICT are popular in the Asia Pacific region? Radios are the clear winner as the most widespread form of communication. However, TV ownership is not far behind in terms of its spread and is expanding rapidly, somewhat independently of income levels. The high incidence of radio ownership in low-income countries in the Asia Pacific indicates that it is a low cost communications technology that many people in developing countries can afford. TV is also important as a means of communication where people on low-incomes have access to electricity also.

> *Some forms of ICT (e.g. community radio, community television) can play a significant role in preserving and providing access to cultural resources. They can promote the traditions and heritage of ethnic and marginalised groups and help to keep their language, indigenous knowledge and way of life and livelihood alive and active.[18]*

However, it is important to note that per capita income alone does not determine the number

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[17] Ibid, p 4.
[18] Ahmed Swapan Mahmud, 2002, 'Crisis and need: information and communication technology in development initiatives runs through a paradox', Voices for Interactive Choice and Empowerment (VOICE), Dhaka, Bangladesh, Document WSIS/PC-2/CONTR/17-E, World Summit on the Information Society, p 3.

of communication outlets. India, Bangladesh and Pakistan are well served in terms of the number of newspapers per 1000 persons despite their low per capita income (See Table A1). On the other hand, Cambodia, Vietnam, Laos and Papua New Guinea have far fewer newspapers than their per capita income level would suggest.

The key factors explaining the different ICT take-up rates by country, according to the analysis reported in the Attachment, are: per capita income, levels of education and the rural concentration and dispersed nature of a country's population. In general, the lower a country's per capita income, the less likely its population is to have access to both old and new information and communication technologies. The situation is further compounded by the high proportion of the population in low-income countries living in poorly serviced rural areas, often spread over vast distances as in the small island states.

Low levels of per capita income and low population density for land area for many countries of the Pacific, for example, suggest that in the absence of private investment, governments in these countries face different choices. These relate to making decisions about allocating often extremely limited resources among many important alternative priorities. Will better roads produce more effective development outcomes than better access to telecommunications? Or is a basic level of both types of services needed for significant development to occur?[19] The analysis presented in Attachment 1 has shown that information about the relative cost effectiveness of different ICT options in a particular developing country is crucial.

The concern about trade offs for low-income countries in terms of devoting scarce resources to ICT is a response often noted by development practitioners.[20] This concern has emerged as a reaction to the sometimes exaggerated expectations surrounding the use of ICT in development.

> *Given such trade-offs, there is a need to identify which kinds of ICT access deliver the best value for money in developing countries, and how the limited resources that can be spent on it can be made to best suit the particular needs of the poor.[21]*

A focus on ICT can be justified if there is a clear attainable objective related to development that can be achieved.

> *…maximising the use from ICTs for developing countries will require an understanding not only of the opportunities ICTs present, but also of the trade-offs involved – and of the particular ways in which ICT access has to be tailored if any developmental benefits are to be reaped.[22]*

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[19] Eggleston, K, 2002, p 72.
[20] For example, an Indonesian NGO PAKTA which offers ICT training and other ICT related support to a range of NGOs has stated that it is their belief that ICT is not a development issue in Indonesia at this stage. As Kemp, Mathison & Prasetyo in their case study note: 'They predict that perhaps 10 years into the future it may become so but systematic poverty and inadequate levels of basic needs still prevail. The cost of ICTs, in hardware and recurrent cost terms, make ICTs unsustainable in the broader context'. Melody Kemp, Stuart Mathison & Jane Prasetyo, 2002, Digital dividend or digital divide? A world of difference. July, p45-46, Foundation for Development Cooperation, Brisbane.
[21] Georg Caspary, 2002, 'Information Technologies to Serve the Poor: How Rural Areas Can Benefit from the Communications Revolution' D+C Development and Cooperation No. 1, January/February 2002, p. 4.
[22] Ibid. p 5.

Does access to advanced ICT benefit the poor?

Access to good and reliable ICT is important for the economic growth prospects of poor countries as no country can prosper without links to the world economy. However, does investment in the advanced forms of ICT help the poor within a country? In other words, does better access to ICT lead to more equitable growth in that country?

Improved access to telephones in a country over time is associated with per capita income growth. However, an increase in the number of telephones per capita (teledensity) in a country is associated with a greater concentration of the population in urban areas. In other words, the better off urban population are benefiting from access to telephones, thus increasing rural urban inequality.[23] In other words, access to the new technology is more likely to go to those who had afford it:

> *…it might be that, especially in the poorer developing countries, telecommunications rollout, by providing new opportunities to the wealthy in urban areas, but not to the poor, rural populations, has encouraged divergence in incomes. This increasing inequality might also lie behind the finding that, overall, teledensity appears to have little relationship with improvements in health quality of life variables.[24]*

This is not to suggest that it is bad policy to provide better telecommunication infrastructure for low and middle-income countries. ICT is a vital link to the wider world, the absence of which will only further reinforce the disadvantages the poor countries already experience. However, the research findings cited above do point to the need for governments to have a more explicit focus in any planned new investment in telecommunications on innovative ways to increase access for the poor.[25]

Improving communication services in low-income countries, therefore, needs to be seen as a necessary but not sufficient condition to address poverty. Providing access to better information and communication flows through reliable infrastructure is an important precondition for fostering economic growth at a macro level. But this is not sufficient to avoid deleterious micro economic effects. Without intervening government policies, the benefits of that growth could be distributed very unequally within a society. Therefore, addressing directly the specific information and communication needs of the poor should form an important component of a wider strategy to tackle poverty in low-income countries.[26]

The above analysis suggests that prior assessment of a country's capacity to use new or effective combinations of old and new technologies is an important part of working out how best to use ICT in development. One way to do this is to conduct an in country workshop which brings together key stakeholders to identify the major barriers to the use of ICT. This has been the approach followed in several Pacific Island countries.[27]

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[23] Ibid, p 634.

[24] Ibid, p 639.

[25] Kenny (2002) describes an approach used by Chile to extend telecommunications access to areas which would not be economically viable. This is done through subsidy auctions to provide lowest cost, privately funded public access in unserved areas. It is an approach which has proved affordable and sustainable.

[26] Marker, P; McNamara, K and Wallace, L; 2001, 'The significance of information and communication technologies for reducing poverty', *The Think! Programme*, Development Policy Department, Department for International Development, UK, para 1.7 http://www.dfid.gov.uk/Pubs/files/ict_poverty.htm

[27] E Stork, D Leeming & R Biliki, 2003, 'Solomon Islands ICT Strategy Workshop Report', The Electronic Journal on Information Systems in Developing Countries Vol 12, Paper 5, www.ejisdc.org;' National

Part II: Two approaches to use of ICT for development: ICT-driven and ICT-in-support

A survey of the uses of ICT for development suggests two distinct approaches: one where projects are ICT-driven and the other where ICT plays a supplementary role. This first approach usually focuses on providing the poor with opportunities to receive up-to-date information or the ability to communicate more easily. The explicit or implicit objective of an ICT-led project is often on promoting economic growth through access to better opportunities to generate income to reduce poverty. The second approach places a more specific development objective to the fore and seeks to use ICT to support that objective.

First approach: ICT as a tool to promote economic growth

The ICT-driven approach is often underpinned by the economic assumption that better information improves how economic resources are allocated. It is a fundamental axiom of orthodox economics that the capacity of an economy to operate efficiently depends on how well markets work. Markets operate through the adjustment of supply and demand of goods and services through prices which send signals about the balance between these two sides of the equation.

In practice, prices do vary widely not only over time but from region to region, particularly where information flows are limited or non-existent.[28] In high-income countries, markets perform well because information about prices is usually easily accessible. Nevertheless, even in these countries, markets can function imperfectly due to 'asymmetries of information'.[29] Better means of communicating and more transparent ways of operating help greatly to overcome these asymmetries.

In low-income economies, especially in rural areas, information flows are much worse if they flow at all.[30] The result is that farmers often produce the wrong mixture of crops in terms of market demand. The buyers in this setting do not receive the goods they are seeking despite the fact they are willing to pay the market price. The overall effect is the compounding of poverty through inefficiency in the allocation of basic goods and services.[31]

> *In poor countries, the coordination of economic activity rarely works well. In isolated rural villages in most developing countries, there are virtually no sources of information regarding market prices and other production related information. For them, 'information is poor, scarce, maldistributed, inefficiently communicated and intensely valued'.[32]*

Workshop Report e-Marshalls: Information, Communications and Technology for every Marshall Islander' November 20-22, 2002, UNDP Multi country Office, Fiji.

[28] Eggleston, K; Jensen, R; and Zeckhauser, R; 2002, 'Information and communication technologies, markets and economic development', in G.Kirkman et al. *The Global Information Technology Report: Readiness for the Networked World.* Oxford University Press, New York, pp 62-63.

[29] Stiglitz, J, 2002, *Globalisation and its Discontents.* Norton & Company New York, p xi.

[30] A study of community access to marketing opportunities - options for remote areas in Uganda noted the following findings: 'Farmers in remote areas are generally ignorant of prices prevailing in Kapchorwa Town, Mbale, Soroti and Kumi, let alone the capital Kampala. Traders tend to dictate the prices due to farmer ignorance…There is a lack of means of communication e.g. telephone, fax, etc. The only way information travels is by people. There is no information dissemination mechanism'. Kleih, U; Odwongo, W; & Ndyashangaki, C 1999, 'Community Access to Marketing Opportunities - Options for Remote Areas' NRI Report No. 2442 Project A0769, UK Department for International Development (DFID), pp 44-45.

[31] Eggleston, K; et al 2002, pp 62-63.

[32] Ibid, p64, citing Clifford Geertz, 1978, 'The bazaar economy: information and search in peasant marketing'

The economic case for the contribution of ICT to the reduction of poverty through economic growth is summarised in Figure 2 below. The postulated relationship between access to ICT and economic growth is spelt out through a five-step process starting at the bottom of the pyramid.

The economic justification for giving the poor better access to ICTs is that up-to-date and reliable information about prices and availability of resources can be more easily disseminated to areas where the poor are more likely to be concentrated. The poor receiving the information are then better able, as both producers and consumers, to participate in effective markets.[33]

> *The immediate consequence should be income gains for participants, and the ability to better spend their incomes. Over the long term, enhanced access to information should enable producers to significantly improve their practices. Such improvement lays the path to economic growth.[34]*

The ICT-driven approach to development is more likely to emphasise communication as a good outcome in itself. ICT-based projects such as telecentres offering access to e-mail or the setting up of a web site as a marketing tool are favoured because they provide better access to markets through current and reliable information on prices, and offer the opportunity to promote goods. There are many publicised stories of how small traders or poor communities in low and middle income countries have gained access to wider markets through the Internet. These range from a small venture in a slum area of Nairobi selling of sandals made from car tyres to the United States to use of the web pages to encourage pro poor tourism in Nepal.[35] The poor benefit through increased demand for their products.
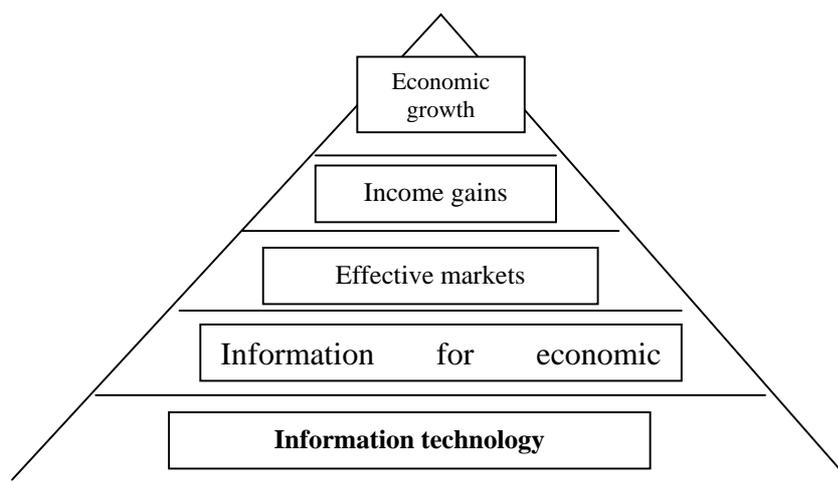

American Economic Review 68, 2: 28-32.

[33] Eggleston, K; et al, 2002, p 71.

[34] Ibid, p 71.

[35] The Dutch development agency SNV works with local communities to set up specific enterprises and communities along a trekking trail…- http://www.propoortourism.org.uk/nepal_sum.html.

Figure 2: The purported relationship between ICT and economic growth

Source: Eggleston, K; Jensen, R; and Zeckhauser, R; 2002, 'Information and communication technologies, markets and economic development', in G.Kirkman et al. The Global Information Technology Report: Readiness for the Networked World. Oxford University Press, New York, p 71.

The shortcomings of the ICT-driven approach

However, the evidence of the benefits of e-Commerce for enterprises in low and middle-income countries is often limited to isolated success stories. In relation to craft producers in India and Bangladesh, for example, a study of 16,500 producers with access to the Internet through www.peoplink.org found no evidence of significant sales of craft goods using e-commerce.[36] This research also found that more immediate benefits for producers and craft networks came from small efficiencies in the overall supply chain rather than from an increase in sales. To reinforce this finding, it is worth noting that the 'non-profit marketplace benefiting grassroots artisans and their communities around the world' at www.peoplink.org is no longer operational.

E-Commerce initiatives in low-income countries have difficulty in achieving success. Supporting infrastructure such reliable shipping services, credit card facilities or alternative solutions, such as wire payment guarantees by local banks are often not available.[37] A study of small and medium size enterprises in Botswana showed that access to reliable information is important for the success of the business. But, the study noted that it is only one part in a chain of resources which include infrastructure, skills, and access to credit required for the enterprise in a low-income country to benefit. If these other resources cannot be sourced, then, 'there is no point providing information via ICTs (or via other means) as it will be of no value'.[38]

This is not to claim that e-Commerce for an enterprise in low-income countries has no future. It depends on the business model used. A more limited e-commerce venture which is profitable is EthioGift, (www.ethiolink.com/EthioGift), an on-line gift shop based in Addis

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[36] Cited in UNDP Evaluation Office 2001, Information Communications Technology for Development. Essentials: Synthesis of Lessons Learned, No 5, September, p 12.
[37] Gerster, R & Zimmermann, S, 2003, *Information and communications technologies for poverty reduction: Discussion Paper.* Swiss Agency of Cooperation & Development; p 16. www.gersterconsulting.ch
[38] Duncombe, R. and R. Heeks, 2001, 'Information and Communication Technologies and small enterprise in Africa', Institute for Development Policy and Management. University of Manchester, http://idpm.man.ac.uk/idpm/di_wp7.htm

Ababa. The gift shop enables Ethiopians living overseas to buy traditional gifts (such as goats, cakes and flowers) via the Internet and have them delivered within 48 hours to their families in Ethiopia. The site's success is linked to Ethiopia's large number of expatriates, the country's strong cultural traditions of gift-giving, and the fact that goods are delivered locally (i.e., not shipped abroad). The success of EthioGift demonstrates that a well-conceived business model, grounded in an accurate assessment of the needs of the target market, can drive a successful e-Commerce venture. This is despite poor quality infrastructure and very little capital.[39]

Telecentres have been successful where they are commercially run and are usually limited to simple services such as telephones. By contrast, donor-funded centres, usually located in remote, impoverished, or rural areas, have tended to offer a wide range of services such as radio, fax, computers, e-mail and web. The UNDP notes that 'although donor-funded centres are undertaken to service specific developmental objectives, none have proven to be sustainable to date'.[40]

Evidence that access to basic communications infrastructure helps the poor

However, there is strong evidence, at a more basic level, of the benefits of access to more reliable information on prices. This comes from an analysis of village household surveys in China. Data on prices for basic commodities in a random sample of 3,800 households in two hundred villages over the period 1989-1993 show that access to a telephone makes a difference.[41]

A comparison of villages with and without access to telephones shows that the mean price levels of three of the four basic commodities studied is lower in the villages with access to a telephone. The variation in prices for each commodity (fish, pork, eggs and vegetables) is much higher (as measured by their standard deviations) in the villages without access to a telephone.[42] Other analysis of the same village household data over time period show that where telephones were added, dramatic increases in income within a two-year period resulted for the households in these villages.[43]

Other studies in developing countries based on 'hard data' confirm the above finding. Access to electricity and to a telephone improved the income-generating opportunities of home enterprises in the rural non-farm sector in Ecuador.[44] The Grameen Village Phone Program in Bangladesh is another example of how better connectivity can result in productivity gains in poor areas by stimulating and supporting the entrepreneurial skills of the poor.[45] The model of

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[39] UNDP Evaluation Office 2001, p 12.
[40] UNDP Evaluation Office, 2001, 'Information Communications Technology for Development', *Essentials: Synthesis of Lessons Learned*. No 5, September, p4.
[41] Eggleston, K, 2002, p 64-67.
[42] Other factors likely to influence prices such as access to roads, transportation costs and proximity to an urban area are controlled for in the analysis. A multivariate analysis taking into account price variance over time concluded: 'villages that add even the most basic communications technology, the telephone, experience declines in the purchase price of various commodities and lower future price variability' Eggleston, K et al, 2002, p 67.
[43] Average household income in the villages with telephones added grew by an average of 15 per cent in two years, with the largest increases in agriculture and business income. Eggleston, K et al. 2002. p 71.
[44] Elbers, C. & P. Lanjouw, 2001, 'Intersectoral Transfer, Growth, and Inequality in Rural Ecuador' *World Development* 29, 3, 481-496.
[45] The Village Phone Program works as an owner-operated pay phone, providing telephone services in rural areas where no such facilities existed before. It allows the rural poor who cannot afford to become a regular subscriber to access the service. Typically, a women borrower of Grameen Bank takes a loan of around Taka 12,000 and buys a handset and subscribes to the mobile service. She is also trained on how to operate it and how to charge the users for it. http://www.grameenphone.com/village.htm

village women getting microcredit loans to buy a mobile phone and selling the access to community has been expanded to over 25,000 villages ICT Bangladesh and has been replicated in India and Uganda.[46]

Historical evidence within countries and cross-countries shows that improved communications leads to more than a one-time lifts in income for the poor. Better communication can encourage isolated producers to adopt better practices and technologies to improve their productivity.[47] However, it is important to acknowledge that information is only valuable if there are serviceable roads and reliable transport to move the goods. The extent to which farmers can benefit from good information will vary according to other factors such as proximity of markets, available means of transportation, and their productive resources to respond to the opportunities information sources might provide.[48]

Second approach: use of ICT in support of development

A second generic approach to the use of ICT in development can also be identified. This is one where ICT plays a supporting or supplementary role to meeting a primary objective. This approach first clarifies the development goal the project is addressing; works out what the information and communication needs of the target group are and then looks to a cost effective way that ICT and other media can play in managing information and providing channels of communication.[49]

This approach starts with a more multidimensional perspective on poverty reduction, acknowledging the importance of better access to services such as education and health. Access to government services in a transparent way with low transaction costs is another way in which ICT can play a key supporting role in development.

The role of the poor themselves in defining their own information needs has been a key characteristic of this second approach. For example, India's TARAhaat or *Star Marketplace* is an Internet gateway that connects the village user through franchised kiosks to information about social services, health, entertainment, and to markets customised in the language of their choice. The website attracts between 5000 and 25,000 contacts per month. Information about the needs of the target group was gathered through extensive market research and socio-economic surveys, including a house-to-house survey of selected villages in the region to first identify the needs of the people to whom it was aimed.[50]

Sustainable ICT for development

Are ICT-supported development projects viable in the medium and longer term? A recent study of 12 projects involving the use of ICT for development purposes has highlighted a number of features important to the sustainability of ICT-supported projects.[51] The projects studied sought to meet the following development objectives: enhancing information to

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[46] Stuart Mathison, personal communication, 2 July, 2003.

[47] Eggleston, K et al. 2002, p 69.

[48] Tran, Thi Thu Trang, 2002, 'Rural Information Audit and Needs Assessment: Viet Nam', Report commissioned by UNDP Viet Nam., cited by Fortier, F, 2003, 'Sustainable rural networking community ownership and appropriate technologies', Paper Presented to the International Workshop on Models of Poverty Alleviation through ICT: Challenge and Prospective of Bridging Digital Divide in China's Rural Areas, 15-19 January, p 8.

[49] Heeks, R; 2002, 'I-Development not e-Development: special issue on ICTs and Development', Journal of International Development Vol 14, p 7.

[50] See http://www.challenge.stockholm.se/new_tavlande_index.html.

[51] Batchelor S, Norrish P, Scott N, Webb M, 2003, *Sustainable ICT Case Histories Project: Technical Report*. Gamos Ltd, funded by Department for International Development, London - http://www.sustainableicts.org/

planners and indirectly the poor, increasing citizens' access to governance, and enhancing incomes and other livelihood sources of the poor.[52] Eleven of the case studies illustrate the use of ICT in support of a development activity. Only one case study was of an ICT stand-alone activity.

The main conclusion of the study is that the use of ICT in projects aimed at achieving explicit development objectives such as general livelihood support or good governance did produce immediate and identifiable benefits. These benefits appeared to be cost effective although a detailed analysis of costs and benefits was not undertaken. In terms of longer term viability, the ICT related projects which were seeking to be economically sustainable had made some progress towards this end. In other cases, economic sustainability was not sought as the projects were directed at supporting other development objectives. It was noted, however, for some projects donors were reluctant to fund development-related ICT activities despite their potential to deliver cost effective development outcomes.[53]

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[52] Ibid, p 6. The case studies were selected because they demonstrated how to enhance ongoing development activities, offered the possibility for replication, and showed some measure of sustainability. The case studies were also selected because they had limited donor funding. Their budgets under approx US$200,000.

[53] Ibid, p21-22.

Part III   Barriers to the take-up of ICT for Development

The amount of information about the uses of ICT for development has grown enormously over the last five years (See Attachment 2 for a listing of the main sources of information). However, much of the information available is in the form of short articles or uncritical case studies that highlight the successes achieved. More systematic evaluations of what has worked and what has not are hard to find. The UNDP's Evaluation Office in September 2001 also notes the lack of critical appraisals:

> *…the strictly evaluative evidence of [Information & Communications Technologies for Development] initiatives is sparse. Although much has been written about the potential of [Information & Communications Technologies for Development] to improve people's lives, there is not yet a robust inventory of documented development outcomes.[54]*

Evaluations of current uses of ICT in development projects

> *As noted above, it is difficult to find specific evaluations of impact of the use of information and communications technologies in development projects.*

A search of the ICT and Development topic on the Development Gateway portal using the word 'evaluation' produced 64 'hits' mentioning evaluation. However, none of these references were to a completed evaluation report on a particular project. The lack of evaluation results could reflect several factors: difficulties measuring outcomes related to ICT usage, overemphasis on the potentialities of ICT in development, a focus on implementation at the expense of assessing outcomes or insufficient time for the results of impact evaluations to be released (see Box 1).

Box 1: Reasons for limited critical evaluation of ICT in development

The UNDP 's Evaluation Office's *Synthesis of Lessons Learned* has suggested four main reasons for the limited analytical information about what has worked and what has not in relation to ICT for development projects:

Many projects have been viewed as 'technology transfer' rather than aiming to achieve development outcomes. This means that project 'success' or 'failure' has been measured in terms of whether a technical system was deployed or no. The actual development outcome (or relevance) of the system was neither monitored nor measured.

There is the 'iceberg phenomenon,' meaning that ICTs have been hidden beneath the surface of other development projects. When viewed as enablers of other development sectors, ICTs were rarely linked to impact indicators. This phenomenon suggests that ICT in many development projects is best viewed as a crosscutting issue.

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[54] UNDP Evaluation Office, 2001, 'Information Communications Technology for Development', Essentials: Synthesis of Lessons Learned. No 5, September, Footnote 1.

> A focus in project evaluations on management issues and project cycles together with the use of inadequate tools, methodologies and timeframes, has hidden ICT's contribution to longer-term social change.
>
> There has also a desire to hide failures on the part of those involved, in many cases. Although many ICT for development initiatives have failed, few failures have been documented. This is due to the lack of incentives in the development system to encourage project managers, development agencies or implementing partners to critically report and make public project shortfalls or failures.
>
> Source: UNDP Evaluation Office, 2001, 'Information Communications Technology for Development', *Essentials: Synthesis of Lessons Learned.* No 5, September, Box 9, p 19.

All these factors may be at work in helping to explain the absence of evaluations of the effectiveness of ICT in development. To some extent, this is the case with many development projects. A recent review of the World Bank's Evaluation Capacity Development noted that a stocktaking for the review 'revealed confusion among Bank staff and in borrower countries concerning what monitoring and evaluation comprises'. This confusion applies to knowledge of the tools and approaches available for evaluating projects, their uses, and to embed monitoring and evaluation processes in a sustainable manner.[55]

A major reason, it is claimed, for the emphasis on ICT success stories rather than a more balanced reporting of failures or partial failures is the new availability of significant amounts of funding for ICT in development projects.[56] Japan in 2000 pledged S$15bn over five years to address the international digital divide and hoped to convince other G8 countries to pledge similar amounts.[57] Donors, it is claimed, are keen to justify their expenditure, wish to promote the 'good news' and ignore or suppress the bad.[58] It is also alleged that commentators talking up the potential of ICT are 'increasingly either donor-funded or seeking donor funds'.[59]

> *…current literature appears to contain a greater proportion of pilots and proposals that, necessarily, emphasise potential benefits rather than actual negative outcomes. The new discourse therefore obscures rather than clarifies the true extent of success and failure, in which successes still form only a small minority of all [ICT] initiatives in developing countries.[60]*

However, it is important to note that valuable evaluation studies do exist and these provide an important basis for developing criteria for assessing what is good practice.[61] These studies are

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[55] World Bank, 2002, *Evaluation Capacity Development: A Growing Priority.* Operations Evaluation Department, *Précis*, November 1, p1.

[56] Heeks, R; 2002, 'failure, success and improvisation of information systems projects in developing countries', Paper No 11, Development Informatics Working Paper Series, January, Institute for Development Policy and Management, University of Manchester http://www.man.ac.uk/idpm p 4.

[57] Japan PM gets advice on 'digital divide' 19 July, 2000, http://news.zdnet.co.uk/story/0,,t269-s2080262,00.html

[58] Heeks, R; 2002, p 4.

[59] Heeks, R; 2002, p 4.

[60] Ibid.

[61] The UNDP Evaluation Office review, cited above, summarises the available evaluatory evidence to September, 2001; also important is a recent report by Batchelor S, Norrish P, Scott N, Webb M, 2003, Sustainable ICT Case Histories Project: Technical Report. Funded by Department for International Development, London - http://www.sustainableicts.org/ and M Kemp, S Mathison & J Prasetyo, 2002, *Digital*

discussed below to identify possible barriers to the more extensive adoption of ICT for development. This discussion of the context shaping the uses of ICT is a precursor to elaborating a set of good practice principles for using ICT in development.

Information on use of information and communications technologies in Australian NGOs

The results of a survey conducted in the year 2000 of approximately 45 Australian international development agencies, commissioned by AusAID pointed to not only the limited use of ICT.[62] The survey results also reported on the reasons development agencies gave for the limited take up of ICT, despite recognition of their usefulness.

Although 90 per cent of the organisations used e-mail, only a small minority of the respondent organisations (10 per cent) were making use of a database management application such as financial management software. There was little use of other communication services such as video conferencing and use of newsgroups. Some 70 per cent of the respondent organisations had web sites but half of these were categorised as 'starter' or basic sites offering only general information and contact details. The use of the Internet by agency staff for information retrieval or research was said to be 'conspicuously absent'. This is despite the fact that most respondent organisations considered ICT was a significant tool in facilitating research and development work.[63]

The use of ICT in developing countries by international development agencies was limited to the use of general-purpose office applications for documentation (for 40 per cent of the developing country partners) and for communication in the form of e-mail. However, the latter was only used by 20 per cent of agencies to communicate with partners in developing countries.

The main reasons given by the development agencies for the low use of ICT by agencies in developing countries were: lack of equipment, poor infrastructure and limited access to Internet services where available. Problems with access to hardware and software were highlighted although it was acknowledged that this situation had improved in recent years. The lack of infrastructure or unreliable services such as power supply and telephone lines was also noted. Where Internet access was possible, difficulties were often experienced in connecting such as competition for the few telephone lines, reliance on only a few Internet Service Providers and high cost of the services that are available.[64] Lack of appropriate training was another obstacle.

However, the survey results also pointed to more complex problems inhibiting or limiting the use of ICT in developing countries. These hard-to-address issues included the constraints of gender roles, rigid managerial control over ICT access, and inhibitions about using a written form of communication.

> *The problem of cultural diversity and the complexity involved in*

dividend or digital divide? A world of difference. The Foundation for Development Cooperation, Brisbane, - www.fdc.org.au and *An Evaluation Of Gyandoot*, Center for Electronic Governance, Indian Institute of Management, Ahmedabad, India, www1.worldbank.org/publicsector/bnpp/Gyandoot.PDF

[62] Kiraka, R; & Manning, K; 2002, 'Getting online: Australian international development agencies and ICT use', *Journal of International Development*, Vol 14, pp 75-87.

[63] Ibid, p 81 & 82. The ways in which they thought ICTs could help were: making relations between international agencies and their partners more accountable through increased information sharing and reporting, making it easier to carry out research, undertake learning activities, establishing wider networks for businesses and counteracting media bias.

[64] Ibid, p83.

> *attempting to link ICT use to the different value systems and beliefs of communities seemed almost insurmountable to some…socio-cultural issues have an important effect on ICT diffusion…particularly where there is a conflict between local culture and the cultural assumptions within ICT systems.[65]*

The international development agencies saw the infrastructure and culture related problems as much more complex and deeper than they could handle alone. It was believed that cooperation with other agencies was needed as well as governments and private enterprises to address the difficulties. However, it was claimed by the survey respondents that to that point (the survey was conducted in 2000), not much consideration had been given to such collaborative efforts.

High failure rates to be expected

The difficulties of implementing projects with an ICT component need to be acknowledged. It is not unusual to have a high rate of failure for sophisticated information systems projects in high-income countries. This applies to IT projects in both the private and the public sector. Many companies in the USA in the late 1990s, for example, experienced major difficulties in implementing whole-of-enterprise resource planning systems.[66] Australian examples of enterprise failures to implement new information systems are not hard to find either.[67] Gartner, an ICT market analysis firm, has estimated a 60 per cent failure rate for information systems related to managing customer relations, despite worldwide spending in this area increasing from US$2.1 billion in 1999 to US$3.1 billion in 2001.[68]

Another source estimates that only 28 per cent of all IT projects in 2000 in the US, in both government and industry, were successful with regard to budget, functionality and timeliness, a further 23 per cent were cancelled and the remainder succeeded only partially, failing on at least one of the three counts.[69] Many Government-funded information systems projects in OECD countries have also experienced a high partial or total failure rate in implementing large IT projects – 'budgets are exceeded, deadlines are over-run and often the quality of the new system is far below the standard agreed when the project was undertaken'.[70]

Given these high failure rates in large IT projects in high-income countries, it is likely that even higher failure rates will be the fate of projects using advanced ICT in middle and low-income countries. One key factor for this is that technical and high-order management skills are much thinner on the ground. The UNDP's Evaluation Office notes the recent evidence of widespread failures of telecentres in Latin America, India and Africa, particularly where they were set up to meet development goals.

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[65] Ibid, p 83, 84.

[66] Beardsley, S; et al; 2003, 'The Business Dimension: ICT: A Critical Enabler of Managerial Innovation', The Global Information Technology Report 2002–2003: Readiness for the Networked World. Oxford University Press, New York, p 67-68.

[67] Ketchell, M; 2003, 'RMIT resignation adds to pressure' The Age Higher Education Reporter February 13. *Last year an expected surplus of $21 million turned into a loss of almost $5 million after the collapse of AMS, a software system that managed student records. Consultants called in to fix the problems reported that the university was in disarray, with a lack of accountability and a 'culture of blame' among senior managers…*

[68] Beardsley, S; et al; 2003, p 68.

[69] OECD, 2001, *The Hidden Threat To E-Government: Avoiding Large Government IT failures*. PUMA Policy Brief No. 8, March, p 1

[70] Ibid. The case studies are summarised in OECD, 2001, 'Management of large public IT Projects: case studies', Public Management Service, Public Management Committee, PUMA/SBO/RD (2001)1 18-May.

> *… the evaluative evidence of numerous donor-funded telecentre efforts – including several high profile initiatives in Africa – reveal fundamental problems and limitations. For example, three wide-ranging assessments of the telecentre experience in Africa, Latin America and the Indian sub-continent reveal that none of the major donor-funded initiatives have managed to become self-sustaining, and most have not achieved their expected development outcomes.[71]*

Reasons ICT projects run into difficulties

If high failure rates for complex information systems projects in high-income countries are common, it is likely that difficulties will also be encountered by less complex ICT projects in low and middle income countries. A three-pronged model has been developed by Richard Heeks to explain what factors contribute to a gap between ICT project design and the reality.[72]

1. Gap between design and reality: different contexts

One prong relates to the gap between the conditions ICT-based systems are usually designed for and the actual conditions existing in most developing countries. The different contexts in which ICT-based systems operate in developed and developing countries are outlined in stereotypical terms in Box 2.

Box 2: Information systems design and implementation: developed and developing country context gaps

Information: formal, quantitative information stored outside the human mind is valued less in developing countries;

Technology: the technological infrastructure (telecommunications, networks, electricity) is more limited and/or older in developing countries;

Processes: work processes are more contingent in developing countries because of the more politicised and inconstant environment;

Objectives, values and motivations: developing countries are reportedly more likely to have cultures that value kin loyalty, authority, holism, secrecy, and risk aversion;

Staffing and skills: developing countries have a more limited local skills base in a wide range of ICT related skills.

Management and structures: developing country organisations are [often] more hierarchical and more centralised.

Other resources: developing countries have less money. In addition, the cost of ICTs is higher than in industrialised countries whereas the cost of labour is less.

Source: Heeks, R, 2002, 'Failure, Success and Improvisation of Information Systems Projects in Developing Countries', *Development Informatics Working Paper Series*, Paper No 11; Institute for Development Policy and Management, University of Manchester, January, p 8.

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[71] UNDP Evaluation Office, 2001, 'Information Communications Technology for Development', Essentials: Synthesis of Lessons Learned. No 5, September, Annex 3 – Note on Telecentres and Sustainability, p 22.
[72] Heeks, R, 2002, 'Failure, Success and Improvisation of Information Systems Projects in Developing Countries', *Development Informatics Working Paper Series*, Paper No 11; Institute for Development Policy and Management, University of Manchester, January.

This is not to claim that these generalisations apply in all cases – the intention is merely to demonstrate the different context that ICT-based systems designed for high-income country implementation are likely to face if they are not significantly adapted for the conditions operating in most developing countries.

2. Gap between design and reality: different approaches

The second prong of the model is the so-called 'hard rational design-soft political reality' gaps.[73] A rational design approach emphasises standardised, formal, and often quantitative data. In contrast, the political reality in developing countries often requires contingent, informal, and qualitative information. Similarly in relation to processes, the rational design approach seeks decision outcomes based on logical criteria. However, the reality in developing countries is often that processes are flexible, complex, constrained and informal with decision outcomes more likely to be compromises based on 'power games'.[74]

Such differences in approach help to explain, for example, the problems encountered by the introduction of geographic information systems (GIS) into developing countries, as demonstrated by the failure of the use of GIS for forestry management in the Indian Ministry of Environment and Forests.[75]

Gap between design and reality: different actors

The third set of differences between developed and developing countries in relation to ICT related projects relate to identifying who the main actor is. An information system designed for the private sector in a high income country will be based on different operating assumptions to those of how the public sector or an NGO functions in a developing country.[76]

The philosophical or cultural approach to implementation and the particular organisational imperatives of the responsible agency need to be taken into account in how the ICT component is incorporated into a development project.   The initial design, no matter how sensitive to local conditions, will still need further modification in the light of regular feedback about changing circumstances facing those implementing the project.

A thorough understanding of local conditions needs to be the starting point for any ICT related development project. However, the above analysis suggests that particular difficulties are likely to be experienced by projects that are mainly ICT driven. The following section presents a good practice checklist in relation to projects in developing countries that have a predominant focus on ICT.   The utility of the checklist is shown by a critical appraisal of a well documented project in the Solomon Islands – the People First Network. It is further illustrated by applying it to a database of 100 ICT-backed projects.

The other use of ICT in development, as noted above, is where it is deployed in a supplementary role in a development project. This approach to the use of ICT in development is commonly referred as mainstreaming ICT. A checklist of good practice in relation to

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[73] Heeks, R; 2002, p 9-10.

[74] The AusGuide notes that 'projects are often undertaken in a difficult and unpredictable environment where its limited capacity to absorb assistance and the real agendas of the key stakeholders are often difficult to ascertain' – *AusGuide - Activity Cycle Overview* 2001, p 20.

[75] Heeks, R; 2002, p 10 citing Barrett, M., Sahay, S. and Walsham, G; 2001, 'Information technology and social transformation: GIS for forestry management in India', *The Information Society*, Vol 17, pp5-20; see also Nancy Odendaal , 2002, 'ICTs in development - who benefits? Use of geographic information systems on the Cato Manor Development project, South Africa' *Journal of International Development* Vol 14, pp 89-100.

[76] Heeks, R; 2002, p 11-12.

mainstreaming ICT into development is also presented in the final part of the paper.

Part IV: Key components of good practice in ICT-driven projects

Using ICT to support an explicit development objective

The need for ICT-based projects in developing countries to have an explicit focus tied to a development objective is stressed by several commentators.[77] Geoffrey Kirkman, managing editor of *The Global Information Technology Report 2001-2002: Readiness for the Networked World* (World Economic Forum and Harvard University) has noted:

> *Most e-development projects don't have clear objectives. The "if we build it, they will come" mentality still dominates technology projects. The "wow" factor still hasn't gone away, and the technology remains the ends rather than the means of many projects... Without clear objectives, it isn't clear how to measure results. There are very few ex ante attempts to figure out what the point of ICT projects should be, let alone to quantify the results. In the end, this means a lot of anecdote and not much analysis...or even material to analyze.[78]*

Related to the need to specify a clear objective is the need for ICT-based projects to identify a specific target group or groups. The beneficiaries of the project need to be clearly identified.[79] Other good practice criteria of How?, What?, How Long?, How Well? and What Risks? are explained below.

The good practice checklist has been developed to highlight the importance of an explicit focus on a contemporary development issue – the reduction of poverty.[80] However, the checklist could also be used to emphasise the value of an explicit focus on other contemporary development issues such as good governance.[81] The following proposed ten criteria relate how to set up an ICT project that has an explicit pro poor focus? (see Box 3). The one word questions, related to each of the ten criteria, are merely offered as signposts - the issues they point to are usually complex, requiring more than a simple answer.

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[77] Soeftestad, L and Sein, M; forthcoming, 'ICT and development: East is east and West is west and the twain may yet meet', in Krishina, S and S. Madon, eds, The Digital Challenge: Information Technology in the Development Context. Ashgate, Aldershot, UK, p 14.

[78] Kirkman, G; 2003, 'The project carcasses that litter the ICT-Dev landscape', Webblog, Berkman Center for the Internet and Society, Harvard Law School., Harvard University.

[79] Batchelor S, et al; 2003, *Sustainable ICT Case Histories Project: Technical Report*, p ii.

[80] After this checklist was developed, Stuart Mathison alerted me to a paper of his that addresses similar issues – 'ICTs and Human Development in Asia: on overcoming the 'Forever Pilot' syndrome', A discussion paper prepared for the Asia-Australasia Regional Conference of the International Telecommunications Society Perth, Australia, 22-24 June 2003, The Foundation for Development Cooperation, Brisbane http://www.fdc.org.au/files/foreverpilot.pdf

[81] See AusGUIDE Stage 3 Appraisal, June 21, 2002, Attachment 3-1, p16.

Box 3: Proposed key components of a good practice guide to the use of ICT for development		
1	Why?	Is the use of ICT-based project aimed clearly at achieving a poverty reduction goal?
2	Who?	Is there a clearly specified target group for poverty alleviation?
3	How?	Is the form of ICT to be deployed appropriate in terms of cost, support, maintenance and compatibility with existing information flows?
4	How?	Is the form of ICT to be deployed scalable to enable it to be replicated and expanded
5	How?	Are appropriate intermediaries being used?
6	How?	What scope is there for public private partnerships?
7	What?	Is the content transmitted by the ICT relevant to the audience and is it in a language easily understood by the target audience?
8	How long?	Is the project self-sustaining over what period?
9	How well?	What performance measurement, monitoring and evaluation processes are in place?
10	What risks?	Managing risk: 'What unexpected events or situations might arise?' and 'What should be done to manage these?'[82]

1. Why? Is the proposed ICT project aimed clearly at achieving a specific development goal or goals related to poverty reduction?

One useful way to identify specific and relevant development objectives for an ICT-based project is to make direct reference to addressing one or more of the indicators specified for each of the United Nations' Millennium Development Goals (MDGs). The recent 'Tokyo Declaration' of the World Summit on the Information Society (WSIS) Asia-Pacific Regional Conference emphasised the important role that ICTs can play in achieving the Millennium Development Goals.[83]

From a poverty reduction perspective, seeking to reduce the digital divide by providing access to computers or the Internet is not the important issue. The real issue for ICT in a development context is how well the use of technologies supports poverty reduction directly. ICT can also play a valuable role as an enabler or facilitator of development opportunities more generally. This can be in addition to supporting the activities of a project with a specific development objective. However, the development focus for an ICT project recommended here specifically excludes a donor-funded project which merely aims to provide for the poor access to better communications such as a community telecentre.

An explicit link to poverty reduction is an important starting point for a project with a

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[82] Ibid.
[83] The governments of 47 countries, 22 international organisations, 54 private sector entities and 116 non-governmental organisations were represented to develop a shared vision and common strategies for the 'Information Society'.

significant ICT component. The extra effort and expense that the use of ICT, in an often inhospitable ICT environment, can involve requires justification. There is a need to demonstrate that the extra effort is worth it in terms of delivering relevant outcomes more effectively.

The eight millennium development goals highlight well the multi-dimensional aspects of poverty. These range from low-incomes and hunger, to lack of primary education, gender inequality, high child and maternal mortality, poor health conditions as shown by the spread of HIV/AIDS, malaria and TB, and the lack of environmental sustainability. Another guide to the importance of poverty reduction as a focus for development aid is AusAID's *Reducing poverty: The central integrating factor of Australia 's Aid Program* (April 2001) .

Also included as a millennium development goal is the high-income countries' response to world poverty in the form of their policies on aid, free trade and debt relief. It is in the context of the latter goal – 'Develop a Global Partnership for Development' that extending the benefits of ICT is mentioned as one aspect.[84] The emphasis here is on promoting public private partnerships to provide better access to new technologies rather than on seeking to overcome the digital divide per se.

The eight goals are expressed in terms of one or more specific targets, 18 in total. However, also listed are indicators, or more accurately measures, which are being used to measure progress in achieving these targets. There are at present 48 indicators with more to be announced. These indicators offer valuable guidance as to how specific an ICT-based project's objective needs to be (See Box 4). For example, an ICT-based project needs to show not merely that it is helping to reduce poverty and hunger but that it is doing this by, for example, promoting in a concrete way rural development/agriculture. Or alternatively, the ICT-based project needs to be explicit about its objective by showing how it is improving gender equality and empowering women. This might be through better access to education, literacy, wage employment in non-agricultural sector, & making it easier for women to enter and stay in the national parliament. The other indicators related to the eight millennium development goals can be used in a similar way to identify an explicit link to poverty reduction.

The value of this reference list is to exclude projects that cannot demonstrate their likely impact in terms of one or more of these indicators. Demonstrating a direct link to addressing a millennium development goal indicator helps to make clear the poverty reduction focus of the project. To make the exercise more rigorous, it will also be necessary to outline just how the project will address the poverty reduction outcome backed by a proposed measure or measures that can show the progress towards achieving the outcome. It is, of course, not possible to attribute a direct link between a project and an aggregate poverty measure, for example. However, appropriate measures specific to the project's outcomes can be devised which can capture the intent of the more aggregate indicator/measure specified for each of the millennium development goals.

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[84] Target 18: In co-operation with the private sector, make available the benefits of new technologies, especially information and communications.

Box 4: Lessons learned from specific ICT interventions

1. Initiatives should be explicit about their development goals and how they will directly impact the target population.

2. Initiatives should be driven by user demands, identified and realized through direct participation and ownership.

3. ICT solutions should be 'built to last.'

4. Initiatives should be sensitive to local conditions and limitations.

5. The interests of key stakeholders must be broadly aligned with each other and with the goals of the intervention.

6. Initiatives with the most impact have approached development problems in a holistic and coordinated way, not only through the provision of ICT.

Source: Creating a Development Dynamic: Final Report of the Digital Opportunity Initiative July 2001, UNDP, Accenture and Markle Foundation

Whether to focus on one MDG rather than another can be gauged from an assessment of a country's progress in relation to particular MDGs. The UNDP Human Development Reports for particular countries offer assessments of progress in relation to the MDGs.

Box 5: Examples of specific poverty reduction objective based on the indicators for the Millennium Development Goals

Objective	Specific indicator
reduce poverty and hunger through promoting rural development/agriculture	reduce incidence of HIV/AIDS, malaria & other major diseases such as tuberculosis or help those affected;
improve gender equality and empower women through better access to education, literacy, wage employment in non-agricultural sector, & national parliament	promote the principles of sustainable development and reverse the loss of environmental resources
lift the number who complete primary education, improve gender equity at all levels of education	improve service delivery to the poor
reduce child mortality & improve maternal health	provide for enhanced law and justice; and to improve a country's infrastructure to make it easier to achieve the above objectives.

improve the prospects of decent & productive employment for young people 15 to 24 years.	

2. **Who?**   Has a specific target group or groups for the project been identified and an understanding of their information needs gained?

Another aspect of how to link ICT better to development outcomes is to have a clear understanding of the target group or groups to whom the project is directed.[85] This criterion responds to the recommendation of the Tokyo Declaration that information and communication services be 'targeted at disadvantaged groups in society, in particular those from lower income groups, to contribute to the alleviation of poverty'.[86]

This means that even in a low-income country, it is important to ensure that the ICT-based project is directed at meeting the needs of the rural population, the poor among the urban population or specific groups such as rural or urban poor women.   More specific target groups of the poor may need to be identified in middle income countries.   However, in countries with a low average income per head, broad target groups defined on the basis of at least two dimensions may be sufficient.

Starting with a clear understanding of the target group is a key design principle for delivering a successful project outcome.   This also requires a good knowledge of the target group or groups' information needs.   This can best be obtained by encouraging a representative group from the target population to define their own information needs.   Other sources of information may also be needed to ensure that narrow self interest has not dominated the results of participatory data collection.

3. **How?**   Is the type of ICT to be used appropriate in terms of cost, available maintenance support and compatible with existing information flows?

The impact of ICTs on poverty reduction will differ according to the way in which ICTs are used.   There needs to be an effective combination of low cost and new, innovative technologies.   Examples are the use of short wave high frequency radio to deliver e-mail messages to people in isolated rural communities through the People First Network in the Solomon Islands.[87] Another example of a use of ICT that meets the above criteria of low cost, scale, support and compatible with existing information flows is the use of low cost wireless local loop (WLL) connections to access a mobile base station on a bus as it passes through Indian villages.[88]

Wireless technologies in particular such as cordless wireless local loop and digital satellite radio have a fast roll-out time, can easily use alternative power sources such as solar power, micro hydro power or wind energy, have low maintenance costs and possess greater network flexibilities than fixed line connections.[89] Wireless technologies, in particular, have the potential to solve the 'last 25 kilometre' problem of rural India where many communities are within 25 kilometres of fixed cable connection.[90]

The Wireless Internet Institute (W2i), in cooperation with the UN ICT Task Force will host a

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[85] See AusGUIDE Stage 3 Appraisal, June 21, 2002, Attachment 3-1, p17.
[86] WSIS Asia-Pacific Regional Conference, 2002, *The Tokyo Declaration*, 15 January. http://www.wsis-japan.jp/documents/tokyo_declaration.html
[87] www.peoplefirst.net.sb/general/pfnet.htm
[88] Presentation by Allen L. Hammond, World Resource Institute, AusAID, 3 March, 2003.
[89] Yasuhiko Kawasumi , n d, 'Connecting Rural Communities Multimedia Services for Rural Areas using Wireless IP Technologies' Presentation for the Digital Opportunity Forum-Asian Diversity and the Role of Japan, Japan Telcom.
[90] Craig Liddell, 2003, 'WiFi Delivers For Developing Countries' *Australia.interent.com*,   May   1, http://australia.internet.com/r/article/jsp/sid/13033

conference at UN Headquarters in New York on June 17, 2003. The conference is seeking to develop strategies necessary to overcome a range of obstacles to deployment of WiFi beyond the pilot stage. These obstacles relate less to the technological capabilities and more to protective regulatory environments and lack of sustainable business models.[91]

However, it is important that the innovative combination of technologies use a scalable, modular design for roll out. Other important design features that need to be present are: simple configuration & operation, accessible user interface, use of equipment that complies with existing standards, use of low frequencies, long life cycle, capacity for remote network management and low power requirements.[92]

Radios, particularly when combined with other forms of ICT, are a cheaper option for providing information than other ICTs (see Box 6).[93] Radios require few skills to operate and can usually provide access to relevant local information in a language readily understood by the poor and isolated. Shortwave access also enables a broader range of information sources to be tapped albeit in a more limited range of languages.

Box 6: Radios using self sufficient energy

Freeplay Radio (FPR2 AM/FM), made in South Africa, is solar powered and does not require batteries radio as it operates through an internal spring driven generator. The radio is designed for community listening as it comes with a 5 watt powered 'silverdome' speaker.

Since the production of Freeplay's first radio product in 1996, over 150,000 Freeplay radios have been brought to communities in at least 40 developing countries. It is estimated that these radios have benefited in excess of 3 million people directly and over 30 million people indirectly, by providing them with a vehicle for information and education despite a lack of electricity and batteries in their communities.

Source: http://www.freeplay.net/newsite/aid/aid.html

Combining information accessed via the Internet with the use of 'old' technologies like community radio can overcome barriers of physical access, affordability, illiteracy, while also appealing to oral-based cultures.[94] For example, an e-mail facility supports a community radio station in the Isobel Province of the Solomon Islands.[95] The use of ICTs to strengthen traditional media such as broadcasting and print has also been highlighted as an important way to disseminate content in the Information Society.[96]

Another important design feature needs to be the use of existing information flows where this

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[91] 'WiFi: universal broadband internet access for the developing world', Press release, 25 March, Boston, http://www.w2i.org/pages/wificonf0603/PressRelease.html

[92] Guidelines for Rural ICTs, Ibid, p 11.

[93] The radio costs A$107.80 inc GST http://www.multipoweredproducts.com.au/category18_1.htm
For a favourable review of utility and robustness of a Freeplay Radio, see http://www.tjtdesign.com/windup.htm
A five power source rechargeable AM/FM radio (solar power, built in rechargeable Ni-Cad battery, 2 back up AA batteries, a hand crank dynamo and AC/DC adaptor) made in China, A$35. Four hours of sunlight fully recharges the Ni-Cad battery.

[94] UNDP Evaluation Office, 2001, 'Information Communications Technology for Development', Essentials: Synthesis of Lessons Learned. No 5, September, p 10.

[95] Personal communication, Edo Stork, UNDP multi country Office, Fiji, 16 May, 2003.

[96] Tokyo Declaration, World Summit on the Information Society (WSIS) Asia-Pacific Regional Conference, 13-15 January, 2003, para 6.

is beneficial. This requires an appreciation of the strength of the national and organisation culture shaping the dynamics of the information flows. Failure to do this can result in limited benefits from the use of ICT. Canadian support to connect 15 agriculture research centres via e-mail in Vietnam had little impact on the Vietnamese researchers because it did not take into account the local focus and hierarchical nature of the organisational setting. Also important was the effect of the wider culture in Vietnam in shaping information transmission.[97]

The sustainable ICT projects, described above, did not use costly special purpose equipment. The IT systems were made up of 'off-the-shelf' components. However, 10 of 12 projects studied have tailored the available software to their own needs or had created local content.

The several key findings about the use of ICT in these cases studies can be highlighted. The first was that the equipment was selected to match the uses required and resources available. This meant that it was important to purchase commercially available equipment in country so that spare parts could be easily sourced and repairs made locally. Also noted as important was a willingness on the part of those running the project to cope with and overcome the technical difficulties common to most ICT related projects.[98]

4. **How?** Does the project design address the issue of scalability?

It is important that the ICT-based project have the capacity to be replicated in other locations or settings so that its success can be extended.[99] This feature requires not only paying attention to the technical specifications of the equipment used, as highlighted in the point above. It also refers to consideration of the capacities and reach of the supporting infrastructure, the availability of technical skills in other locations, and the supporting regulatory framework related to the use of ICT.

The use of wireless networks, for example, may be an innovative way of providing low cost access to a number of people in a particular location. However, its scalability for more widespread adoption may require regulatory changes that support the new mode of communicating on a larger scale.

The Grameen Phone initiative, for example, has been criticised for its poor scalability because of its technology choice (based on international standards but expensive and poorly suited to rural conditions) and its lack of fit with the telecommunications policy environment.[100] A similar initiative undertaken by the TeNet Group in India has been praised for using more adaptable technology and being able to work within national telecommunications policy guidelines. The Indian initiative has chosen a multi-point wireless technology which is more functional for rural areas (with greater transmission range), integrates easily with the national system, and meets regulatory standards.[101]

Another important aspect of scalability is the existence in-country of appropriate forms of technical education or access to low cost external skill sources to supply the skills needed to support an expansion of the pilot facilities. As the Asia Pacific Development Information Programme has pointed out, expansion of a successful pilot project involves more than mere replication on a larger scale.

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[97] Boyle, G; 2002, 'Putting context into ICTs in international development: an institutional networking project in Vietnam' , Journal of International Development Vol 14, pp 101-112

[98] Batchelor S, Norrish P, Scott N, & Webb M, 2003, *Sustainable ICT Case Histories Project: Technical Report.* p 18.

[99] I am indebted to Louise Chamberlain for highlighting for me the importance of this point.

[100] UNDP with Accenture and Markle Foundation, 2001, Creating a Development Dynamic: Final Report of the Digital Opportunity Initiative July, pp 26 7 34.

[101] Ibid.

> *If the unit costs of the pilot projects are scaled up to national proportions, then they immediately become prohibitive. Whilst localised adaptations to the opportunities offered by ICTs are fairly easy to achieve in the intensive atmosphere of pioneering projects, adjustments at national levels require wholesale institutional reform and change management practices that can be expected to encounter entrenched resistance, scepticism and interests that are vested in the status quo.[102]*

5. **How?** Are appropriate intermediaries being used?

The need to use intermediaries is a key finding of most critical assessments of how ICT can be used effectively in development.[103] The UNDP Evaluation Office's synthesis of lessons learned in relation to ICT notes that:

> *Intermediary organizations that have the capacity to use ICTs can serve as important bridges by helping illiterate communities access the benefits of ICTs without having to learn the technologies themselves... Research has shown that the most effective intermediaries are those who are members of, or have direct ties to, the beneficiary community...[104]*

However, a distinction needs to be made between technical and traditional intermediaries. The latter are likely to have some form of monopolistic control over access to information and other resources. Traditional intermediaries often act as 'gatekeepers' in controlling access to information to derive some personal advantage such as a corrupt official seeks a bribe for his advice. On the other hand, technical intermediaries are those who open up multiple sources of access to information.[105] ICT, in setting up multiple access points, breaks down the monopoly of corrupt government officials. However, technical intermediaries are still needed to help the illiterate, or minority language speakers to access the sought-after information.

Removal of the traditional 'gatekeeper' was an outcome in 10 of the 12 sustainable ICT projects, described above. This removal of an intermediary varied from taking information directly to the poor and out of government offices, removing the need to travel long distances to complete and submit a form, or creating alternative outlets to the local middle men marketeers.[106]

For appropriate intermediaries to make the most effective use of ICT in addressing barriers to development, they need to have direct face-to-face contact with those they are seeking to serve and show that they understand well the context in which they are working. The intermediary will also need to be financially viable, have the human capacities needed to perform their role, as well as keep the technology they are using maintained and operational.[107]

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[102] APDIP, 2003, Information and Communication Technologies for Governance and Poverty Alleviation: Scaling up the Successes, http://www.apdip.net/projects/india.asp (accessed 9 May 2003).

[103] Cecchini, S and Scott, C; 2003, 'Can Information and Communications Technology Applications Contribute to Poverty Reduction? Lessons from Rural India' April.

[104] UNDP Evaluation Office, 2001, 'Information Communications Technology for Development', *Essentials: Synthesis of Lessons Learned.* No 5, September, p 11.

[105] Batchelor S, Norrish P, Scott N, Webb M, 2003, p 9.

[106] Ibid, p 9-10.

[107] Heeks, R; Journal of International Development Vol 14, pp

6. How? What scope is there for tri sector public private partnerships?

The UN ICT Task Force, in its report to the Secretary General in May 2001, has emphasised the value of partnerships between governments and the private sector to 'enable real, tangible and sustainable transfer of knowledge and technology, especially ICT, to developing countries.'[108]

> *The private sector has at its disposal the financial strength and technological wherewithal which, if utilised appropriately within the context of a genuine partnership, can make a positive contribution to the development process.[109]*

Public-private partnerships have the potential to enable governments to increase public infrastructure or public services by using fewer of their own resources while maintaining or even improving the quality of the standards offered.[110]   Public-private partnerships are particularly suited to ICT-related development programs because the private sector partner is in a good position to not only provide funding but also to assist with the knowledge and expertise required to operate ICT facilities.

Tri sector partnerships refer to collaboration between a private enterprise, government and a non government organisation (see Box 7). This sort of partnership is particularly valuable in the context of ICT for development because it pools resources and risk and builds on core complementary competencies. The result is a 'added value' outcome over and above the outcome each party could achieve alone.

Tri-sector partnerships involving business, non-governmental organisations and governments) are usually formed through a four-stage process: partnership exploration, partnership building, partnership maintenance, and partnership completion. Often the partnership will be defined by a set of agreements designed to deliver on shared expectations and a joint action program. These agreements, or charters, may vary in their nature from voluntary arrangements to formal contracts between equal parties.[111]

Box 7: Example of a public private partnership in relation to use of ICT in the Asia Pacific

The "e-LEARNING FOR LIFE: The Malaysian Initiative" is a partnership between the Government of Malaysia (Ministry of Education), Coca-Cola Far East Limited, Malaysia Branch ("Coca-Cola Malaysia"), and Asia Pacific Development Information Programme/United Nations Development Programme (APDIP/UNDP).

The central concept of the "e-Learning for Life" (ELFL) initiative is to enable schools to become "hubs" for life-long e-learning, by extending ICT access to their local communities. Students, teachers, and community members will all

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[108] UN ICT Task Force (2001): Report of the Secretary-General: *The role of the United Nations in promoting development, …especially information and communication technologies, …through partnerships with relevant stakeholders, including the private sector*, E/2001/59, 2 May, para. 70, p. 33.

[109] Ibid, p. 33.

[110] The Canadian Council for Public-Private Partnerships, see http://www.pppcouncil.ca/whoweare.htm

[111] Business Partners for Development, 2002, *Putting Partnering to Work: Business Partners for Development 1998– 2001: Tri-sector Partnership Results and Recommendations*, p7. http://www.bpdweb.org//products.htm Business Partners for Development Program was a three-year program initiated in 1998 by the World Bank, the UK Department for International Development, and 118 other international organizations, corporations and NGOs to study, support, and promote examples of tri-sector partnership.

share the ICT facility and infrastructure of the school. It is expected that the latter will pay a nominal user fee as contribution towards the maintenance of the facility. For more information please visit: http://www.elearningforlife.org/

Source: http://www.apdip.net/projects/projects.asp

However, tri sector partnerships will not work in all circumstances. It is important to note the preconditions that need to be present to improve the chances of success.[112] These conditions include first, evidence that the planned activities for delivery through a tri-sector partnership will produce added value outcomes for all partners. This will also require evidence that alternative mechanisms would be less effective than working through a tri-sector partnership model. The partners will need to appreciate that some modification and compromise is necessary to create a sustainable partnership. At least one internal champion will be needed within each of the partner organisations to drive the partnership-building process forward.

7. What? Is the content transmitted by the ICT relevant to the audience and is it in a language easily understood by the target audience?

The availability of content in the local language can be a key barrier to the effective use of ICT for addressing barriers to development. Where there is relevant information in a local language, it can still be too general for village level use.[113] As noted above, local research involving direct engagement with the local population is needed to work out what is relevant information.

Another issue is the widespread presence of illiteracy in many developing countries, both in relation to the written word and the more specific computer illiteracy. Literacy to use computers may not be necessary in some cases if symbols are used to make software more easily navigable. In terms of information flow, it is important to set up the ICT in such as way that two-way communication is possible to ensure that genuine understanding can take place and is demonstrated.[114]

8. **How long?** Is the project self-sustaining over what period?

Sustainability refers to not only financial viability, which may not be a consideration in the case of an aid funded project, but also to continuing organisational, social and political support. The UNDP Evaluation Office's synthesis of lessons learned notes that: 'Over the past decade, very few donor-funded ICT for development initiatives have proven to be self-sustaining once external assistance (financial and material) has run out'.[115] The UNDP report goes on to note that while the reasons for non-sustainability are varied and context-specific, often they can be traced to insufficient consideration of the challenges faced. These relate to the lack of support in the local community from key stakeholders, lack of an appropriate national policy structure, and poor appreciation of the physical, economic and educational barriers to the effective use of ICTs.

> *Overall, sustainability is largely dependent on end-user appropriation*
> *and ownership of ICTD initiatives. This places a premium on*
> *beneficiary and stakeholder participation from the very start of the*

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[112] Business Partners for Development, 2002, *Putting Partnering to Work: Business Partners for Development 1998–2001: Tri-sector Partnership Results and Recommendations, p18.*

[113] Batchelor S, Norrish P, Scott N, Webb M, 2003, p 25.

114 Ibid, p 25.

115 UNDP Evaluation Office, 2001, 'Information Communications Technology for Development', Essentials: Synthesis of Lessons Learned. No 5, September, p 14.

> *project, as well as on-going monitoring and feedback, to ensure that the technologies are both appropriate and being appropriated by the user communities.[116]*

Other barriers to sustainability may stem from overly short timeframes allocated to ICT for development initiatives. It has been noted that project timeframes are often determined by bureaucratic fiat and linked to broader budgetary considerations governing the overall operations of the development actor. However, a time horizon of even a few years may not be sufficient to overcome the myriad challenges involved in many types of ICT for development initiatives.[117]

9. **How well?** What performance measurement, monitoring and evaluation processes are in place?

One of the key factors in the failure of ICT for development projects is the absence of critical feedback loops. As Geoffrey Kirkman notes:

> *Development organizations are not effective nor timely in learning from mistakes and incorporating those lessons into new project design or implementation... there is a real need in the development profession to be able to identify failure and walk away from bad projects....[118]*

Monitoring and evaluation is essential to provide 'an adaptable and iterative learning process that encourages the participation of stakeholders and beneficiaries, as well as organizational learning'.[119] The objective of evaluation should be to 'understand the changes that have occurred in individual or community well-being, to improve on past experience, and to influence decision-making and future policy formulation'.[120] However, it is also important that evaluation results should be effectively disseminated, which often means producing different products for different target audiences.

It is important that the evaluation focus on assessing the extent to which the project's desired outcome or outcomes are being achieved. This may appear to be difficult in the absence of an elaborate evaluation methodology. However, another way is to ask the intended beneficiaries themselves. This should be done in an open ended way to find out what range of intended and unintended benefits or downsides may have resulted. This could be done using a systematic instrument such as a survey or it could be done through a group format such as a workshop or village meeting, using a metric that offered a systematic and replicable form of assessment.[121]

Public release of progress reports and impact evaluation reports are also an essential element of good practice.[122] Unless all the stakeholders are fully informed about progress which includes both reporting on positive news as well as the barriers encountered, the project may lose support abruptly. The People First Network in the Solomon Islands, discussed at length below, is exemplary in the amount of information it makes available on its website about its progress and the problems it is facing.

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[116] Ibid, p 14.

[117] Ibid, p 14.

[118] Kirkman, G, 2003, ibid.

[119] UNDP Evaluation Office, 2001, 'Information Communications Technology for Development', Essentials: Synthesis of Lessons Learned. No 5, September, p 16.

[120] Ibid

[121] I am indebted to David Leeming for suggesting this point.

[122] I am indebted to Edo Stork, UNDP Multi Country Office, Fiji for highlighting this point to me.

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A model evaluation

The World Bank Institute's *ICT for Education Program* commissioned an independent consultancy to evaluate the impact of its *AIDSWEB online* project in Africa after its first three years of implementation. The evaluation examined: 1) the goals and activities of AIDSWEB; 2) structure; 3) overall resources; 4) collaborative relationships; 5) impact on participants; and 6) implications for future design.

The evaluation methodology was designed to provide insight into the contributions of AIDSWEB at the lowest cost. Components of the evaluation included: developing evaluation questions; reviewing documents; developing an approach to identifying a control group of schools; designing and administering a survey for students and teachers in intervention (participant) and control (non-participant) schools, and analyzing data; interviewing a limited number of AIDSWEB collaborators; interviewing AIDSWEB staff and consultants; and synthesizing the results and preparing an evaluation report. Data was collected from Botswana, Ghana, South Africa, Uganda, and Zimbabwe.

The evaluation results showed, among other things, that the knowledge gain was significant. AIDSWEB students through their supervised access to the Internet and AIDSWEB information were almost twice as likely to identify correctly all four methods of AIDS prevention and transmission. The evaluation concluded that …'the design of AIDSWEB enabled it to reach young minds and hearts, to support commitment educators, and to strengthen community and peer support to fight HIV/AIDS'.

Source: ENCOMPASS, 2002, *Evaluation Report of World Bank's ICT for Education AIDSWEB Project* .Submitted to The World Bank Institute, November 23.

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10. **What Risks?** Managing risk

Delivering an aid program is an inherently risky venture, as the AusAID guide states. [123] Delivering an aid program with an ICT component may compound the risk. This could be due, among other things, to the technical difficulties that are an inherent feature of ICT in its current state of development and the more limited access to advice on how to resolve these difficulties. The AusGUIDE notes that many development activities underachieve because of unrealistic expectations concerning the counterpart agencies' contributions. This may apply particularly to ICT related projects because of the widespread hype about the new technology's potential.

The key questions for a donor in identifying and managing risk are: 'What unexpected events or situations might arise?' and 'What should be done to manage these?'[124] Therefore, the risks involved at each of the five stages of the activity cycle of a project need to be identified and managed (see Figure 2). This is 'to enable more reliable planning, greater certainty about financial and management outcomes, and improved decision-making'.[125]

It is important to identify the risks from the point of view of all the stakeholders involved and

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[123] AusGUIDE, 2001, *Activity Cycle Overview.* AusAID, p 20.
[124] Ibid.
[125] Ibid.

not merely the donors. Therefore the risks for the recipient Government, the community targeted for the program and the service deliverers or other intermediaries also need to be ascertained. In relation to the targeted poor, for example, is this project likely to exacerbate local inequalities in terms of socio economic groups or gender or increase tension between ethnic or religious groups?[126]

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[126] I am grateful to Louise Chamberlain for suggesting this point.

Figure 2: Main stages of the AusAID Activity cycle
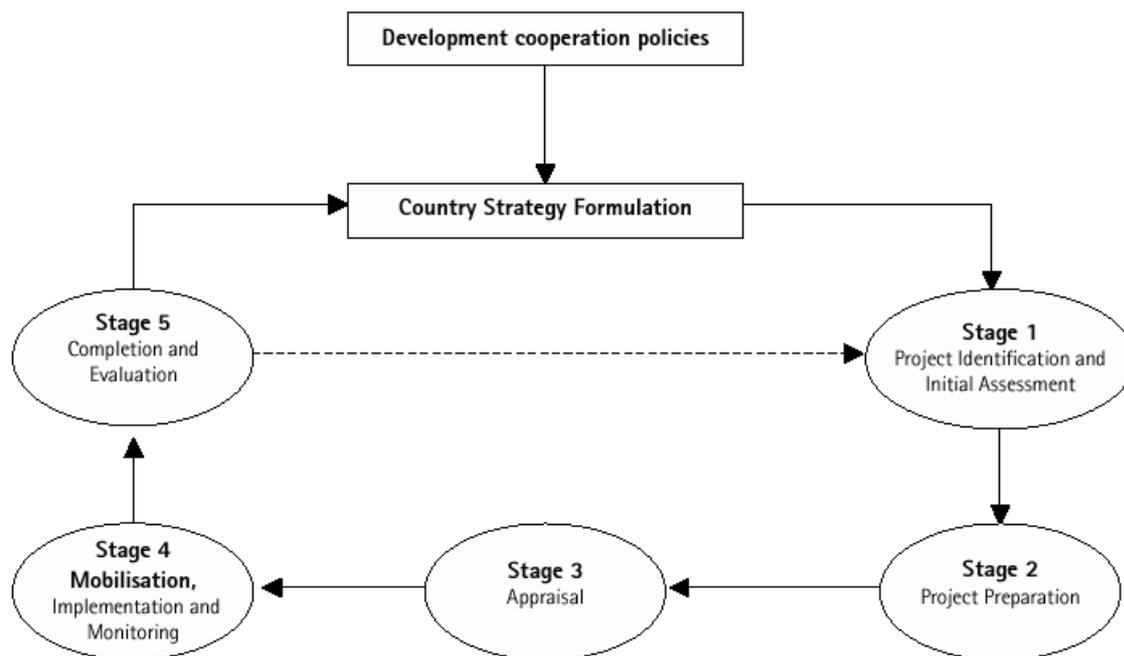
Source: AusGUIDE, 2001, *Activity Cycle Overview.* AusAID, p 1.

Application of the checklist to examples of best practice[127]

The following section applies the checklist presented above to an assessment of 100 best practice ICT projects. The information on ICT backed projects was derived from various sources. A third of the list came from the shortlist of 100 finalists for the Stockholm Challenge. The aim of the Stockholm Challenge is to identify and reward innovative use of IT within areas such as citizen empowerment, education, health care, economic development and environment. Other sources of information were: International Institute for Communication and Development (IICD), Digital Partners;[128] World Resources Institute's Digital Dividend Knowledge Bank and Project Clearinghouse;[129] the Information for Development Program, Infodev[130] and, in relation to Indonesia and Malaysia, the Foundation

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[127] The following section has benefited greatly from an open e-mail-based exchange for the Technical Adviser to People First Network project, David Leeming. David's response to the issues raised by the application of the checklist to the People First Network project are spelt out in his paper: 'Success Factors of The Solomon Islands People First Network', Presentation to Annual General meeting of the Global Knowledge Partnership 21 to 23 May 2003, Rome.

[128] A goal of Digital Partners' 'Applying Digital Technology for Poverty Alleviation' strategy is to spawn initiatives that are most capable of triggering changes in market forces so that they address the needs of the have-nots. http://www.digitalpartners.org/ideas_model_init.html

[129] The Knowledge Bank is a 'collection of materials that explore promising business models using ICT to deliver critical tools and services to underserved populations in developing countries, make the case for investment in such 'digital dividend' activity, and discuss sustainable ICT-for-development in general' - http://www.digitaldividend.org/knwldge_bank/knwldge_bank.htm . The Digital Dividend Clearinghouse is ' online platform tracking social enterprises that use ICTs to deliver critical tools and services to underserved communities in developing countries. Its twin goals are 1) to serve as a knowledgebase for those interested in developing sustainable business models to bridge the global digital divide, and b) to facilitate networking among those stakeholders'.http://wriws1.digitaldividend.org/wri/app/index.jsp

[130] InfoDev is a 'global grant program managed by the World Bank to promote innovative projects on the use of ICTs for economic and social development, with a special emphasis on the needs of the poor in developing countries'. As of June 30, 2002, infoDev's portfolio of supported ICT projects since 1995 comprised 249 projects $86.5 million, of which infoDev funded $26.9 million. http://www.infodev.org/

for Development Cooperation's report: *Digital dividend or digital divide? A world of difference*.[131] It is important to acknowledge that the information on most projects is limited. Few projects have references to evaluations which can offer a more self critical perspective.

The ICT projects from the Asia Pacific region were given first choice. However, there are also projects from sub-Saharan Africa, Latin America, and the Caribbean. The projects have been classified according to the eight main priority areas of AusAID – education, governance, law and justice, agriculture and rural development, health, infrastructure, environment and humanitarian and emergency aid. Projects are also classified by the type of activity undertaken and the ICT strategy used.

An analysis of the 100 projects shows that only two projects meet the first nine good practice criteria. This indicates that compliance with the checklist in its entirety will be demanding for most current ICT projects. Some 30 projects have poverty reduction as their direct objective such as seeking to achieve a specific millennium development goal. A fifth of the sample or 20 projects have both a poverty reduction objective such as a millennium development goal and an identifiable target group among the poor. The existence of only a minority of projects directed to poverty reduction suggests that there is considerable scope for most ICT projects to adopt a more explicit poverty alleviation focus.

Consistent with their best practice status, nearly two thirds of the projects listed (66) appear to meet the third criterion of appropriate ICT deployment in terms of cost, support, maintenance and compatibility with existing information flows. Some 63 of the projects appear to be in a form that is scalable to enable them to be replicated and expanded beyond their pilot status.

In relation to the use of appropriate intermediaries, the evidence was more extensive, with 76 projects scoring positively. Some 35 projects are involved in public private partnerships, defined as a partnership with a private company or international development agency. Use of relevant content and language applied to 88 of the projects listed. Some 48 projects appeared to have evidence that they could be self sustaining.

However, only 23 projects provided information which showed that they had performance measures and evaluation processes in place. The existence of a risk management strategy was hard to assess as there is not enough information about the project's planning documentation. In cases where the project has an international funding agency as a partner, it was assumed that a risk management strategy would have been developed – this applied to 9 of the projects. In relation to the first two good practice criteria, the projects with a poverty reduction focus in terms of objective and target group include the use of smart cards to provide more effective ways to deliver credit to poor women.

Also in this category is an interactive website for young people in sub Saharan Africa to encourage discussion of issues related to reproductive health. Other projects are an education portal focused on improving basic education, and training in IT for street kids. The use of simple but appropriate information technology to facilitate timely collection of milk and record keeping to generate, higher earnings for the Indian rural milk producers.

The poverty reduction objectives of other projects include: provision of mobile phones to urban women in India enable them to network to better market their products, an e-mail service to support a solar electrification project in the Himalayas, access to better information

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[131] Kemp, M; Mathison, S; & Prasetyo, J; 2002, *Digital dividend or digital divide? A world of difference*. July, p45-46, Foundation for Development Cooperation, Brisbane.

for poor farmers, use of a Mobile Interactive Geographical Information System and participative techniques to plot land use patterns, a web site to improve the accessibility to information about human rights and civic information in Zimbabwe, a digital broadcast initiative for women on HIV/Aids, interactive radio in Nigeria to conduct peer education on HIV/Aids, and the use of ICT and music to help unemployed young people develop job skills.

Some 36 of the projects related to education, 13 related to governance, three to law and justice, 9 to agriculture and rural development, 14 to health, 5 to infrastructure, 3 to the environment, and 2 to emergency assistance. Other categories are culture, urban business, NGO support and community development.

The checklist applied to People First Network of the Solomon Islands

The information is drawn from several documents provided on the People First Network's web site and from personal communication with David Leeming, the project's Technical Advisor.[132]   The first project examined has a high level of relevance to AusAID as it is servicing a dispersed rural population in a small Pacific Island country (see Box 8).

Box 8: As assessment of the People First Network - The Solomon Islands' Rural E-Mail Network For Peace and Development			
People First Network (PFnet) is an ICT project comprising a rural e-mail network aimed at promoting and facilitating equitable and sustainable rural development and peace building. PFnet has established a rural community e-mail network and instigated partnerships to utilise the network for developmental activities such as education, health, finance and agriculture, and good governance. The project has three components - Internet Café in Honiara for communication and training; web site with substantial information resources and news; and a network of e-mail stations located in remote islands across the country. The stations are usually hosted in provincial clinics, community schools, or other accessible and secure public facilities. E-mail operators assist customer to send and receive e-mails at a nominal cost.			
1	Why?	ICT project aimed clearly at the achievement of a specific development goal?	The project's three objectives are: facilitate point-to-point communications to/from the remote provinces of the Solomon Islands; facilitate rural development and peace-related information flows among all social groups; & facilitate the exchange of information between communities and development programmes, NGOs, government offices, the media, businesses and other stakeholders.

Five development focused initiatives are being piloted in relation to distance education, farmer's technical and marketing advice centre, indigenous business development service, a rural fisheries |

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[132] Fortier, F, 2003, 'Sustainable rural networking community ownership and appropriate technologies', Paper Presented to the International Workshop on Models of Poverty Alleviation through ICT: Challenge and Prospective of Bridging Digital Divide in China's Rural Areas, 15-19 January; David Leeming, Randall Biliki, Alan Agassi, and Francois Fortier, 2003, People First Network The Solomon Islands' Rural E-Mail Network For Peace And Development, paper prepared for Technical Advisors meeting at the World Summit on the Information Society Regional Meeting in Tokyo, January 5 and David Leeming, & Randall Biliki, 2002, Mid Project Substantive Report. December, Pacific WSIS Consultations – PFnet Discussion Paper, all available on People First Network web site - www.peoplefirst.net.sb ; and David Leeming, 2003, personal communication, 30 April.

			project, support for rural vocational teachers college and a human rights awareness and education program.
2	Who?	Is there a clearly specified target group for poverty alleviation?	The Solomon Islands is a low-income country with 80 per cent of the population dispersed rural locations. Attention has been given to improving opportunities for women. To participate.
3	How?	Is the form of ICT to be deployed appropriate re cost, maintenance support, and compatible with existing info flows?	The rural links in the network use a simple, robust and well-proven technology, consisting of a short-wave radio, a low-end computer, and solar energy. Continuing in country technical support may be difficult to find.
4	How?	Is the form of ICT to be deployed scalable to enable it to be replicated and expanded	The technical design of the project is based on a scalable modular structure which makes it easy to expand the number of stations when and if funding is available. However, the absence of a national regulatory framework is one possible constraint on its wider adoption.
5	How?	Appropriate intermediaries	NGO Rural Development Volunteers Association (RDVA).
6	How?	What scope is there for public private partnerships?	Possibilities for partnerships identified but yet to be mobilised.
7	What?	Is the content relevant and in a language easily understood by the target audience?	Grass roots news between communities, emergency communications, procurement, consultations related to health, linkage to early warning systems, reporting system for damage and casualties in relation to cyclones & other natural disasters, information to support traditional farming, human rights and constitutional reform education, & preparation of development profiles for electorates and provinces are the major outputs.
8	How long?	Is the project self-sustaining over what period?	Difficulties in the short term are due to lack of scale and cost of initial expert assistance to support basic operations. Aim is to have Internet Café and rural stations self supporting through their own revenue for daily operations, with subsidised technical support and long term equipment replacement. At present, dependent on high cost technical support. Donor funding required for explicit development related activities.
9	How well?	What performance measurement, monitoring and evaluation processes?	Substantial progress reports available with detailed statistics on outputs. An initial evaluation of the impact has been conducted.
10	What risks?	'What unexpected events or situations might arise?' and	Core operations only sustainable after scaling up; unavailability of finance for scaling up; lack of national ICT strategy; need for more coordination

| | | 'What should be done to manage these?'[133] | on ICT; local conditions (law and order, rights awareness, high cost of IT), lack of IT capacity, lack of credit for rural enterprises; uncertain legal situation for Internet publication |

As noted above, the People First Network of the Solomon Islands offers a well documented case of the use of ICT to support development. The network operates through three components: an Internet Café in Honiara for communication and training; web site with substantial information resources and news; and a network of e-mail stations located in remote islands across the country.

The initial focus was on improving communication between Honiara and rural communities and the wider world. A later emphasis has been on linking the communication network to more explicit development objectives. These have included distance learning in partnership with the University of the South Pacific Centre, a farmer's technical and marketing advice centre, supporting communications related to a government-run business development service, communication support for a rural teacher training college, human rights awareness and good governance education related to participation in democratic processes and e-commerce support for a rural fisheries project.

However, it is suggested that more explicit links to the achievement of specific development objectives, such as those suggested by the millennium development indicators, would help show better the value of the project to all stakeholders. This focus needs to be backed by specific performance measures related to the development objectives rather than mere input and outputs measures related to communication flows.

In terms of Point 3 on the checklist, the network's ICT technology is highly appropriate in terms of cost, operator support and existing information flows. It is based on a closed network using data transmission over HF short wave radios and a hub connected to the Internet. The rural stations in the network consist of a mid range HF short wave radio with broadband antenna, a Pactor HF modem, reconditioned Pentium 1 or early Pentium 2 Toshiba laptops with replaceable hard drives and keyboards, a bubble-jet printer and a 80W solar power supply. This configuration of technologies is low cost, reliable and easy to use for people who are already familiar with operating two-way radios. Training for operators who can already type only takes a week. Extra technical support is provided by voice radio calls when required, followed up by regular training workshops.

The long term local sourcing of technical assistance to operate the hub may be a problem. The cost of providing overseas sourced technical support is a major cost impost on the project. Recruitment and training of a locally sourced technical manager is planned. However, the scarcity of local IT skills may make it difficult to retain skilled staff in the face of higher pay offers.

Scalability is good as the communication network has the potential to expand with the availability of additional funding. However, the value of a network increases as it expands – the absence of a communication link across the nine provinces of the country is an impediment to its wider use. A survey of villages at one rural station found that 64 percent of respondents had someone in the family who used the e-mail station. Thirty eight percent of the random sample stated that they use the e-mail station themselves. However, 61 per cent of those interviewed said that they have no need to use the e-mail as they had 'no-one to

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[133] Ibid.

contact'.[134] This suggests that communication flows outside a small network are likely to happen if there is a reason for communicating further afield. These reasons are likely to be provided by development related activities.

The project has identified a number of risks that need to be managed. In addition to the need for network scaling up, referred to above, other issues are the operating uncertainty produced by the lack of national ICT strategy which means whole-of-government support; the need for more coordination between donors on ICT; the impact of local conditions (law and order, rights awareness, high cost of IT), the lack of IT capacity, the lack of credit facilities for rural enterprises; and an uncertain legal situation for Internet publication.[135]

There is also greater scope for linking the fledgling communication network with more explicit development goals through larger scale initiatives such as access to micro credit, information on agriculture, transfer of health information and adult learning opportunities. The survey of a random sample of villagers at one rural station found that the most common main purpose for using e-mail was for family communication, nearly half stating this as their main reason. A quarter of the e-mail users gave education as their main reason. However, only 9 per cent identified business and only 6 per cent gave health as their main purpose for using e-mail.

The education related purposes are also narrow in focus: to arrange the payment of school fees and for teachers to contact the Ministry of Education. The Distance Learning students use it to communicate with tutors and sending assignments. The business purposes are related to village storeowners ordering stock from suppliers. Health reasons for using e-mail are to do with ordering medical supplies and contacting the Ministry of Health.

The proposed checklist has helped in relation to the People First Network of the Solomon Islands to highlight several features which are good practice and some gaps in current practice. The fit for purpose nature of the technology is obviously an exemplary feature. The form of ICT deployed in terms of cost, scale, support, and compatibility with existing information flows is certainly appropriate. The use of intermediaries and the participative processes used to set up the rural stations are also good practice. The emphasis on performance measurement, monitoring and evaluation is also a strong feature of the project's operations.

However, sustainability in the short term has not yet been achieved. The Internet Café in Honiara, although a steady income earner, cannot generate sufficient income to be self sustaining. This is due at least in art to the high cost of overseas sourced technical support. Donor funding is required and this has been uncertain.

The other issues the checklist highlights are the lack of strong links between the communication facility and development projects. The project management recognise that the main benefit has been affordable and efficient communication with indirect benefits related to more explicit development gaols.[136] A number of efforts have been made to link the communication benefit to development projects. These links will no doubt increase and deepen as the network expands. A network and donor support 'tipping point' has yet to be

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[134] Ibid, p12.
[135] Ibid, p19.   Page: 47
[0]The ICT Strategy Workshop of key stakeholders in February 2003 identified and prioritised objectives in relation to the formation of a national ICT strategy and a Working Group has been formed. See
E Stork, D Leeming & Rl Biliki, 2003, 'Solomon Islands ICT Strategy Workshop Report', The Electronic Journal on Information Systems in Developing Countries Vol 12, Paper 5, www.ejisdc.org
[136] Ibid, p 18.

reached. This tipping point will be reached when government and donors will see it as essential to use the network to support a range of development activities. The other approach to viewing the role of ICT in development is to start from the perspective of mainstream development projects. What role, if any, should ICT have in a mainstream development project?

Part V: A role for ICT in mainstream development projects

> *...information technology will ultimately be integrated into the mainstream of overseas development aid ...today every G-7 and European Union government is reconsidering its aid strategy and they are all very receptive to increasing the use of technology not as a replacement for traditional aid but as a vital and complementary tool.*[137]

Influential bodies such as the G8's Digital Opportunities Task Force have called for 'ICT-enabled development' and urged the international development community to mainstream ICTs into their bilateral and multilateral assistance programs.[138] 'Mainstreaming' is defined as using ICT in 'project planning and design and, even more importantly, within development strategies, both nationally and internationally'. Mainstreaming ICT into development and linking ICT to the achievement of the millennium development goals are also emerging as an important themes in the forthcoming World Summit for Information Society.[139]

This is not to claim that mainstreaming ICTs into development projects means using ICT in each and every case or using ICT in an inappropriate way is required. It simply means not overlooking the ICT-related opportunities to increase a program's effectiveness.[140]

Why the need to mainstream ICT for development?

There are at least three important justifications for mainstreaming ICT into development projects. These are to do ICT's potential to quicken the pace for achieving the millennium development goal targets, and ICT's capacity to improve aid effectiveness through better coordination and the capacity to extend a project's reach.

Urgency to achieve millennium development goals

Poverty alleviation as a development focus has an increased urgency since the UN General Assembly's commitment in September 2000 to achieving the millennium development goals by 2015. The new focus has highlighted the plight of the poorest countries such as those in sub-Saharan Africa and the Asia Pacific region. The urgency stems from the raised expectations this commitment has created.

The millennium development goal targets for 2015 are still regarded as achievable with additional resources and focus. According to the World Bank's chief economist, Nicholas Stern, confirm this on the release of the 2002 edition of the World Bank's Development Indicators. He claimed that global poverty can still be cut in half by 2015 if rich countries lower trade barriers and boost foreign aid, and poor countries invest more in the health and education of their citizens.[141]

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[137] Denis Gilhooly, 2002, Director of information technology aid projects at the UN Development Program, International Herald Tribune, April 12, p. 16.

[138] Digital Opportunities Taskforce, 2002, *Human Capacity and Knowledge*. June

[139] Information and Communication For All Explanatory Note submitted by the President of the WSIS Preparatory Committee, 30 January 2003.

[140] Gerster R. and Zimmermann, S, 2003, Information and communication technologies for poverty reduction? Discussion paper for the Swiss Agency for Development and Cooperation (SDC), Berne, March, p 22.

[141] 'Global Poverty Goals Within Reach, if Action Taken on Trade, Aid' World Bank Weekly Web Update - April 14, 2003

The greater capacity to achieve the millennium development goals 'more quickly by harnessing the full potential of information and communication technologies' is a key reason offered by the President of the Preparatory Committee of World Summit on the Information Society (WSIS). Mainstreaming ICT into development is suggested for the areas of ICT-enhanced learning (including e-learning); E-Health; E-Government; E-business; ICTs for disaster recovery; and for other areas such as agriculture, population growth and the natural environment.[142]

ICT has been one of the key factors associated with the growth in productivity in the OECD countries during the last decade. Two other prominent factors have been improvements in labour utilisation and t (the employment rate of the working age population and the average number of hours worked) and the quality of human capital.[143] The key role of ICT in improving productivity in high income countries makes it an obvious tool to deploy to improve the efficiency and effectiveness of international development efforts.

ICT offers considerable potential gains in good governance in relation to transparency and accountability. These ICT supported improvements can be achieved in relation to internal fiscal responsibilities, government procurement, government's role as registrar, regulator and protector of the environment as well as improved education and health service delivery to the poor.[144]

ICT and improved aid effectiveness

The causes of poverty are more complex than simply than the absence of a decent livelihood. This means that projects aimed at reducing poverty need to be open to cross sectoral links so that more than one aspect of poverty can be addressed. Efforts to reduce child malnutrition may also need to establish links with a micro credit project for women to enable them to feed themselves and their children with an adequate diet. The same ICT facility has the potential to not only assist healthcare workers in their work in monitoring and helping mothers. It could also be used to track repayment records for a micro credit scheme for the same mothers.

Recent focus on aid harmonisation and effectiveness has highlighted the importance of more co-ordination between stakeholders: donors, governments and agencies delivering the funded goods or services.[145] This requires working collaboratively, undertaking joint tasks, and combining skills and resources. ICT has a valuable role to play in making donor procedures more transparent, reducing the excessive demands on government officials' time, reducing delays in disbursements and reporting on performance.

Use of appropriate ICT offers development projects the potential for better coordination with other poverty reduction initiatives through cross sectoral links. These links can be achieved through the more systematic recording of information and more frequent, better documented communication, two key benefits offered by ICT. However, also required, among other things, is a greater emphasis on policy coherence on the part of recipient governments and

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[142] 'Information and Communication for All' Explanatory Note submitted by the President of the WSIS Preparatory Committee, 30 January, 2003.
30 January 2003
[143] Bassanini, A & Scarpetta, S; 2002, 'Growth, technological change and ICT diffusion: recent evidence from OECD countries', *Oxford Review of Economic Policy*, Vol 18, No 3; pp324-344.
[144] Daniel H. Rosen, 2002, New Directions in US Foreign Assistance and the Role of Information and Communication Technology. *A Markle Foundation Policy Brief*, November, pp 10-17.
[145] OECD, 2001, *Rising to the Global Challenge: Partnership for Reducing World Poverty.* Policy Statement by the DAC High Level Meeting, Paris, 25 - 26 April; para 7

donors.

Capacity of ICT to extend reach

One of the effects of underdevelopment is a lack of awareness among the poor of opportunities beyond their immediate experience. This stems from a lack of access to a wider network of contacts and opportunities which is now widely recognised in terms of a lack of social capital.[146] However, these contacts and links to opportunities outside their immediate community need to be offered to the poor in a structured rather than in a passive way. In other words, more provision of access to better communication facilities may not be sufficient to provide access to opportunities. Development-focused communications may be more beneficial.

The third potential benefit, therefore, from mainstreaming ICT into a development project is to extend a project's reach. The use of community or grassroots radio is one example of how this might be done. The increased reach benefit of the use of ICT is also related to its capacity to promote cultural and linguistic diversity through local content and media development. Related to this is the potential to assist with the use and preservation of traditional and indigenous knowledge.[147]

Box 9: Community radio linked to development objectives in Timor-Leste

Community radio was an explicit component of the Community Empowerment and Local Governance (CEP) Project in Timor-Leste. The project included the setting up of eight new community radio stations with broadcasting equipment, tape recorders and training for nearly 50 volunteer reporters, managers and technicians. The CEP project also helped to establish eight media-culture boards, known as Kliburs, to oversee their community radio stations and sponsor cultural events, including poetry contests and dance festivals. The radio stations have also played a valuable role in promoting transparency and local governance.

Source: World Bank, 2003, 'Giving A Voice To The Voiceless' DevNews Media Centre, 6 May. www.worldbank.org

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In summary, ICT can be a valuable tool to implement more effectively a more multifaceted approach to poverty reduction. Mainstreaming ICT into development is the opposite of the stand alone approach highlighted above. This perspective on ICT views it as a tool that may or may not be useful, depending on the circumstances. It is the opposite of the view of critics of ICT in development who see it as having no role for it at all.

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[146] '*Local-level organizations (those operating strictly within a community) are very beneficial to the welfare of the households in the community, but their effectiveness is necessarily limited. Bebbington and Carroll's study showed the value of second-level organizations, which act as an umbrella for organizations at the community level and allow them to combine forces in obtaining resources and engaging in a dialogue with the next level of government. More important, their study shows that outside intervention can stimulate this type of organization and in doing so bestow benefits on communities and their members':* Christiaan Grootaert and Thierry van Bastelaer, 2001,'Understanding and Measuring Social Capital: A Synthesis of Findings and Recommendations from the Social Capital Initiative', Center for Institutional Reform and the Informal Sector, University of Maryland, Working Paper No 250, p 48.

[147] 'Information And Communication For All' Explanatory Note submitted by the President of the WSIS Preparatory Committee, 30 January, 2003

Need for different approach

However, mainstreaming ICT for development requires a different approach to that of implementing an ICT-based project in a developing country. The latter projects often require considerable technical expertise to overcome the barriers that innovative use of new technologies usually involves. Integrating ICT into development calls for a different skill set. It requires of project designers and development practitioners a strong strategic focus and management skills to work out how best to combine different elements of what can be a complex jigsaw. An innovative management approach is more important than a simple application of technology.

In broad terms, linking ICT to a development project in an integrated way involves clarifying the development objectives the project is addressing, and working out what the best point of intervention is. The next step is to identify the information and communication requirements needed to meet the project's development objectives. Only then is it appropriate to identify the appropriate types of ICT and other technologies that might be used to meet these information and communication requirements.[148]

Suggested steps to mainstream ICT for Development

The purpose of the following list of eleven steps is to 'unpack' what it means to integrate ICT into development projects (see Box 10). Poverty reduction is chosen as a focus to illustrate the proposed steps for two reasons. The first is that poverty reduction is likely to be the objective of many mainstream development projects. Second, a focus on poverty reduction highlights the need for information and communication technologies not to be considered as ends in themselves but as a means to an end.

	Box 10: Suggested steps on how to mainstream ICT into development projects	
	Key step	Example or comment
1	Define Project objective: In terms of poverty reduction, what aspect of poverty does the project address? In more specific terms, how does this project relate to the millennium development goals (MDGs)? What specific indicator related to a particular MDG does it address?	Examples of specific MDG indicators are: to reduce poverty and hunger through promoting rural development/agriculture, improve gender equality and empower women through better access to education,
2	Who are the poor to be targeted by this program? To what extent is it possible to identify the poor in terms of rural/urban location, region, gender, age, education attainment & health status?	In countries with a low average income per head, broad target groups could be defined using only two dimensions may be sufficient eg rural women, rural subsistence farmers.
3	What are the likely causes, as distinct from the effects, of the aspect of poverty the program is focusing on? Is it possible to rate the likely causes in order of importance? Is poor communication a cause of this aspect of	Disentangling cause and effect may be difficult in many instances, but it is critical if poverty reduction is to be effectively addressed.[149]

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[148] Heeks, R; 2002, p 7.
[149] J. Dirck Stryker, 2000, Common Diagnostic Framework For Poverty Reduction Associates for International Resources and Development (AIRD) August 29, p5

	poverty?	
4	What types of interventions are most likely to be effective in breaking the causal linkages? Need to distinguish between direct, indirect and supporting interventions.	Direct interventions are aimed at the targeted population, indirect interventions may focus on the use of intermediaries, and supporting interventions may refer to the enabling policy environment.

5	What are the information and communication needs of the targeted poor in relation to the project's objectives and how important are they to the success of the project?	How important to the success of the project is the meeting of the information and communication needs of the targeted poor? Is the importance crucial, valuable but not essential or peripheral?
6	What role can ICT and other media play in delivering the information and providing channels of two-way communication?	Is this role a direct, indirect or supporting one to meeting the information and communication needs of the targeted poor?
7	Is there an appropriate form of ICT which can be deployed in terms of cost, support, maintenance and compatibility with existing information flows?	This may require working out a combination of ICT which includes a final link which is low cost such as a community radio outlet and radios using renewable energy sources. It also refers to use of locally available equipment and skills.
8	Does an enabling environment exist for the ICT to provide the proposed support?	This refers to not only the regulatory framework. It also refers to government practice such as a whole-of-government strategy to improve service delivery
9	What measures can be devised to assess progress towards the poverty reduction objective?	
10	Is there a methodology in place to assess how effective the proposed intervention is in achieving the operational objectives of the program	
11	Managing risk 'What unexpected events or situations might arise?' and 'What should be done to manage these?'[150]	
Source: Steps 1-4 derived from J. Dirck Stryker, 2000, **Common Diagnostic Framework for Poverty Reduction.** Associates for International Resources and Development (AIRD) August 29, p 3.		

Step 1: Define Project objective

In terms of poverty reduction, what aspect of poverty does the project seek to address? As noted above, poverty is now understood as a multi dimensional phenomenon as reflected in the Millennium Development Goals. The indicators associated with each MDG can be used as a reference point as a further aid to identify a specific focus for poverty reduction. There are 48 of these indicators in total.

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[150] Ibid.

Step 2: Who are the poor to be targeted by this program?

Is it possible to identify the poor in terms of rural/urban location, region, gender, age, main source of livelihood, education attainment & health status? This profiling, however, depends on the availability of comprehensive data sources such as census data, large sample representative sample survey or good quality administrative data at the local level. It may be sufficient, however, in countries with a low average income per head, to identify broad target groups by using only two dimensions.[151]   In low-income countries, examples of the two dimensions are: location and gender such as rural women or region and source of livelihood such as rural subsistence farmers.

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[151] J. Dirck Stryker, 2000, p5.

Step 3: What are the causes of the aspect of poverty being addressed?

Identifying the likely causes of the particular type of poverty under scrutiny is essential to work out the best point of intervention. A focus on possible causes helps to ensure that the project is not merely alleviating the symptoms of poverty. For example, looking for the causes of hunger may require going beyond the rather obvious such as poor nutrition to look for more fundamental causes such as a lack of access to productive land or other critical aspects. [152] This process of assigning an order of importance to the likely causes may be difficult but it holds the promise of achieving a more permanent impact.

Step 4: What types of interventions are most likely to be effective?

Given an appreciation of the complexity of the causal linkages, what sort of intervention is required? This refers to distinguishing between direct, indirect and supporting interventions. A direct intervention refers to addressing a prominent underlying cause of poverty. For example, providing access to other income generating opportunities in the above case where hunger is caused by lack of access to a sustainable livelihood.

Indirect interventions seek to establish an environment or set up an intermediary to make the directly targeted interventions more effective.[153] Examples of indirect interventions include financing public health facilities, establishing a sound policy and regulatory framework for credit facilities, and undertaking agricultural research appropriate for small farmers.

Supporting interventions may not provide any direct linkages with the target population but may nevertheless benefit them and help to achieve the operational objectives.[154] Such would be the case, for example, with policy reform which is a supporting intervention designed to make government service delivery more accountable and transparent.

Step 5: What are the information and communication needs of the poor?

What are the information and communication needs of the targeted poor in relation to the project's objectives and how important are these needs to the success of the project? Importance needs to be assessed in terms of whether meeting the poor's needs are in relation to the success of the project are:

crucial,
valuable but not essential or
peripheral?

The answers to this question will help decide whether it is worth considering a role for information and communication technologies in the project.

Step 6: What role can ICT and other media play in meeting these needs?

Given the priority for meeting the information and communications needs identified in Step 5, what role is there for ICT as the vehicle for delivering the required information and providing channels of two way communication? Is this role a direct, indirect or supporting role for ICT in meeting the information and communication needs of the targeted poor? Assessment of cost effectiveness is an important focus for this step in the assessment process.

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[152] Ibid, p 5.
[153] Ibid, p 5.
[154] Ibid, p 5.

Step 7: Is there an appropriate form of ICT which can be deployed?

Is there a form of ICT in terms of cost, support, maintenance and compatible with existing information flows which can be used? A number of issues need to be considered here. There may be a need to work out how to combine several information and communication technologies to deliver the desired cost effective outcome. For example, it may be important to have a final link which is low cost such as a community radio outlet and radios using renewable energy sources. Other important considerations include the potential for use of locally available equipment to replace parts easily and provide maintenance support.

Compatibility with existing information flows refers to the cultural and/or organisational context that is likely to shape how the targeted poor communicate traditionally. As noted above, in relation to the use of e-mail in agricultural research stations in Vietnam, simply providing the technical means to communicate better did not lead to better communication between or within the research facilities.

Step 8: Does an enabling environment exist for the ICT to provide the proposed support?

This refers to not only the regulatory framework. It also refers to government practice such as a whole-of-government strategy to improve service delivery. The sorts of issues that may be important are national telecom policy and revised telecom legislation, infrastructure such as electrical power sources, local training in ICT literacy, changes to education and health delivery to make use of ICT.

One method for working out the gaps in the enabling environment is to bring together a group of stakeholders and use a methodology to identify the issues or problems and what needs to be done to change the situation. A workshop of interested parties in the Solomon Islands to identify key issues related to the development of ICT came up with 54 issues or barriers.[155] These issues were arranged into a 'problem' tree to show cause and effect relationships agreed by all participants in the workshop. This problem tree was then turned into an 'objective tree' by the workshop participants to identify the priorities for ICT development. This objective tree was then formulated into clusters of interrelated objectives, from which project ideas were suggested and recommendations made.

The workshop the key issues or barriers to the development of an ICT strategy as: absence of national policy, lack of affordable Access, need for networking and awareness, better access to equipment and more education and training. The three most basic problem clusters identified were: affordable access, networking/awareness, and equipment/access.

Step 9: What measures can be devised to assess progress towards the poverty reduction objective or objectives of the project?

Examples of possible measures are the indicators for the Millennium Development Goals. It is important that they report on outcomes in some way rather than merely inputs and outputs.

Step 10: Is there a methodology in place to assess how effective the proposed intervention is in achieving the operational objectives of the program.
An evaluation strategy needs to be in place to not only provide interim feedback on how well the project is meeting its objectives. The value of a long term perspective is highlighted by the 2015 targets of the Millennium Development Goals. This long term perspective suggests

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[155] E. Stork, D. Leeming & R. Biliki, 2003, 'Solomon Islands ICT Strategy Workshop Report', The Electronic Journal on Information Systems in Developing Countries Vol 12, Paper 5, www.ejisdc.org

there will be a major emphasis in the future on good information about what is working and what is not in relation to attaining the poverty reduction targets.

Step 11: 'What unexpected events or situations might arise?' and 'What should be done to manage these?'

As highlighted above in relation to the checklist for the ICT-based projects, identifying potential risks and development appropriate strategies for managing the identified risks is also an essential part of project design. As noted above, as well, it is important to identify the risks from the point of view of all the stakeholders involved and not merely the donors. Therefore, in addition to the donor, the risks for the recipient Government, the community targeted for the program and the service deliverers or other intermediaries also need to be ascertained.

Conclusion

The paper has offered a critical review of the role of information and communication technologies in development. The intention of the author has been to offer a more balanced or realistic view as a counter to the often overly optimistic view of many of the proponents of ICT for development. This has required giving some emphasis to the barriers that exist to the widespread use of ICT in many countries as well as to reporting the shortcomings of current projects.

Nevertheless, it is important to note that the critical or realistic view should not be taken as a negative view of the potential of ICT in development. It is common for new technologies to go through an initial period of widely varying views about its potential, followed by a period of more balanced assessments of what it can or cannot do.

Technological cycles

It has been recently suggested that new technologies, from steam and the railways to electricity and steel, have gone through two broad stages.[156] The first has been called the 'installation period' which is one of exploration, experimentation and exuberance about the potential of the new technology. The second stage has been called the 'deployment period'. The emphasis in this period is on bedding down the new technology into everyday processes: 'the emphasis is no longer on the raw technology but on how to make it easy to use, reliable and secure'.

The crucial time in this cycle is the turning point from the pilot stage to the diffusion of the new technology into all aspects of the production process including service delivery. The turning point requires major institutional change in terms of not only the regulatory framework, for example. It is also requires change in the way that existing institutions involved in the production of goods or delivery of services go about their business. The skills required are less the technical ones associated with finetuning a new technology and more those which are to do with implementation through coordination and collaboration.

The initial focus in relation to ICT for development has been largely on the technology itself, demonstrating what variations might work in what types of settings. The second stage will focus on the application of the technology to addressing more directly the development outcomes that need to be addressed. The shift is from the technology itself to how it is

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[156] Perez, Carlota, 2002, *Technological revolutions and Financial Capital: the Dynamics of Bubbles and Golden Ages.* Edward Elgar, UK, cited in Siegele, L; 2003, 'Paradise lost: a survey of the IT Industry', *The Economist,* 10-16 May, p 3-4.

applied. However, this shift is not an automatic one. It requires a good deal of attention to devising new, appropriate new institutional arrangements.

Facilitating the turning point

An EC meta-evaluation of European donor agencies' use of ICT in development has noted that the ICT-dimension of programs in governance, poverty etc, was often subject to the discretion of individual desk-officers.[157] This meant that incorporating ICT into mainstream programs was reliant on the individual desk officer's own understanding of the potential of ICT (or lack thereof). This piecemeal approach has led to a highly variable result, restricting opportunities to make good use of ICT in development. The overall effect was a disjointed approach to ICTD by the development organization overall because individual desk officers were unaware of each others' experiences in the use of ICT.

In any new set of institutional arrangements, champions can play a key role in smoothing the introduction of new ways of working. As the analysis of the key features of the 100 best practice projects showed, ICT champions or intermediaries are found in most ICT-based projects. Their role is to help to adapt the new technology to the development context and to help others to learn the new processes. There is obviously scope for ICT champions to pay the same role within donor agencies.[158]

Another way to diffuse new perspectives in an organisational setting is to set up a 'community of practice.' This can be done through face-to-face meetings (such as 'brown bag' lunchtime seminars, for example). However, the obvious way to keep up regular contact is through an electronic discussion list. This can be used to share knowledge, experiences, and ideas amongst development practitioners and others.[159] The discussion list could be kept internal to the donor organisation or it could also be broaden to include practitioners in the field or researchers working on the same issues. Pestnet is a successful e-mail network focused on development issues, involving significant numbers of participants from developing countries spread over vast geographical distances (see Box 11).

Box 11: Community of practice based on e-mail

E-mail-based networks on development issues have been used successfully in the Pacific and Africa. PestNet which provides advice on pest control for the tropics is a good example. It is operated by volunteers from Fiji and has 400 members, more than one-third of whom live in 40 tropical countries. There is an average of 40 postings per month. See their new, AusAID partly funded, web site - www.pestnet.org

The challenge for those promoting ICT in development is to seek out and highlight the lessons of the initial pilot or 'installation' stage as the best way to achieve a turning point for progress to a more synergistic and mature 'deployment' stage. Regular, focused communication needs to be at the centre of any strategy to achieve this turning point.

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[157] UNDP Evaluation Office, 2001, 'Information Communications Technology for Development', Essentials: Synthesis of Lessons Learned. No 5, September, Footnote 18.
[158] Ibid, p 18.
[159] UNDP, 2001, ibid, p18.

Attachment 1 Current level of access to ICT in the Asia Pacific region

Data on six ICT indicators for sixteen low and middle-income countries in the Asia Pacific region and in South Africa are presented in Table A1 in the Attachment to this paper. The indicators refer to five electronic means of communicating and one non-electronic form (newspapers although many are also on the Internet). A summary table, with the sixteen countries grouped according to three World Bank defined income levels, is presented below (see Table 1).

Table A1: Indicators of ICT and newspaper penetration for selected countries in the Asia Pacific and South Africa grouped by per capita income levels, 1998, 2000 or 2001

	Average income per head of population	Communication media penetration				
		Daily news papers	Radios	TV	Personal computers	Internet
World Bank Income designation*	GNI per capita $US 2001	Per 1,000 people 1998	Per 1,000 people 2000	Sets per 1,000 people 2000	Per 1,000 people 2000	Internet users per 100 inhabitants 2001
Low-income (9 countries)	416.7	22.3	103.7	65.8	4.5	0.9
Lower middle (6 countries)	1,628.3	51.8	256.2	191.8	25.7	2.7
Upper middle (1 country)	3,640.0	158.0	420.0	168.0	103.1	27.3
Source: World Bank Development Indicators 2002						

* The World Bank groups countries by four income groups: 'low-income' (US$ 755 or less per person per year), 'lower middle income' (US$ 756- US$ 2,995), 'upper middle income' (US$ 2,996- US$ 9,265) and 'high income' (US$ 9,266 or more).

Per capita income and access to communication media

In broad terms, country per capita income groupings of low, lower middle and upper middle income help to explain the differences in access to communications.   The low-income countries (Bangladesh, Cambodia, India, Indonesia, Laos, Nepal, Pakistan, Papua New Guinea and Viet Nam) have, per head of population, notably lower numbers of newspapers, radios, TV, personal computers, and Internet users than wealthier countries. The ratio of low cost media outlets in the form of newspapers and radios in low-income countries is just under half that of the next income group of countries. The gap between countries grouped by per capita is wider in relation to ownership of TVs and Internet users. In relation to personal computers, the gap between countries grouped by income level is the latest of all (nearly six times less).[160]

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[160] It is worth noting that the number of Internet users refers to a larger number than the number of subscribers to Internet services. In Indonesia, for example, 2001 data show that there are 4 m Internet users but only 600,000 Internet subscribers (a ratio of 6.7 users per Internet connection). The much larger number of users than subscribers suggests the wide spread use of community-based facilities for accessing the Internet. It also helps to

The strong association, shown in Table 1, between the per capita income of a country and its citizens' access to information and communication technologies is confirmed by correlation analysis for the sixteen countries. There is a strong association between per capita income and access to information technologies. The strongest correlations are between per capita income and personal computers and Internet users.[161] In other words, the higher a country's per head level of income, the larger the number of PCs in that country and the bigger the Internet usage.

Also significant but not as strong an association is evident between per capita income and the number of newspapers and radios per head of population in a country. However, in relation to TV set ownership, the association with the per capita income of a country is much less stronger.[162] In other words, while a country's income per head is a general guide to the extent of the adoption and use of information and communications technologies, this is less so in relation to TV ownership. This suggests that more of the population in low-income countries are willing to spend their scarce resources to purchase a TV set.

In terms of what forms of ICT are popular in the Asia Pacific region, radios are the clear winner as the most widespread form of communication. However, TV is not far behind in terms of its spread and is expanding rapidly, somewhat independently of income levels. Radio is a low cost communications technology many in low-income countries can afford. It also appears that where electricity is available, the purchase of a TV is not beyond the means of people on low-incomes. TV is obviously regarded by many in low-income countries as a means of communication that is worth the expense.

> *Some forms of ICT (e.g. community radio, community television) can play a significant role in preserving and providing access to cultural resources. They can promote the traditions and heritage of ethnic and marginalised groups and help to keep their language, indigenous knowledge and way of life and livelihood alive and active.[163]*

However, it is important to note that per capita income alone does not determine the number of communication outlets. India, Bangladesh and Pakistan are well served in terms of the number of newspapers per 1000 persons despite their low per capita income (See Table A1). On the other hand, Cambodia, Vietnam, Laos and Papua New Guinea have far fewer newspapers than their per capita income level would suggest.

In relation to the other low cost form of communication, radios, the populations of Laos, India and China appear to have more access to radios than their per capita income level would suggest. On the other hand, Nepal, Bangladesh and Papua New Guinea have lower numbers of radios per head of population that could be inferred from their income levels. This might suggest that other barriers are important in explaining their lower take up in these countries.

As noted above, access to personal computers and the Internet are closely tied to per capita income. Malaysia, the highest income country in the group of countries under examination

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explain the lower number of personal computers per head of population in the low-income countries. Greater reliance on community facilities means fewer computers are needed. However, the smaller number of computers per head of population may also be a result of lack of capacity to operate a larger number.

[161] The correlation coefficients are: 0.96 and 0.95 respectively.

[162] The correlation coefficients are: 0.76, 0.85 and 0.44 respectively.

[163] Ahmed Swapan Mahmud, 2002, 'Crisis and need: information and communication technology in development initiatives runs through a paradox', Voices for Interactive Choice and Empowerment (VOICE), Dhaka, Bangladesh, Document WSIS/PC-2/CONTR/17-E, World Summit on the Information Society, p 3.

stands out with nearly twice as many computers per head of population as the next country in the ranking South Africa. Similarly, Malaysia, with 27 per cent of its population using the Internet in 2001, is far ahead (by a factor of 4) of next largest Internet user, Thailand. Internet use in all the other countries only applies to a small proportion of the population.

How do countries in the Asia Pacific region fare in terms of access to telephony? Only four countries, Fiji, Thailand, South Africa, and Malaysia have more than 200 telephone subscribers per 1000 population (see Table A2). Seven countries have less than 50 telephone subscribers per 1000 population: Bangladesh, Nepal, Solomon Islands, Cambodia, Pakistan, Vanuatu and India. The poor in isolated rural areas in these countries lack access to telephones, as the land lines or reception antennae are concentrated in major urban areas.

Per capita income and a country's access to ICT

The finding noted above that income per head of population largely determines the type and extent of engagement with information and communications technologies is borne out by more sophisticated analysis based on a larger group of countries. The Networked ICT Readiness Index is based on a rating of 82 countries, 9 of which are low and middle-income Asia Pacific countries. The Readiness Index measures each country's degree of preparation and capacity to participate in and benefit from ICT development.[164] The association between GDP per capita and the Readiness Index is evident, as the graph below illustrates (See Figure 1).

However, the relationship between a country's GDP and its readiness to participate and benefit from ICT is not a simple one. There is a range of countries along the trend curve that are either over-performers or under-performers. Thus India, for its per capita income level, is an over performer while Greece for its income level is an underperformer.

An important feature of the graph from the perspective of this paper is the effect of low per capita income levels on ICT capacity and usage. The lower the per capita income level of a country, the lower the country's networked readiness rating. The graph shows that a country's readiness score increases notably with small increases in a country's per capita income until it tapers off at around US$9,000 per head of population. This suggests that with increases in income per head of population for low-income countries, the capacity to use ICT will improve.

In terms of low and middle-income countries in Asia Pacific and South Africa, Malaysia rates at the top of the list on the Networked Readiness Index but is only 32 in the ranking of 82 countries (see Table 2). South Africa ranks 36th, India 37th (due largely to its large number of IT personnel), Thailand at 41, China 43, Sri Lanka 54, Philippines 62, Indonesia 64, Vietnam 71 and Bangladesh, sixth from the bottom, ahead of Bolivia, Nicaragua, Zimbabwe, Honduras with Haiti ranked last (see Table A2).[165]

What is missing from Table 2 and the Networked Readiness Index, due to lack of data, are the Island countries of the South Pacific: Fiji, Kiribati, Papua New Guinea, Samoa, Solomon

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[164] The Networked Readiness Index is defined as 'the degree of preparation of a nation or community to participate in and benefit from ICT developments'. The Index is a composite of three components: the environment for ICT, offered by a given country or community; the readiness of the community's key stakeholders (individuals, businesses, and governments) to use ICT; and the usage of ICT amongst these stakeholders (Soumitra Dutta and Amit Jain, 2003, 'The Networked Readiness of Nations', p10 in S Dutta, B Lanvin, & F. Paua, 2003, *The Global Information Technology Report 2002–2003*. World Economic Forum, Oxford University Press, New York.

[165] Australia, by the way, ranks 15th with a score of 5.04.

Islands, Vanuatu and Tonga; as well as other small countries in Asia: Cambodia, East Timor, Laos, Nepal, Pakistan, and Vietnam. However, other data recent information on Internet usage for seven Pacific Island countries are available (see Table A3). These data show that the number of Internet users per head of population is similar to the other low and lower middle income countries in the wider Asia Pacific region (see Table 1 and Table A6).

Figure A1: GDP per Capita versus Network Readiness Index, 2002-2003.
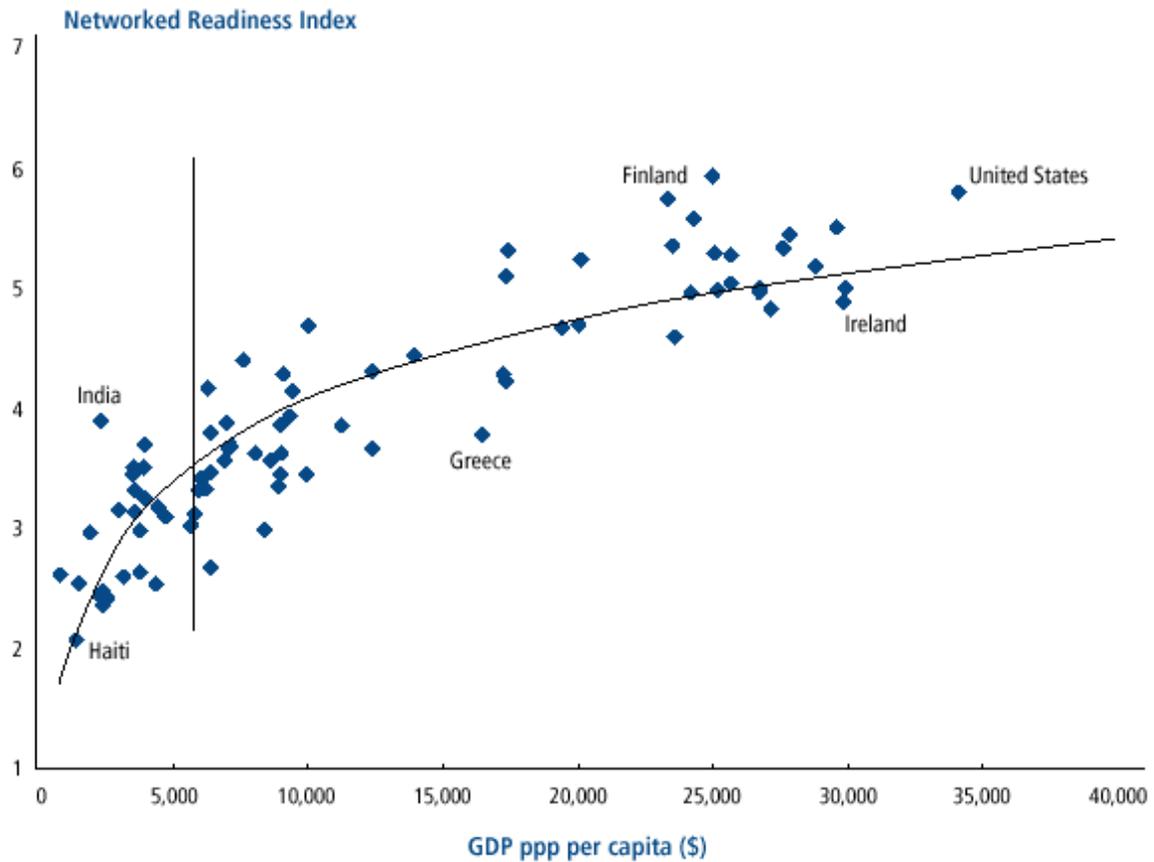
Source: Technology Management Department, INSEAD

Table A2: Networked Readiness Rating and Ranking of Selected Asia Pacific countries and South Africa, 2002-2003.

Country	Score	NRI Rank
Malaysia	4.28	32
South Africa	3.94	36
India	3.89	37
Thailand	3.80	41
China	3.70	43
Sri Lanka	3.45	54
Philippines	3.25	62
Indonesia	3.16	64
Vietnam	2.96	71
Bangladesh	2.53	77
Source: Derived from Dutta & Jain 2003, Table 3, p 11.		

Table A3: Access to the Internet and per capita income for Pacific Island countries, 2001.

	Income grouping	Per capita GNI US$	Number of ISPs	Internet users (000s)	Per 100 inhabitants
Fiji	Lower middle	2130	2	15,000	1.8
Tonga	Lower middle	1530	1	3,000	2.8
Samoa	Lower middle	1520	3	3,000	1.7
Vanuatu	Lower middle	1050	1	6,000	2.7
Kiribati	Lower middle	830	1	2,000	2.3
Solomon Islands	Low-income	580	1	2,000	0.5
Papua New Guinea	Low-income	580	6	50,000	0.9
Source: Asia-Pacific Internet economy (2001), International Telecommunications Union, December 2002. http://www.itu.int/itunews/issue/2002/10/indicators.html					

Per capita income barrier to ICT take up

The important finding from the above analysis is that a country's per capita income level is likely to be a good guide to its capacity to adopt advanced forms of ICT. Governments in low-income countries and many in middle income countries are still faced with difficult choices between directing funding to ICT-related objectives on one hand, and responding to urgent, basic needs including food, health, and education on the other hand.[166] These countries are also likely to lack the regulatory and competition policy frameworks that provide the

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[166] Lanvin, B, 2003, 'Leaders and facilitators: the new roles of governments in digital economies', Chapter 5, p 78 in S. Dutta, B. Lanvin, & F. Paua, 2003, *The Global Information Technology Report 2002–2003*. World Economic Forum, Oxford University Press, New York. Bruno Lanvin is manager of the Information for Development Program (infoDev) at the World Bank.

necessary incentives to diffuse ICT beyond the major centres.[167]

Low-income per head is also associated with other barriers to the use of advanced forms of ICT. These include high adult illiteracy rates, high proportion of a country's population in rural areas and sparsely distributed population. The unweighted averages on these variables for 15 countries from the Asia Pacific are presented in Table A4.

Adult illiteracy is a major barrier to the diffusion of advanced ICT in Nepal, Pakistan, Bangladesh, India, Papua New Guinea and Cambodia (see Table A8). Only three countries have significant concentrations of their populations in urban areas: Fiji, Malaysia and the Philippines and so are likely to have less difficulty using ICT to reach the poor.

A sparsely distributed population, independently of income level, is also another barrier to the diffusion of ICT. The prospect of fewer potential customers means it is more difficult to justify the costly investment in infrastructure. Papua New Guinea, Solomon Islands, Vanuatu, Fiji and Cambodia with low population densities are likely to face particular economic disincentives to investment in the extension of ICT beyond existing facilities.

Table A4: Barriers to ICT diffusion: female and male illiteracy rates, rural population and overall population density, 15 countries in the Asia Pacific region, unweighted average, 2001

	Female adult illiteracy rate Per 100	Male adult illiteracy rate Per 100	Rural population Per 100	Population density per sq km
Selected countries of AusAID focus	31.8	18.9	70.3	187.75

Source: World Banks Development Indicators, 2002

Is access to advanced ICT worth it for low-income countries?

These constraints, in terms of low per capita income, high levels of adult illiteracy, large rural and sparsely distributed populations, suggest that the cost of providing advanced ICT is a major issue for low and middle income countries. This is the conclusion of a recent rigorous analysis of available cost and related data by a World Bank infrastructure economist Charles Kenny:

> _The nature of extreme poverty in LDCs –very low-incomes, subsistence and unskilled wage labor as the dominant income source, food as the dominant consumption good, low education and high illiteracy, minority language group status and rural location—points to an unsustainably high cost and relatively low benefit of direct Internet service provision through telecentres to the very poor. This might suggest that the push for universal Internet access as a tool for poverty relief is misplaced.[168]_

This is not to claim that access to ICT is a luxury for the poor. ICT in the form of the Internet is a powerful technology that will have a long-term impact on the quality of life in developing

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[167] Ibid, p 78. However, a country's per capita income level is not entirely predictive of readiness to adopt advanced forms of ICT. Some countries within their own income grouping stand out in terms of the ICT readiness and adoption. Estonia, China, and Tunisia stand out among the low, lower middle and upper middle-income cluster. Among countries with GDP per capita between US$7,000 and US$18,000, Korea and Israel are the leaders.

[168] Kenny, C; 2002, 'Information and communications technologies for direct poverty alleviation: costs and benefits', _Development Policy Review_ Vol 20 (2) p 142.

countries.[169] The challenge for those in development is to tap the potential of the new technologies or combinations of the old and the new to work out more cost effective ways that ICT can be used.

A simple measure of a country's likely suitability for ICT investment in terms of 'demand intensity' has been developed.[170] This measure is based on a country's gross domestic product divided by a country's land area. In other words, the measure highlights, as a guide to investors, whether there are 'thick' or 'thin' markets for ICT services. The following table ranks countries in the Asia Pacific region in terms of their likely 'demand intensity' for ICT services based around the telephone (see Table A5).

This measure of demand intensity suggests that countries with a combination of low per capita and large land areas with dispersed populations will be less likely to attract private investment to rural populations to extend telephony. The countries in this situation are: Papua New Guinea, Laos, Solomon Islands, Vanuatu, Cambodia, Nepal, Kiribati, Pakistan and Indonesia. This means that if ICT is to be expanded, public monies will need to be spent. This in turn raises the issue of competing uses for scarce public resources.

At the other end of the scale, due to either high population density or high income, the following countries are likely to be more attractive for private investment in telephony and other forms of advanced ICT: Bangladesh, Malaysia, Sri Lanka, Philippines, Thailand, Tonga, India and China. These differences in per capita income and population density for land area suggest that in the absence of private investment, governments in developing countries face different choices. These relate to allocating often extremely limited resources among many important alternative priorities. Will better roads produce more effective development outcomes than better access to telecommunications? Or is a basic level of both needed for significant development to occur?[171] The above analysis has shown that the need for information about the relative cost effectiveness of different ICT options is crucial.

Table A5: Relative capacity of a country to support telephony: selected countries, Gross Domestic Product (GDP) divided by the country's land area in square kilometres (km^2)

	Average GDP per km^2 US$		Average GDP per km^2 US$
		Bangladesh	323,972
Papua New Guinea	6,391	Fiji	92,022
Lao PDR	7,224	South Africa	92,771
Solomon Islands	9,135	Vietnam	99,105
Vanuatu	17,459	China	120,756
Cambodia	18,696	India	145,286
Nepal	37,585	Tonga	177,500
Kiribati	57,143	Thailand	223,704
Pakistan	74,881	Philippines	238,127
Indonesia	76,276	Sri Lanka	247,667

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[169] Kenny, C; 2002, 'The internet and economic growth in least developed countries: a case of managing expectations?' *WIDER Discussion Paper No. 2002/75*, World Institute for Development Economics Research, United Nations University, Helsinki, p 13.
[170] Kenny, C; 2002, Table 2, p146.
[171] Eggleston, K, 2002, p 72.

Samoa	91,071	Malaysia	265,273

Table A6: Indicators of ICT and newspaper penetration for selected countries in the Asia Pacific and South Africa, countries in order of per capita income, 1998, 2000 or 2001

Country	Income group		Daily newspapers	Radios	TV	Cable TV	Personal computers		Internet users	
	WB group	GNI per capita $US 2001	Per 1,000 people 1998	Per 1,000 people 2000	Sets per 1,000 people 2000	Subscribers per 1,000 people 2000	Per 1,000 people 2000	Installed in education Total 2000	Users 2001	Internet users per 1000 inhabitants 2001
Malaysia	UM	3,640	158	420	168		103.1	100,706	6,500,000	273
South Africa	LM	2,900	32	338	127		61.8	317,298	3,068,000	
Fiji	LM	2,130							15,000	18
Thailand	LM	1,970	64	235	284	2.5	24.3	225,832	3,536,000	58
Philippines	LM	1,050	82	161	144	13.1	19.3	66,336	2,000,000	26
China	LM	890	..	339	293	61.1	15.9	1,539,843	33,700,000	26
Sri Lanka	LM	830	29	208	111	0.3	7.1		150,000	8
Indonesia	Low	680	23	157	149	0.2	9.9	46,483	4,000,000	19
Papua New Guinea	Low	580	14	86	17				50,000	9
India	Low	460	48	121	78	38.5	4.5	161,014	7,000,000	7
Pakistan	Low	420	30	105	131	0.1	4.2		500,000	3
Viet Nam	Low	410	4	109	185		8.8	21,027	1,010,000	1.2
Bangladesh	Low	370	53	49	7		1.5		250,000	2
Lao PDR	Low	310	4	148	10		2.6		10,000	2
Cambodia	Low	270	2	119	8		1.1		10,000	1
Nepal	Low	250		39	7	2.9	3		60,000	3

Source: World Bank, 2002,World Development Indicators 2002 (Indicators 1-7) and ITU Asia Pacific ITU Telecommunication Indicators Update International Internet bandwidth In Asia-Pacific, December 2002 (Indicators 8-9)

Table A7: Millennium Development Goal Indicator: Telephone lines and mobile phone subscribers per 1000 population, in rank order, 2001

Country	Telephone lines and cellular phone subscribers (ITU estimates) per 1000 - 2001
Bangladesh	7.8
Nepal	13.4
Solomon Islands	19.3
Cambodia	20.9
Pakistan	29.7
Vanuatu	35.3
India	39.2
Vietnam	54.1
Indonesia	62.0
Samoa	76.0
Sri Lanka	78.8
Philippines	177.5
Fiji	202.1
Thailand	220.8
South Africa	327.6
Malaysia	498.7

Source: UN Statistics – Millennium Development Goals - http://millenniumindicators.un.org

Table A8: Barriers to ICT diffusion: female and male illiteracy rates, rural population and overall population density, 15 countries in the Asia Pacific region, unweighted average, 2001

Country	Female adult illiteracy rate	Male adult illiteracy rate	Rural population	Population density
Bangladesh	69.8	47.1	74.4	1007
Cambodia	41.8	20.0	82.6	68
Fiji	8.8	4.8	49.8	44
India	53.7	31.0	72.1	342
Indonesia	17.3	7.8	58.0	116
Malaysia	15.9	8.3	41.9	71
Nepal	74.8	39.4	87.8	161
Pakistan	71.2	41.8	66.6	179
Philippines	4.7	4.4	40.7	253
Solomon Islands	*	*	79.8	16
Sri Lanka	10.7	5.5	76.9	300
Thailand	5.9	2.7	80.0	119
Vanuatu	*	*	77.9	16
Vietnam	8.3	4.4	75.5	241
Papua New Guinea	42.3	28.9	82.4	11

Source: World Bank, 2003, World Bank Development Indicators 2002 - http://www.worldbank.org/data/

Attachment 2: Sources of information on ICT for Development

The World Bank's Development Gateway, an 'interactive portal for information and knowledge sharing on sustainable development and poverty reduction', initially set up by the World Bank, has 'ICT and Development' as one of its 32 topics. The 'ICT and Development' topic has, as of end March 2003, some 3885 resources available on its web site.[172] Other important sources of information on innovative ICT projects in particular are:

World Resources Institute's Digital Dividend Knowledge Bank and Project Clearinghouse;[173]

Information for Development Program, Infodev, also a source of funding for innovative projects;[174]

United Nations Information and Communications Technology (ICT) Task Force;[175]

United Nations Development Program (UNDP) practice area on ICT for Development;[176]

Stockholm Challenge; [177]

Digital Partners;[178]

iConnect; [179]

Global Knowledge for Development Discussion List; [180]

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[172] Resource Categories: Data and Statistics (223), Documents and Reports (1595), Events and Discussion Forums (376), Get Involved (75), How to / Tools (244), Organizations, Networks, People (1388), Programs and Projects (767), and Publications and Multimedia (486). http://www.developmentgateway.org/node/133831/

[173] The Knowledge Bank is a 'collection of materials that explore promising business models using ICT to deliver critical tools and services to underserved populations in developing countries, make the case for investment in such 'digital dividend' activity, and discuss sustainable ICT-for-development in general' - http://www.digitaldividend.org/knwldge_bank/knwldge_bank.htm . The Digital Dividend Clearinghouse is ' online platform tracking social enterprises that use ICTs to deliver critical tools and services to underserved communities in developing countries. Its twin goals are 1) to serve as a knowledgebase for those interested in developing sustainable business models to bridge the global digital divide, and b) to facilitate networking among those stakeholders'.http://wriws1.digitaldividend.org/wri/app/index.jsp

[174] InfoDev is a 'global grant program managed by the World Bank to promote innovative projects on the use of information and communication technologies (ICTs) for economic and social development, with a special emphasis on the needs of the poor in developing countries'. As of June 30, 2002, infoDev's portfolio of supported ICT projects since 1995 comprised 249 projects $86.5 million, of which infoDev funded $26.9 million. http://www.infodev.org/

[175] http://www.unicttaskforce.org/

[176] http://www.sdnp.undp.org/it4dev/

[177] Nearly 600 ICT projects with a social or cultural objective from 78 countries entered the 5th Stockholm Challenge in October, 2002 - http://www.challenge.stockholm.se/about_index.html

[178] A goal of Digital Partners' 'Applying Digital Technology for Poverty Alleviation' strategy is to spawn initiatives that are most capable of triggering changes in market forces so that they address the needs of the have-nots. Therefore, the aim is not to move quickly to embrace any project, but to go through a process of looking before leaping. Our aim is to find the specific initiatives that will trigger further public and private resources and, ultimately, will influence market forces so that the needs of the have-nots will be fulfilled without further intervention. Part of the challenge is to build on the best of what organizations from various sectors are already doing to close the Digital Divide. http://www.digitalpartners.org/ideas_model_init.html

[179] iConnect is a database about ways in which ICTs contribute to sustainable development - http://www.iconnect-online.org

[180] The Global Knowledge for Development List (GKD) http://www.edc.org/GLG/gkd/invitation.html was established to facilitate broad discussion of the role and impacts of knowledge, including ICTs for sustainable development. With over 2,500 members from over 100 countries, GKD offers a major forum for the exchange of

Open economies Discussion List;[181]

Bytes For All;[182]

The International Institute for Communication and Development (IICD);[183] and

The Digital Opportunity Task Force (DOT Force) of the G8 countries, now defunct;[184]

Other sources of information related to ICT and development worth noting are The Global Digital Divide Initiative of the World Economic Forum;[185] and regional initiatives as listed on the website of the International Telecommunication Union.[186]

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experience and knowledge. GKD examines a range of themes related to the use of ICTs for development: policies, strategies, tools, and partnerships to improve access to and use of information resources by the poor in rural and urban areas alike, case studies, best practices, and other examples of activities …success stories of efforts, including public-private partnerships, to build 'knowledge for development' capacity in developing countries [and] research findings related to ICTs and development.

[181] Open Economies is 'an open discussion list on bridging the global digital divide and bringing digital opportunities to all' hosted by the Berkman Center for Internet & Society at the Harvard law School http://cyber.law.harvard.edu/openeconomies/opendiscussion.html

[182] Bytes for All maintains a web site (www.bytesforall.org), a monthly electronic-magazine or ezine (bytesforall@goacom.com) and two popular e-mail based mailing lists bytesforall@yahoogroups.com and bytesforall_readers@yahoogroups.com

[183] The International Institute for Communication and Development (IICD) assists developing countries to realise locally owned sustainable development by harnessing the potential of information and communication technologies (ICTs) http://www.iicd.nl/about/

[184] http://www.dotforce.org/about/

[185] http://www.weforum.org/

[186] http://www.itu.int/osg/spu/ni/ipdc/links/ict_initiatives_links.html