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UNDP-APDIP ICT4D Series

ICT Policy Formulation and e-Strategy Development

A Comprehensive Guidebook

Richard Labelle

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Asia-Pacific Development
Information Programme

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Foreword

Information and Communication Technologies (ICTs) are now widely accepted by developing countries as a critical tool in their efforts to eradicate poverty, enhance human development, and achieve Millennium Development Goals (MDGs). Recognizing this untapped potential, infrastructure initiatives and development strategies incorporating ICT are being increasingly promoted and launched across the Asia-Pacific.

While the potential advantages of ICT for Development (ICT4D) are enormous, national policies are yet to adequately reflect truly comprehensive and integrated strategies for harnessing and exploiting this potential. Much mention has been made of a growing digital divide between countries. However, just as technology and knowledge gaps need to be bridged between countries, the increasing information and technology gap within countries also requires critical attention. There is, perhaps, a directly attributable link between growing inequality within nations and the intra-national digital and information divide.

This Guidebook, part of the ICT4D series produced by the United Nations Development Programme (UNDP) through its Asia-Pacific Development Information Programme (APDIP), is designed to provide policy-makers the necessary tools, information and knowledge to facilitate the formulation and adoption of ICT policies and strategies. Through the examination of vital sectors and case study analysis of applied policies and strategies implemented in the Asia-Pacific region, this publication provides tangible examples and lessons for policy-makers and practitioners involved in the field.

The debate on ICT has permanently shifted from 'why' ICT for Development, to 'how' comprehensive and holistic ICT policies can unleash human potential and enhance people's capabilities to improve their lives. Sound ICT policies that are truly pro-poor must be an indispensable part of national development strategies.

We hope this Guidebook and the entire series will positively contribute to assisting policy-makers in moving forward on this agenda.

Hafiz Pasha
UN Assistant Secretary-General
UNDP Assistant Administrator
Director, Regional Bureau for Asia and the Pacific

List of Abbreviations

A2P2	-	Advocacy + Advice and Pilot + Partnership
ABT	-	Agreement on Basic Telecommunications
ADSL	-	Asymmetric Digital Subscriber Line
AIDS	-	Acute Immune Deficiency Syndrome
APIA	-	Asia-Pacific Internet Association
APDIP	-	Asia-Pacific Development Information Programme
APNIC	-	Asia-Pacific Network Information Centre
ASEAN	-	Association of Southeast Asian Nations
ASYCUDA	-	Automated SYstem for CUstoms DAta
B2B	-	Business to Business
B2C	-	Business to Customer
BAC	-	Business Advisory Centre
BI	-	Business Incubator
BPCA	-	Bluefield Peoples' Community Association
CANARIE	-	Canadian Network for the Advancement of Research, Industry and Education
CDMA	-	Code Division Multiple Access
CGIAR	-	Consultative Group for International Agriculture Research
CID	-	Center for International Development, Harvard University
CSO	-	Civil Society Organization
DOI	-	Digital Opportunity Initiative
ECDC	-	e-Commerce for Developing Countries
EDI	-	Electronic Data Interchange
EFT	-	Electronic Funds Transfer
EU	-	European Union
FAO	-	Food and Agriculture Organization
FDI	-	Foreign Direct Investment
FEWS	-	Famine Early Warning System
FEWS-Net	-	Famine Early Warning System Network
FLAG	-	Fibre-optic Link Around the Globe
FSU	-	Former Soviet Union
GATS	-	General Agreement on Trade in Services
GDP	-	Gross Domestic Product
GIS	-	Geographical Information System
GNP	-	Gross National Product
GOL	-	Government On-Line
GRI	-	Government-supported Research Institutes
GSM	-	Global System for Mobile Communications
HDI	-	Human Development Index
HDR	-	Human Development Report
HRDC	-	Human Resources Development Canada
ICANN	-	Internet Corporation for Assigned Names and Numbers
ICT	-	Information and Communications Technology
ICT4D	-	ICT for Development
ICSU	-	International Council of Scientific Unions
IDA	-	Info-Communications Development Authority, Singapore
IDS	-	Institute of Development Studies, University of Sussex
IFI	-	International Financial Institution
IM	-	Instant Messaging
IP	-	Internet Protocol
IPR	-	Intellectual Property Rights
IRMT	-	International Records Management Trust
IT	-	Information Technology

ITU	-	International Telecommunication Union
LAN	-	Local Area Network
LDC	-	Least Developed Country
MAN	-	Metropolitan Area Network
MCSE	-	Microsoft Certified Systems Engineer
MDGs	-	Millennium Development Goals
MIMOS	-	Malaysian Institute of Microelectron Systems
MSC	-	Multimedia Super Corridor
NGO	-	Non-Government Organization
NHDR	-	National Human Development Report
NSF	-	National Science Foundation
OECD	-	Organisation for Economic Cooperation and Development
OOPP	-	Object Oriented Project Planning methodology
PC	-	Personal Computers
PDA	-	Personal Digital Assistant
PFNet	-	PeopleFirst Network
PRA	-	Participatory Rural Appraisal
PoP	-	Point of Presence
PTA	-	Pacific Telecom Authority
PRSPs	-	Poverty Reduction Strategy Papers
R&D	-	Research and Development
ROAR	-	Results-Oriented Annual Report
RRA	-	Rapid Rural Appraisal
SADC	-	Southern African Development Community
SDNP	-	Sustainable Development Network Programme
SIDS	-	Small Island Developing States
SMEs	-	Small and Medium Enterprises
SMMEs	-	Small, Medium and Micro Enterprises
SMS	-	Short Message Service
STD	-	Sexually Transmitted Disease
TAE	-	Trans Asia Europe
TAI	-	Technology Achievement Index
TNC	-	Trans-National Corporation
UK	-	United Kingdom
UN	-	United Nations
UNCITRAL	-	United Nations Commission on International Trade Law
UNCTAD	-	United Nations Conference on Trade and Development
UNDP	-	United Nations Development Programme
UNEP	-	United Nations Environment Programme
UNESCO	-	United Nations Education, Scientific and Cultural Organization
UNF	-	United Nations Foundation
UNIC	-	United Nations Information Center
UNITes	-	United Nations Information Technology Services
USA	-	United States of America
USAID	-	United States Agency for International Development
VoIP	-	Voice over Internet Protocol or Voice over IP
WB	-	World Bank
WCO	-	World Customs Organization
WEF	-	World Economic Forum
Wi-Fi	-	Wireless fidelity - IEEE Standard 802.11
WiMAX	-	Fixed wireless standard - IEEE 802.16
WTO	-	World Trade Organization
WWW	-	World Wide Web

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Preface

The objective of this Guidebook is to explain the nature of people-focused ICT policy formulation and strategy development. Using examples and practices drawn from the Asia-Pacific and around the world, it discusses the role of ICT policy-making in human development. In particular, its potential contribution in the fight against poverty and disease, advocacy for the empowerment of women and other marginalized groups, prevention and management of disasters of all types, advancement of good governance, and the achievement of MDGs is highlighted.

The Guidebook focuses on the steps required in developing ICT policies, including appropriate e-readiness assessment methodologies, participatory methodologies and visioning exercises. Also discussed are questions that need to be considered in developing an ICT strategy, the sectors that ICT policy-making needs to deal with, and the approach to ICT action planning. Related topics covered include strategies for various sectors in dealing with information access, e-government, e-business and e-commerce, e-health, ICTs applied to learning at all levels, ICTs for scientific research and development, ICTs for local and community development as well as the development objectives and outcomes sought through an ICT strategy. Some of the principles of implementation that need to be considered from a human development perspective are outlined and discussed.

The Guidebook will be useful to generalists and development specialists, such as planning officers, seeking to understand how to introduce ICTs in national development planning at every level – national, district or regional, local and community. It will help them understand some of the issues and concerns they should deal with. It will assist them in dealing with the special challenges of introducing technology in conditions that *a priori* may not always appear conducive or, in some circumstances, may seem completely inappropriate given other development needs and priorities.

This Guidebook will be useful for development actors and decision-makers in government, and development agencies and organizations including NGOs. It can also be utilized at the community level by those who seek to understand ICTs' role in development, and how they can organize, plan and marshal resources to best meet the needs of their constituencies using ICTs.

Finally, the Guidebook will be helpful to development planners because their concern is the use of ICTs for the community and they measure the benefits and outcomes of using ICTs in human development terms.

Stage One

Visioning and the Role of ICTs in Development

WHAT ARE ICTs?

Information technology (IT) is "a fancy name for data processing", according to Newton[1]. IT means all equipment, processes, procedures and systems used to provide and support information systems (both computerized and manual) within an organization and those reaching out to customers and suppliers[2]. The term information and communications technology (ICT) was coined to reflect the seamless convergence of digital processing and telecommunications.

ICTs include hardware, processes, and systems that are used for storing, managing, communicating and sharing information. These tools can be either manual or computerized (digital)[3,4]. This definition of ICTs extends to older non-digital devices such as analogue radio and television. Beyond hardware, i.e., computers, wireless devices, telecommunications towers, etc. ICTs include computer software and associated systems such as management methods and practices, or the so-called application layer.

An ICT with a far-reaching impact is the Internet, a worldwide network of computers connected through a robust digital technology called the IP protocol (Internet protocol), which permits the efficient routing, transmission and management of bits and bytes of data between computers. Mobile devices such as cellular or mobile phones are also an especially important class of ICTs.

ICT Diffusion and Access to Information

ICTs continue to be diffused at a rapid rate all over the world. The information economy is a fact and there are impressive statistics and other evidence to prove that ICTs do make a

[1] Newton, H. *Newton's Telecom Dictionary,* 18th edition, New York, 2002.
[2] Ibid.
[3] Duncombe, R. and Heeks, R. 'Information, ICTs and small enterprise: Findings from Botswana', Development Informatics Working Paper Series, Working Paper 7, Institute for Development Policy and Management, Manchester, UK, 1999; available at http://www.man.ac.uk/idpm/idpm_dp.htm. For Duncombe and Heeks, ICTs deal only with digital information.
[4] To distinguish between analogue and digital ICTs, the French term is new ICTs (nouvelles technologies de l'information et de la communication – NTIC).

difference to the competitive and comparative advantage of nations, organizations, communities and people. Some consider the extent of ICT adoption a prime factor in the rapid development of countries. A study claims that ICT diffusion accounts for up to 90 percent of the increase in the Human Development Index (HDI)[5] observed in some nations. It is clear that ICTs have an important role to play in fighting poverty and in achieving the MDGs[6].

This Guidebook's perspective is that ICTs are not an end in themselves. ICTs are tools to empower people and communities to become self-sufficient in meeting their basic needs and reach their full potential. The agent of change and of empowerment is information. Access to information helps people identify and seize opportunities to grow and develop, and to better their lives and that of their families and communities. Access to information facilitates participation in society, in the economy, in government, and in the development process itself. The ability to share information on a level playing field helps overcome barriers to communication and encourages exchange and collaboration.

The international community also recognizes the importance of access to information. In Article 19 of the Universal Declaration of Human Rights, the international community via the United Nations (UN) recognizes that, "Everyone has the right to freedom of opinion and expression; this right includes freedom to hold opinions without interference and to seek, receive and impart information and ideas through any media and regardless of frontiers"[7]. The ability to use information and to communicate is fundamental to human welfare.

THE IMPORTANCE OF A STRATEGIC NATIONAL ICT VISION AND AGENDA

The ability to take full advantage of the information economy for the benefit of all in a given country or jurisdiction requires vision, discipline, planning, and method. The vision sets the stage and the agenda is defined by a strategic plan, followed by an action plan.

There are three aspects that need to be considered from a strategic planning standpoint. The first is the importance of maintaining a human development perspective and focusing on the achievement of benefits for people through the appropriate use of ICTs. The MDGs capture the most important objectives or outcomes sought from development initiatives from a human development perspective. ICT visions, agendas and plans need to consider MDGs.

Having agreed on a people-centric approach, the second step is defining the process, agreeing on the steps involved, and managing this process.

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[5] Trujillo-Mendoza, M. 'The global digital divide: Exploring the relation between core national computing and national capacity and progress in human development over the last decade', Doctoral dissertation, 2001; available at http://studentweb.tulane.edu/~mtruill/index-phddiss.html.

[6] Marker, P., McNamara, K. and Wallace, L. 'The significance of information and communication technologies for reducing poverty', Department for International Development, London, 2002.

[7] Office of the UN High Commissioner for Human Rights, 'Universal Declaration of Human Rights'; available at http://www.unhchr.ch/udhr/lang/eng.htm.

A third aspect is the impact of changes in the international economy, especially the telecommunications sector, on the diffusion of technology and of ICTs, in particular. This aspect has a strong bearing on the strategic ICT vision and agenda. Understanding the issues that affect access to ICTs is also important and is included here for this purpose.

The ICT vision and strategy should focus on people and not just on technology. For this to happen, it is important to develop both the ICT vision and strategy with people in mind and with the input of these very same people.

While planning and implementing an ICT agenda, it is helpful to take a look at established practice. Should the national ICT agenda be sector driven or should it focus on broader issues and objectives, on benefits for society and the economy as a whole? Many ICT strategies adopt a sectoral approach to ICT implementation. The Digital Opportunities Initiative (DOI) report[8] clearly states that while there are many types of strategies that various countries have evolved to develop ICTs, evidence suggests that an integrated approach to ICT development and deployment is most likely to yield success in human, social and economic development over the longer term.

The national ICT vision is a step towards understanding the options and their possible benefits, and a way of communicating that potential to all stakeholders.

Defining the Process from a Human Development Perspective

As many of the issues related to human development are complex and interlinked, a strategic planning approach is needed for the following reasons:

- To instil rigour in the ICT planning process;
- To understand the goal of using ICTs from a people perspective. This means in part to establish the basis for action by defining and understanding the benefits and outcomes. (What are we trying to do? What is the ICT strategy for and why? And who is this for? What is the ultimate vision or goal? What are the objectives to achieve the goal? How do these help countries meet MDGs?);
- To help define the benefits and outcomes sought in relation to the vision, development goals and objectives;
- To help define ways of measuring these benefits and outcomes by defining benchmarks of progress, and by helping to define success. This will allow the independent audit of achievements and will help decision-makers and the constituents of the strategy to track progress;
- To help define, scope and analyze the situation using appropriate tools;
- To help identify and consider the main stakeholders and their concerns;
- To help identify and understand pertinent issues;
- To help compare and contrast practices (especially best practices);

[8] Accenture, Markle Foundation and UNDP, *Creating a Development Dynamic,* Final Report of the Digital Opportunities Initiative, New York, 2001.

- To help plan and undertake appropriate communications and consultations with stakeholders;
- To help identify and make use of appropriate management tools in arriving at these decisions; and
- To help identify priorities, the required resources, and ways to implement these priorities and move forward.

Many of these issues will be discussed in this Guidebook.

Understanding human needs and how ICTs can help achieve them

To understand the role that ICTs can play in human development, there is a need to first understand the requirements and circumstances of the people who are to benefit from the introduction of ICTs. At the same time, the ways in which ICTs can help people address and meet these needs must be understood.

People do not need word processing to survive, but they may want efficient ways of sharing information about livelihoods and employment, for example. Word processing may be one of the technologies or applications that will make it easier to communicate information about livelihoods, and it may be more reliable than depending solely on word-of-mouth when those communicating and/or receiving the information are spread over time and space.

An electronic bulletin board system for sharing information about job opportunities may be useful to those who are connected to the Internet, but useless to people who are not. On the other hand, in societies where the oral tradition is important, accessing the Internet to inform a community radio station may be a way of communicating valuable information to computer illiterate users in rural locations.

ICTs for human development are not about technology, but about people using the technology to meet some basic need. Understanding human requirements takes time and effort. User needs assessments are essential in planning the introduction of ICTs to communities, no matter what their status or HDI.

The Changing International Marketplace

As the information economy becomes predominant, efforts to streamline its operation or at least encourage greater collaboration and interoperability have been the object of much effort. An important mechanism affecting ICT diffusion and use have been the agreements negotiated under the World Trade Organization (WTO). One hundred forty-six countries (as of 2003) adhere to the WTO agreements, which regulate international trade. These include 30 of the 46 countries listed by the United Nations as least developed countries (LDCs)[9] .

Considered the political underpinning of globalization, the WTO agreements represent a

[9] See http://www.wto.org/english/thewto_e/whatis_e/tif_e/org7_e.htm.

significant achievement in international collaboration. However, they risk being one of the last far-reaching global trade agreements to be concluded in the foreseeable future. This is because of the failure of the international community to reach an agreement at the Fifth WTO Ministerial meeting under the Doha Development Agenda in Cancun in September 2003. The main stumbling block was the issue of subsidies, especially agricultural subsidies paid by developed countries to their farmers. This situation may change, but a resolution in the short-term is unlikely, given its immense political impact on the developed countries that pursue these distortionary measures.

Of special interest to ICT policy formulation are trade rules affecting telecommunications regulation and licensing. These rules are especially important in opening up the telecommunications sector to competition and foreign investment. Some observers consider the break-up of monopolies a prerequisite of increasing information flows and for encouraging the diffusion of ICTs. Until the WTO agreements, the telecommunications markets in most countries had been closed to competition and had been operated by *de facto* monopolies, the national telecommunications operators. This is still the case in many of the non-signatory countries and it is changing slowly in some of the signatory countries[10] as well. For signatories, the end result will be similar in all cases – more open national and international markets for telecommunications goods and services.

However, getting from one state to another is not that straightforward. Many factors influence the real and potential value of an operator in the eyes of a private sector investor. These include the size of the market in terms of number and density of potential customers (population density) as well as the geographic spread of these customers and their ability to pay for services. The actual and perceived value of the market and thus of the operator, the way privatization takes place, and the change management capacities of personnel are also issues that affect the success of privatization and delivery of services.

Geographic spread is especially important because of the provision for universal access. There is a need to provide services to remote dwellers. However, the provision of rural telephony is completely unprofitable and therefore unattractive to investors, for instance, in island communities of the South Pacific or for larger countries with small population bases such as Mongolia and many of the countries in Africa. If privatization is not properly managed, private operators will skim off the most profitable telecommunications services and leave remote, rural and poorer users out in the cold. Disparities increase, tensions rise, the country suffers and everyone loses.

The transition can be made less difficult by proceeding cautiously, in a planned and stepwise fashion, with advice from experts in the field such as the International Telecommunication Union (ITU), other international agencies and private sector specialists. By adopting an integrated ICT strategy, including universal access provisions based on sound market data and an analysis of best practices, a jurisdiction can avoid some of the pitfalls discussed above. However, there is no magic solution. One of the most challenging areas of ICT in support of

[10] The full listing of WTO signatories can be found at http://www.wto.org/english/thewto_e/whatis_e/tif_e/org6_e.htm.

human development is rural telecommunications. Models are being developed and tested to show how countries can actually take advantage of cutting-edge technologies (WiMAX, Wi-Fi, full-duplex satellite technologies such as DirecWave) to create sustainable business models to deliver the benefits of the information economy to everyone everywhere.

Also, it is wise to remember that privatization, that allows for the selective acquisition of high value telecommunications services such as mobile telephony and data services (now IP services) while the less valuable services are funded by public sources, is a sure recipe for disaster.

Since the formation of the WTO, change is taking place rapidly and dramatically, such that telecommunications services have become more competitive and the Internet has grown, bringing advantages to consumers and the private sector as well as governments.

There are two basic WTO agreements that are of concern: the General Agreement on Trade in Services (GATS), and the Agreement on Basic Telecommunications (ABT). These agreements provide for the opening up of national telecommunications markets to foreign investment and competition. The ABT states: "… governments must ensure that foreign service suppliers are given access to the public telecommunications networks without discrimination"[11].

Another relevant WTO agreement touches on intellectual property rights (IPR). A regime that protects IPR allows the benefits of Research and Development (R&D) to be shared and full advantage to be taken of ICTs, the Internet and the information economy. At present, enforcing IPR regimes is extremely costly and only well-endowed companies and nations can afford to do so. The result is that many smaller or poorer companies and countries cannot enforce the requirements of IPR or ensure that their own claims are respected beyond their own jurisdictions. Similarly, many smaller and less developed countries cannot afford to implement the international agreements on IPR with respect to software, for example. The cost of purchasing these products would simply mean that they would cease to be used in the jurisdictions concerned if they were not otherwise available.

The management of the Internet IP address naming system and the allocation of IP addresses, sometimes known as Internet governance, is another issue of broad concern in the preparation of ICT policies. Here the problem is that of ensuring that access to IP names and classes is equitable and that each country, and eventually each user, can be guaranteed reasonable access to the number and type of IP addresses they require. In some countries, Internet naming systems have been commandeered by operators interested not in ensuring that more addresses are made available, but in maximizing their profits, to the detriment of Internet development.

The Internet Corporation for Assigned Names and Numbers (ICANN) has been created as a consensus-based private sector organization to supervise the allocation of IP addresses. An international board representing users from around the world governs ICANN. A test is ongoing to promote competition in the allocation of Internet domain names. This could lead to more than 52 entities with authorization to compete in selling domain names and related services[12].

[11] See http://www.wto.org/english/thewto_e/whatis_e/tif_e/agrm6_e.htm.
[12] See http://www.icann.org/general/background.htm.

Box 1: **Definition of the Information Economy**[13]

The term "information economy" refers to "a new global electronic structure, wherein the production of information goods and services dominates wealth and job creation, and is underpinned by the use of information and communication technologies (ICTs) and the global information infrastructure."

The diffusion of ICTs affects the status and competitive position of countries and jurisdictions, and has an impact across sectors and at all levels of society. Hence, a considered or strategic approach is needed in planning the diffusion of ICTs.

National ICT Vision and Priorities

As countries and jurisdictions position themselves to take better advantage of ICTs, they need to reflect on their response to the rapid transformations brought about by the information economy. One possible starting point is an exercise to help focus on the long-term implications of the diffusion of ICTs. An outcome of this effort could be a vision statement outlining a short- to long-term scenario for ICT development, including measurable outcomes or benchmarks over a given time frame.

A vision is a statement of great expectations for the future. It documents outcomes that the country or jurisdiction wishes to arrive at within a given time frame. Vision statements are always upbeat and ambitious. Knowing what a country or jurisdiction wants and what it can achieve, agreeing on this and communicating it as widely as possible are some of the outcomes of visioning.

A vision statement could be written for an organization, a community or even a household. It could even incorporate personal goals. Vision statements can and probably should include quantitative results such as the number of computers per user, the bandwidth available on a per capita basis, the number of devices that will be available, the percentage of Gross Domestic Product (GDP) that can be assigned to the introduction and deployment of ICTs, etc. With quantitative results or measurable outcomes, comparative analysis and benchmarking are possible.

Many countries have developed visions of the future where ICTs are seen as engines of transformation to achieve a desired state. Invariably, this future state is e-enabled. Some of the best known include Malaysia's Vision 2020, which foresees Malaysia becoming an industrialized country by 2020, and e-Japan, which is a vision of a society " where everyone can actively utilize information technology (IT) and fully enjoy its benefits". In Botswana, one tenet of Vision 2016, which proposes "prosperity for all", calls for Botswana to become an educated and informed society. The national vision for Canada is based on rolling out infrastructure to "make the information and knowledge infrastructure accessible to all

[13] Cogburn, D. 'Globalization and the information economy: Challenges and opportunities for Africa'. African Development Forum, 1999; available at www.un.org/depts/eca/adf/pub.htm. Quoted in James, T. *An Information Policy Handbook for Southern Africa: A Knowledge Base for Decision-makers*, IDRC, Ottawa, 2001; available at www.dbsa.org/publications/ictpolsa and www.ap.org/books/ictpolsa.

Canadians, making Canada the most connected nation in the world".

In visioning and in developing ICT strategies, it is important to think strategically of ICTs as enablers of human development. It is imperative to consider how enhanced access to information can improve the lives of people as well as stimulate the economy and streamline government. In thinking strategically of the role of ICTs and information in development, the first thing to do is to identify the development priorities and challenges facing the country. With a description of the current development situation, it is possible to consider the extent to which greater access to information and ICTs can contribute to bettering people's lives.

Visioning exercises

Visioning exercises can be a first step in strategic planning. They are brainstorming exercises applied to scenario-building about the future. They can also be very effective in outlining a shared vision and in securing support for its implementation. Visioning exercises[14] require a definition of personal, community and national goals for the future. They have added value when a quantitative measure of achievement to be realized in the future is agreed upon and formulated.

Visioning is an engaging exercise. Thinking about a future state of affairs can captivate people's imaginations. All participants have a view of what they would like themselves, their children and their communities to have in the future. As a communication tool, visioning exercises can be very effective.

Visioning works well at the corporate or community level, but does not appear to have been used much at the national level or in situations where large numbers of people are involved or could be involved.

e-Readiness assessments, which will be discussed in following sections, can be helpful sources of information for visioning exercises, especially if they are more focused on people instead of only on documenting hard evidence of technical diffusion.

ICT Policies vis-à-vis e-Strategies

Governments develop policies. Legislation enshrines the policies in law. Strategies direct the body of policies and provide a framework for policy implementation. Individual policies themselves are rather meaningless when they are not based on an underlying national agenda. A strategic framework is necessary to help explain policy decisions and choices, and to give policies personality and direction.

Strong leaders and governments in many countries in the Asia-Pacific have developed ambitious ICT strategies. In these countries, there are regulations and supervision mechanisms

[14] See World Resources Institute, 'How to conduct a visioning exercise'; available at http://www.wri.org/enved/suscom-vision.html.

to ensure compliance. Policy statements and laws in themselves may not be sufficient to bring about the change that is sometimes necessary to transform business practices for the greatest possible diffusion of ICTs. While government sets policies, people need to be involved in developing these policies. Ongoing consultation with stakeholders is a requisite for successful implementation of development policies, including those that apply to the diffusion of ICTs.

Internationally, the WTO agreements have provided the incentives that have enabled meaningful changes in business practices and telecommunications policies to create a more level playing field in the provision of telecommunications and related services. This change usually takes the form of increased competition and greater access to services in national markets.

New legal frameworks will be required to implement the ICT vision and strategy of a country or jurisdiction. However, while legislation is a necessary step to bring about change in business practices, the law alone is not enough. One of the greatest concerns is the application of laws and regulations, and the issue of jurisprudence to guide legal decisions and judges dealing with what may be a new area of jurisdiction and legislation. A country can have the best of laws and intentions but if these cannot or will not be applied, they may be useless and may, in fact, constitute an impediment.

The effectiveness of the courts, the capacity of people and associations to seek and obtain legal redress, and the perceived equity of the government and legal decisions will greatly affect the involvement of people. They will create the necessary support for the success of the ICT strategy and its objectives. Prospects for outside investors to contribute to the implementation of the ICT strategy and associated actions plans will also be affected by these issues. Competitiveness surveys undertaken by the World Economic Forum (WEF) have shown foreign investors to be particularly sensitive to the reputation of the courts with respect to how foreigners are treated. If the courts are seen to treat foreign investors in a fair and equitable manner, this will encourage further investment.

In general, issues that affect foreign direct investment (FDI) are also going to have a bearing on the implementation of ICT plans and strategies since foreign investors – as sources of expertise, funds and other resources – are considered partners in the strategy and its implementation. Indeed, a recent UN Conference on Trade and Development (UNCTAD) report on technology and competitiveness states that the research, development and manufacturing costs involved in continuing to develop and market ICTs are such that only transnational corporations (TNCs) can afford them[15] . The implication is that without the involvement of these corporations, countries and other companies cannot expect to be able to develop a competitive ICT industrial sector. ICT policies have to take this reality into consideration, especially when the intention is to grow a national ICT sector that can compete internationally.

As for smaller and more local ICT industries, the usual business incentives will help them establish themselves. Some countries naturally favour their home-grown ICT industries, but to

[15] UNCTAD, 'Investment and technology policies for competitiveness: Review of successful country experiences', Technology for Development Series, UNCTAD/ITE/IPC/2003/2, New York and Geneva, 2003.

compete they must look to partnerships with international firms and TNCs. The partnership programmes of heavyweights such as Microsoft, Cisco, HP and others are a clear illustration of this reality.

For small and medium enterprises (SMEs) in developing countries, such as those described by Heeks and Duncombe in their study of ICTs in smaller enterprises, there is a need to promote policies and develop incentives. These measures will not only encourage private sector operators to enter the ICT business sector but, more appropriately, help develop entrepreneurial skills and the capacity of SMEs to become players in the ICT sector. Policies that help incubate ICT companies as well as new businesses are also required.

ICTs AS TOOLS FOR SOCIO-ECONOMIC DEVELOPMENT

This section uses the Technology Achievement Index (TAI)[16] to rapidly group and compare countries on their abilities to use technology and ICTs as tools for development. The TAI is a measure of how well a country is creating and diffusing technology and building a human skill base, reflecting capacity to participate in the technological innovations of the network age. Introduced by UNDP, TAI is intended to help policy-makers define technology strategies. Technical achievement is directly correlated to TAI, which can reach a maximum of one.

TAI Rank	TAI Value
Leaders	
1. Finland	0.744
2 United States	0.733
3. Sweden	0.703
4. Japan	0.698
5. Korea, Republic of	0.666
6. Netherlands	0.630
7. United Kingdom	0.606
8. Canada	0.589
9. Australia	0.587
10. Singapore	0.585
11. Germany	0.583
12. Norway	0.579
13. Ireland	0.566
14. Belgium	0.553
15. New Zealand	0.548
16. Austria	0.544
17. France	0.535
18. Israel	0.514

Figure 1 **Countries with the Highest TAI**

TAI measures achievements in four areas:

- Technology creation as measured by the number of patents granted to residents and by receipts of royalties and license fees from abroad;
- Diffusion of recent innovations as measure by the number of Internet hosts per capita;
- Diffusion of old innovations (telephones/capita, electricity consumption/capita); and
- Human skills as measured by mean years of schooling and the gross tertiary science enrolment ratio.

Countries with the highest TAI have policies that are based on the belief that ICTs enable economic and social development (Figure 1)[17].

However, the ability to generate benefits that derive from ICT use is itself directly related to the level of economic development in a country. Some basic requirements for fully exploiting the knowledge and

[16] UNDP, *Human Development Report 2001: Making New Technologies Work for Human Development*, Oxford University Press, New York, 2001.
[17] Ibid.

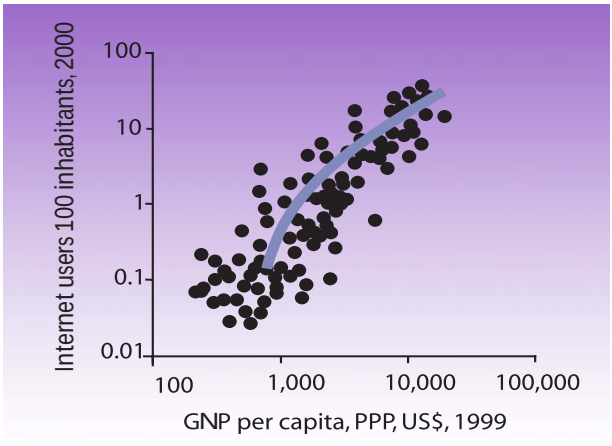

Figure 2 **GNP Per Capita vs. Internet Penetration**

Note: GNP per capita, US$, 1999 compared to Internet penetration, 2000. Each dot represents a country.
Source: ITU World Telecommunication Indicators database[18].

information economy are related to GNP (Figure 2). TAI shown here are based on data reported in 2001. However, these trends are still prevalent.

Given these disparities, the digital divide is really a reflection of existing disparities between the haves and have-nots. As a meeting of the Organization for Economic Cooperation and Development (OECD) put it,

> "The digital divide is a symptom of existing economic and social divides, which will widen even further if developing countries are not helped to take advantage of ICT in tackling economic and social problems and are denied access to markets that are becoming increasingly ICT-dependent as part of globalization."[19]

Perspective of High-income Countries

According to the Human Development Report (HDR) of 2001,

> "Leaders[20] (TAI above 0.5) – topped by Finland, the United States, Sweden and Japan – are at the cutting edge of technological innovation. Technological innovation is self-sustaining, and these countries have high achievements in technology creation, diffusion and skills. Coming fifth is the Republic of Korea, and 10th is Singapore – two countries that have advanced rapidly in technology in recent decades. This group is set apart from the rest by its higher invention index, with a marked gap between Israel in this group and Spain in the next."

The view of industrialized countries is that ICTs can enable the economy and all sectors of human activity. There is now clear proof that the adoption of ICTs in the 1990s in the USA is directly related to increases in efficiency that have translated into increased rates of economic growth and GDP. The USA has recognized that ICTs are major enablers of the economy and, as

[18] ITU, *World Telecommunication Development Report 2002: Reinventing Telecoms*, Geneva, 2002.
[19] OECD, 'Digital opportunities for poverty reduction: Addressing the international digital divide', OECD Global Forum on the Knowledge Economy, Joint OECD/UN/UNDP/WORLD BANK Global Forum, Exploiting the Digital Opportunities for Poverty Reduction, Paris, 2001.
[20] UNDP, *Human Development Report 2001: Making New Technologies Work for Human Development*, Oxford University Press, New York, 2001.

a sector, major contributors to GNP. Many industrialized countries have developed ambitious plans to connect their citizens (e.g., Connecting Canadians strategy in Canada) or deploy ICTs throughout society and the economy. Australia, Great Britain, Singapore, the USA, Republic of Korea, Japan and Canada have developed ambitious strategies to provide universal access to the Internet along with universal service, usually to the telephone. These countries are also leaders in providing government online (GOL) services to their citizens.

The experience of newly industrialized countries in the Asia-Pacific

Japan and many of the Asian Tigers have predicated their development strategies on a strong and modern education system, and the promotion of science and technology. Singapore, Republic of Korea and Japan developed integrated IT master plans early on. In Singapore, the ICT plan was developed between 1980 and 1985, in Korea in 1987, and in Japan in the early 1990s.

Consider Singapore[21]: its goal was to attain a living standard unrivalled in Asia by 2000 and is to surpass the US standard of living by 2010. Singapore is an example of what a recently industrialized country can achieve with vision, determination, investment, hard work and strong leadership.

Singapore has undergone essentially three stages of economic development. The first phase is based on providing low-cost labour. The next phase is based on upgrading technology and other infrastructure. The last phase is based on developing globally competitive businesses. Singapore lost its competitiveness in low-wage job markets and was forced to move beyond this growth phase. The country then focused on building up national technology bases with increasingly sophisticated industrial and domestic research infrastructures and incentives designed to attract global technological leaders and advanced research activities. It realized that it could not attract large-scale manufacturing industries to its shores because of the uncompetitive wages of its now better-off workforce. It therefore encouraged off-shore manufacturing while retaining the headquarters and R&D facilities of these offshore enterprises in Singapore. It has undertaken all this in an energetic fashion.

Its 1991-1996 five-year plan budgeted over US$3 billion to upgrade infrastructure from that of a manufacturing centre into that of an innovation hub, capable of creating new and better products and services for the region and the world. Included in the budget was US$500 million to promote innovation within companies by covering up to 70 percent of qualifying project costs.

A second thrust developed specialized skills and capabilities, land requirements and infrastructure to attract international investors. A third thrust was labour skills training for emerging industries and wafer fabrication projects required for assembling microprocessors. This move to upgrade infrastructure is only the beginning of an ongoing process of reorienting traditional economies toward technology, innovativeness and institutional dynamism.

[21] Boulton, R., Kelly, M.J. and Yoshida, P.G. *Information Technologies in the Development Strategies of Asia*, International Technology Research Institute, USA, 1999.

Continuing to improve local standards of living and build long-term economic viability requires sustained technological and business expansion.

A key part of Singapore's plan is to create an electronics industry cluster, including semiconductors, communications, display and data storage businesses. Singapore's successful electronics development strategy produced revenues of over US$45 billion in 1995. The government is offering tax incentives for pioneering investments, incentives for skills and R&D training, and special reduced taxation for specific industries and technologies. Singapore has also introduced a value-added tax system to reduce overall taxation on individuals as well as on corporations.

In a separate undertaking, Singapore is building a multi-technology, ultramodern telecommunications and information infrastructure. It plans to make its port the most automated in the world. Its Tradenet system now links (since 1999) government agencies by computer networks that can process over 10,000 customs declarations daily. The system can handle complete documentation for trade, government administrations, transportation, banking and insurance.

What is striking is the high level of commitment in Singapore and other Asian countries to advancing their economies as rapidly as possible through stages of development, to achieve global economic leadership. Asian national leaders hold the conviction that electronics, information and communication technologies are key to the future competitiveness of their domestic economies, of their peoples' standards of living, and of their countries' abilities to fully participate in the global economy.

That Singapore is a world-class leader in science and technology and R&D can clearly be appreciated from the programme of work of the Agency for Science, Technology and Research of the Government of Singapore[22] . This agency focuses on two main research threads: biomedical sciences, and science and engineering. It also has two main thrusts in education: one for science and technology called "Students and scholarships" and another for industry.

Like all other endeavours in Singapore, science and technology is undertaken in a multilingual, multicultural and cross-cultural, multidisciplinary and interdisciplinary learning, research and entrepreneurial environment. This is a key feature in attracting the best people and companies from around the world.

Potential leaders

According to UNDP HDR 2001, "Potential leaders...have invested in high levels of human skills and have diffused old technologies widely but innovate little. Each tends to rank low in one or two dimensions, such as diffusion of recent innovations or of old inventions. Most countries in this group have skill levels comparable to those in the top group"[23]. In the Asia-Pacific, these

[22] See http://www.a-star.edu.sg/astar/index.do.

[23] UNDP, Human Development Report 2001: Making New Technologies Work for Human Development, Oxford University Press, New York, 2001.

countries include China, Hong Kong and Malaysia.

Consider the example of Malaysia[24]. Malaysia's official vision is to become fully developed by the year 2020. Part of the effort to achieve this goal involves the creation of government-supported research institutes (GRIs). GRIs include the Standards and Industrial Research Institute of Malaysia and the Malaysian Institute for Microelectronic Systems (MIMOS). MIMOS, which started in 1985 within the Prime Minister's office and which is now a department of the Ministry of Science, Technology and the Environment, is Malaysia's national centre of excellence in microelectronics and information technology. MIMOS projects are product-oriented and focused on boosting the competitive and innovative levels of the domestic electronics industry.

Newly industrialized economies of Asia, such as Malaysia, have relied heavily on cooperation with foreign technology leaders to enter and compete in markets for technologically advanced components and products, often by expanding on relationships begun in contract labour arrangements. For such economies, overcoming the financial and technical challenges of expanding into advanced fields may be feasible only with such cooperation. Taiwan, Singapore and Malaysia have, therefore, been strongly committed to attracting and keeping the involvement of leading companies, especially in the 1990s. Once foreign corporations have a stake in local markets, they typically continue to upgrade technologies.

Malaysia is committed to the use of ICTs to achieve its development objectives. The State has a vision to utilize ICT to transform Malaysia successively to an information society, a knowledge society and finally a values-based knowledge society. Malaysia plans to invest more than US$2 billion over the next decade to become the multimedia hub of South-East Asia. In August 1995, Prime Minister Mahathir proposed the Multimedia Super Corridor (MSC) project to attract IT industries. The MSC stretches south of the capital of Kuala Lumpur to where the new international airport and new federal capital are located – a 15 km by 50 km (9 mile by 30 mile) zone, about the size of Singapore. It is estimated that in 2004 the MSC employed 22,398 people, of whom 88 percent are knowledge workers[25].

By creating an advanced information network, Malaysia's government hopes to lure leading R&D companies and software developers from abroad. At present, 1,031 companies have MSC status: 984 technology companies, 36 institutions of higher learning, and 11 incubator companies. Qualifying firms must be suppliers of multimedia and other information technology products or services and they must be willing to transfer technology to Malaysia. Non-manual workers such as engineers should account for at least 15 percent of the workforce. Companies that joined the project by the end of 1997 are to be exempted from corporate taxes for up to 10 years.

Dynamic adopters

UNDP HDR 2001 defines dynamic adopters (with TAI between 0.20-0.34) as "countries [that]

[24] Boulton, R., Kelly, M.J. and Yoshida, P.G. *Information Technologies in the Development Strategies of Asia*, International Technology Research Institute, USA, 1999.
[25] See http://www.mdc.com.my/xtras/fact_figures/msc.asp.

are dynamic in the use of new technology. Most are developing countries with significantly higher human skills than the fourth group. Included are Brazil, China, India, Indonesia, South Africa and Tunisia, among others. Many of these countries have important high-technology industries and technology hubs, but the diffusion of old inventions is slow and incomplete."[26] The Philippines and Sri Lanka also fall in this category.

Many of these countries have large populations, and are characterized by an uneven diffusion of technology. India, which is home to a world-class technology hub in Bangalore, ranks at the lower end of TAI. Why? Because Bangalore is a small enclave in a country where the average adult receives only 5.1 years of education, adult illiteracy is 44 percent, electricity consumption is half that in China, and there are only 28 telephones for every 1,000 people[27].

Apart from having technology clusters and/or centres of excellence, India, China and Brazil are also known for their concern for diffusing technology to all levels of society, including rural dwellers and the poor. Efforts in India to develop the Simputer, as well as other efforts at the local and community levels, are well documented. China's success in providing near universal access to telephones, whether fixed line or wireless, is also well known.

China's commitment to e-enable the country is supported at the highest levels and represents a significant national investment in technology and other capabilities. A clear objective is to make China a major participant in the global economy. China's efforts to connect all major centres with fibre-optic cabling is another clear example of the enthusiasm with which ICTs are being rolled out in that country. Experimentation in bringing relevant ICT-enabled applications to the people in rural areas is also evidence of the concern that ICTs be relevant to the needs of rural dwellers.

However, much remains to be done, as many users do not have the ability to take advantage of ICTs or of the information that ICTs provide access to. The challenge in India and China, as in other countries, is the extent to which applications that are useful to, and usable by, the poor can be developed. The agricultural information service in Huoshan County (see Box 2 on page 17) is an example of such an innovation that can have economic benefits for the farmers that take part in it. If these and other appropriate applications are not developed, then poorer and more marginalized communities will not benefit. The digital divide will remain a major problem limiting human development, as a result.

Perspectives from Low Technology Adopters

In countries with TAI below 0.20, technology diffusion and skill-building have a long way to go. Also, large parts of the population have not benefited from the diffusion of old technology.

In these countries, ICTs other than radio are not readily accessible outside major urban centres. Survival and other development issues predominate. Environmental conditions may be difficult.

[26]UNDP, *Human Development Report 2001: Making New Technologies Work for Human Development*, Oxford University Press, New York, 2001.
[27]Ibid.

There may be civil strife and the country may be in a period of conflict or undergoing reconstruction after conflict. These countries or regions do not have the basic means to benefit from the information revolution or to fully participate in the information economy. In some cases, even basic connectivity is a challenge and only major centres have Internet connections. Local and community groups do not have access to reliable power or telecommunications infrastructure. Illiteracy may be an issue, along with a lack of basic technical and managerial skills. Discrimination against women, language conflicts and other issues such as insecurity may also prevail. These countries risk being marginalized. They need support in crafting and implementing strategies and related action plans to bootstrap into the information economy.

Reconstruction efforts in some of these countries have recognized the importance of including plans for developing the national capacity to use ICTs. In the work undertaken with the help of the international community in Timor-Leste, a plan to strengthen the capacity to use ICTs and establish basic connectivity and networking infrastructures has been an important consideration from the start[28].

Special cases: small island developing states (SIDS) in the South Pacific

Unlike the Caribbean and the SIDS around Africa and the Indian Ocean, the South Pacific SIDS are made up of many small islands and countries covering vast reaches of the Ocean. They are far from major markets and concentrations of human population, and poorly serviced by telecommunications infrastructure. There are no more than two million people in the South Pacific. However, unlike the SIDS islanders around Africa and the Western Indian Ocean, many of these people share common customs and languages. ICT deployment in this region is focused on overcoming isolation, small population sizes, smaller markets and the vast distances that separate these countries from each other and from the rest of the world.

Pacific Islanders live in tightly-knit island communities where family and close personal contact is an important and everyday fact of life. Life is more rural than in the Caribbean on average. ICTs have been especially useful in facilitating voice communications at low costs between residents of these islands. For many years the Peacesat satellite service has provided locally accessible broadcasting studios that are used for voice communications between groups of people living on the different islands. The PakTok store and forward e-mail messaging service was used in the mid- to late-1990s over the existing telephone connections to enable e-mail communication.

Community-based networking initiatives designed to increase awareness of ICTs and to encourage their use by local populations and in schools are increasing. A community-based approach is essential in the South Pacific. ICT development efforts are predicated on introducing these technologies in the community in public access sites or in schools. In the PFNet project, a community approach to understanding the needs and circumstances of Solomon Islanders was proven to be essential to the successful introduction of ICTs.

In general, ICTs at the local and community levels help people communicate and contribute to

[28] See http://www.gov.east-timor.org/old/itpt/it.php as well as http://www.apdip.net/news/newsart/12122000.pdf.

local empowerment and community development. One technology that appears to hold great promise is community radio. Used in conjunction with the other technologies such as the Internet and digital satellite radio, community radio is much appreciated in some Sahelian countries where it contributes to community renewal and job creation for young people. Radio may be an intermediate or middleware technology for many users that have no capacity to use ICTs or no access to these tools. Used in combination with satellite technologies such as satellite digital radio or fully bi-directional satellite-based Internet access services such as Hughes Direct Way or the equivalent, radio can be a suitable enabler for learning about, taking advantage of and, eventually, using the Internet.

A good example of the marriage of radio and the Internet comes from Kothmale in Sri Lanka, where community radio and Internet connectivity have been brought together to help the radio station meet the information needs of its listeners. This initiative is supported by the United Nations Educational, Scientific and Cultural Organization (UNESCO)[29].

ICTS AS ENABLERS OF DEVELOPMENT

ICTs enhance all forms of information exchange. Observation, learning and decision-making are facilitated, and business transactions are expanded and speeded up with ICTs. Opportunities can be identified and acted on more easily. Markets operate more efficiently and are more accessible. These lead to business-related efficiencies and faster turnover, increased productivity, especially in the services sector[30], and profitability. Lallana, in his overview paper, reports similar results[31].

As eBay has demonstrated, virtually anything can be bought or sold over the Internet using

Box 2: **The Huoshan Agricultural Information Service[32]**

It is not just large corporations that have realized the advantages of the Internet. In Huoshan County, one of the poorer counties of Anhui province in China, an agricultural information service connects several townships and villages. A network combining door-to-door information collection and exchanges (sneaker nets), telephone, Internet via dial-up, small single operator agricultural information offices located in townships, and larger Web-enabled centres in municipalities has been established. In the municipalities, the county Web sites market local produce nationally and internationally and match needs for agricultural produce, especially cash crops such as medicinal plants, prized mushrooms, bamboo products, etc. This service facilitates contact and promotes exchanges between buyers and sellers, and helps extend and enhance the local agricultural market while helping small-scale farmers to bypass middlemen and obtain valuable information.

[29] See http://www.unesco.org/webworld/highlights/internet_radio_130599.html.
[30] Annual Report of the Council of Economic Advisors, United States Government Printing Office, Washington, DC, 2001.
[31] Lallana, E. *An Overview of ICT Policy and e-Strategies of Select Asian Economies*, UNDP-APDIP, 2004.
[32] Labelle, R. and team. 'Huoshan county, Anhui province assessment mission', China: Notes and observations, ICTs for Poverty Reduction, UNDP China, 2001.

online marketplaces. Asia-Pacific countries have recognized this and so have many entrepreneurs. Several online markets – the so-called horizontal marketplaces – have been established to expand access to Asian goods and services[33]. Indeed, for China, facilitating access to international markets for Chinese goods and services is one of the most important drivers of ICT policy.

The expectation is clearly that e-commerce will become essential for international trade. Early adopters will win. Countries must transform themselves into information economies and knowledge-based societies. For many countries, including many Asian countries, this is the basis of their ICT policies.

HOW DO PEOPLE BENEFIT FROM ACCESS TO ICTs?

Information opens up more possibilities and opportunities for people. Information and knowledge empower people to become more self-sufficient. ICTs make information acquisition and management easier and more efficient, and open up possibilities for universal access to knowledge and markets.

The specific advantages of using ICTs include:

- Access to information for private and professional decision-making: ICTs expand the range of choices and opportunities by facilitating greater access to economic, educational and development-related information;
- Reduction of geography and distance as a factor in social and economic participation: research is much easier with ICTs, especially through the Internet;
- Access to opportunities: ICTs empower individuals, businesses, especially SMEs, local and community groups, women and marginalized or disenfranchised people or groups to do what they do, only better. With ICTs and the capacity to use ICTs, these groups can access the same information that government and large corporations use. Access to information can help level the playing field by increasing participation in economic and human development activities and in those applications that depend on information, such as markets;
- Greater ability to learn: distance learning permits students to get accreditations online from recognized universities;
- Greater environmental awareness: information about the weather and the environment is more readily available. It can help to predict and prepare for environmental perturbations and catastrophes. In Sub Saharan Africa, earth observation is used to predict crop failure and prepare for emergency food relief[34]. FAO maintains another such Web site with a global purview[35];
- More awareness of factors affecting individual well-being;
- Greater ability to influence and participate in decision-making;

[33] Momentum Technologies, 'Horizontal marketplaces in Asia', 2003; available at http://www.sourceguides.com/markets/byI/horizon/byR/Asia/Asia.shtml.
[34] Famine Early Warning System, FEWS-Net; available at http://www.fews.net/networks/.
[35] See http://www.fao.org/WAICENT/faoinfo/economic/giews/english/alertes/sptoc.htm.

- Transaction processing: ICTs speed up and ease transactions of all types, and are especially important for business and government transactions; and
- Improved trade: ICTs enhance and facilitate trade. ICTs make markets more efficient. Commerce is enabled and extended. With ICTs, all markets have the potential of being international or of being selective, depending on their requirements.

ICTs in the Fight Against Poverty

ICTs have been used to help fishermen, farmers and herdsmen to locate schools of fish, or manage land, or identify prime grazing areas. In Africa, drought prediction is based on satellite imagery. In Bangladesh, storm early warning systems use ICTs, including radio, to warn fishermen in the Gulf of Bengal. Tools used for environmental management and earth observation are especially helpful. The data from these earth observation platforms are increasingly integrated into data networks and the Internet and are thus readily available to resource users and managers.

ICTs have also contributed to job creation. For women, ICTs have created employment opportunities in back office services and call centres. In the Asia-Pacific especially, where women operate 35 percent of SMEs, ICTs are considered to have a good potential to help women entrepreneurs and small business holders[36].

ICTs for Local and Community Development

Successful – that is, sustainable – models of the use of ICTs at the local and community level are limited. According to one study, there are few, if any, examples of successful donor-supported community access or telecentre projects in Africa, Latin America or Asia[37]. However, some more modest models have demonstrated success. Senegal's experience with telecentres operated by private sector entrepreneurs has had great success in extending the reach of the national telecommunications operator. In this case, the telecentres are part and parcel of the business plan of the national operator and there is an existing market or demand for their services. The telecentres are not as exclusively focused on the public good as some of the donor-supported initiatives referred to above, but they are a commercial success[38].

In Malanville in northern Benin in Africa, the community access centre was a major investment for all parties concerned. There was marked interest in computer training, with many women taking courses that were otherwise unavailable to them so that they could better qualify for job opportunities. Similarly, many of the local professionals and managers, including civil servants, used courses at the multipurpose community telecentre to improve their skills. The main lesson here was that the telecentre served a need that was not being met. In Niger, community radios have had great success in allowing people to share local and relevant information.

[36] UNCTAD, 'e-Commerce for Development Report 2002', Geneva, 2001.
[37] UNDP, 'Information communications technology for development essentials: Synthesis of lessons learned', UNDP Evaluation Office, No 5, September 2001.
[38] Fuchs, R. 'The little engine that did: Case histories from the global telecenter movement', IDRC Study/Acacia Initiative, 1998; available at http://www.futureworks.ca/engine/eng_3.htm.

In developing community access centres, it is important to base interventions on local needs and circumstances and the participation of local actors. If there is no local buy-in, the project will not be sustainable. The best way to develop appropriate policies and projects is to undertake extensive surveys of local needs.

China provides a good example of this. China is now experimenting with several models of ICT access at the rural and community levels. A pilot project has been undertaken in collaboration with the Ministry of Science and Technology and has been running for nearly two-and-a-half years. One thousand two hundred households are being surveyed to measure impact and to determine what improvements may be necessary. Survey results are fed back into policy-making at the national level. This model of piloting, testing and surveying does not appear to have been undertaken in a systematic way in many other countries, certainly not at the level proposed in China[39].

ICTs for Greater Access to Information about Livelihoods

Government can put in place policies encouraging various stakeholders – government departments and ministries, educators, publishers, the private sector, local government – to develop applications and provide information about livelihoods. Government portals and other e-applications aimed at helping people find employment or information that can support them in their work have been demonstrated to be very useful in many countries. In some cases, public-private partnerships have been struck to help people working in a given sector buy and sell goods and services.

Virtual agricultural marketplaces exist, bringing together buyers and sellers and those seeking new opportunities for trade in agricultural products and services. Virtual markets have been developed in the US and elsewhere to help bring together suppliers and buyers in given industries. Agri-trader-online is a Chinese online agricultural marketplace trading in agricultural commodities[40] that has registered over 44 million hits.

In Canada, Strategis[41] is a business and consumer portal developed by Industry Canada with the objective of helping Canadian businesses establish themselves in Canada and secure opportunities and markets abroad. Strategis also tries to provide impartial information for consumers through a "consumer information gateway"[42] . The site includes databases listing over 50,000 businesses, including aboriginal businesses, along with a business capabilities index to promote these capabilities internationally. Strategis has proven to be very popular as a model application of interest to other countries and jurisdictions. Governments need to be aware of these and other applications as well as examples of best practices in order to learn from them. They could then apply, adapt and possibly adopt variants more compatible with their own contexts.

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[39] Wang, D.D. 'Note to the UNDP SURF-IT discussion list under the heading: ICTD practice note on rural poverty', First draft, October 8, 2003.
[40] Global Agricultural Trader Online; available at http://www.agri-trader.com/english/index.asp.
[41] See http://strategis.ic.gc.ca/engdoc/main.html.
[42] See http://consumerinformation.ca/cgi-bin/main.cgi?Language=E.

ICTs for Better Government

e-Government, electronic government and government online are various expressions of e-business in government and the public sector. What are the development objectives of e-government? One objective is the modernization of the government and its transformation into a service-oriented public enterprise that works for the public good. These and related development benefits and outcomes are listed in the following box.

A planned and stepwise introduction and use of ICTs in government can lead to the transformation of the public sector into an open, accessible, informative, helpful and user-friendly service for the people. This means going beyond the usual office productivity

Box 3: **Benefits and Outcomes of e-Government**

Key benefits

- More accessible government information and services;
- Faster, smoother transactions with government agencies;
- Increased access to government decision-makers and parliamentarians;
- More local (distributed) access, greater ubiquity;
- Increased participation in government;
- Increased efficiency in government operations; and
- Enhanced opportunities for smart partnerships with civil society and the private sector.

Principal outcomes

- Increase in service expectations by the public and increasing satisfaction of these expectations;
- Increase in the efficiency and effectiveness of government;
- Greater access to and availability of public information: less need to travel and queue;
- Automation of most government services and transactions;
- Increased participation in government;
- Increased public satisfaction with government;
- Increased trust in government;
- Decentralization and strengthening of local government; and
- A stronger national identity.

applications. Collaborative software combined with awareness promotion, training and mentoring, as well as a strong commitment to openness and transparency, are the cornerstones of e-government. Government leaders must show the way and encourage this transformation.

The full benefits of e-government require policy-makers and planners to assess the state of government readiness for transformation into a service-based and client-focused enterprise for public good. There is a tendency in planning for e-government to assume that the introduction of ICTs will lead automatically to changes in behaviour.

Box 4: **Some Key e-Government Applications for People**

- Community-based access centres or telecentres to provide access to government information. In some countries, the aim is to provide public access within walking distance for everyone.
- Web portals in local and other languages:
  - Brochure portals: static information, read only;
  - Interactive service portals (interactive forms: applications, renewals, registrations, etc.);
  - Knowledge portals: health network, business and investment portal + interactive and ancillary services such as e-mail, mailing lists, data and databases, value-added services; and
  - Transactional portals (online tax filing and receipt issuance, online banking applications, online public procurement services, etc.).
- Public kiosks in government offices and public spaces such as clinics or post offices.
- Fully interactive and transactional public procurement portals linked to the major international development portals (UN Business, World Bank and other international financial institutions, as well as other national procurement portals in a given trading block, for example, and beyond, possibly as a result of free trade agreements).
- Smart communities: municipalities and other communities that have mainstreamed ICTs and especially PCs and IP networks for local and community development:
  - Community resources and services, including local shopping opportunities, available online to encourage local shopping and spending. Could include online marketplaces or shopping malls;
  - Creation of a community database where all community-based events are logged and available. Could include a community calendar; and
  - A people database and calendar of events that tracks important dates such as date of renewal of permits, licenses, passports and other documents and authorizations, etc., for users.

This is not the case. A concerted effort is needed to influence the attitude and change the behaviour of government employees and the public that will interact with them. An e-government policy and strategy will be useful, along with an action plan to implement the transformation of government into an e-enabled public enterprise.

ICTs for Crisis Prevention and Recovery

The development objectives here are to improve the quality of life by reducing the risks associated with natural phenomena, to reduce the likelihood of natural disasters, and to help manage disasters and mitigate their impact when they do happen.

ICTs for remote sensing and earth observation as well as analytical applications such as

Geographic Information Systems (GISs) and appropriate communications infrastructure can have an important role to play here. Many early warning systems exist, some supported through international and/or regional entities or collaboration.

One of the best examples is the Famine Early Warning System (FEWS) that has been established in Africa by the United States Agency for International Development (USAID)[43]. Policy-makers need to be aware of these possibilities and the opportunities that they present when developing national ICT policies and strategies.

ICTs for Research, Environmental Observation and Management

The use of GIS and related applications has been described above. However, the deployment of ICT infrastructure, or the so-called cyber-infrastructure, has provided benefits for research, especially for environmental research and management.

Box 5: **ICTs Revolutionize Environmental Sciences[44]**

Cyber-infrastructure, grids and Web services have long been associated with sharing distributed computer resources, but their application goes way beyond that. Perhaps the biggest impact of cyber-infrastructure will be in linking sensor and instrumentation grids to databases and other devices for environment studies, oceanography and other disciplines. Networks of smart sensors are being deployed to monitor and collect information on endangered species, soil and air contaminants, medical patients, buildings, bridges and other man-made structures.

Source: Bill St-Arnaud, CANARIE, Canada and the National Science Foundation, USA, February 9, 2004

The use of ICTs in environmental management is especially important. Computers help collect, analyze, aggregate, interpret and communicate vast amounts of data that are sensed and recorded by a variety of earth observation technologies. A global network of environmental monitoring and collaboration exists in the form of meteorological and environmental services. This network is growing and becoming international. The increasingly widespread availability of wireless technologies is helping this happen everywhere and broadening the network accordingly.

Many countries may not have the human and technological resources to fully exploit these tools and use the available information for research and/or environmental management. For this reason, policy-makers need to be made aware of their availability through various international networks and mechanisms, including the United Nations Environment Programme (UNEP). These networks facilitate international participation. Similarly, a research network linking the USA, Russia and China, which focuses on joint scientific and education projects, has been established[45].

[43] See http://www.fews.org.
[44] National Science Foundation, 'Cyber-infrastructure poised to revolutionize environmental sciences and other disciplines', February 9, 2004.
[45] See http://www.nsf.gov/od/lpa/news/03/pr03151.htm.

ICTs for research and for environmental management are an important area of endeavour. But this is not always recognized in ICT strategic planning efforts. Countries and jurisdictions need to be especially aware of the opportunities that international research represents.

In Uzbekistan, astronomers at the National Academy of Sciences (NSF) were able to benefit from a research grant from the National Science Foundation of the USA and receive ongoing support and exchanges to train and equip a solar observatory and participate in international research networking[46]. Tashkent was selected by virtue of its central position on the Asian continent, a valuable asset in solar observation[47].

ICTs for Health and the Fight against Disease and HIV/AIDS

e-Health applications bring efficiency and productivity advantages to the management and delivery of health and medical services. Some key applications can have an important impact on health delivery. Telemedicine has been considered of great use, although it depends on access to broadband as well as modern medical or hospital services that are not always available in developing countries, especially in the rural areas.

In China, access to information about health has been demonstrated to be a priority in some of the poorer provinces. This is especially important since, with the recent *de facto* privatization of health services in that country, people can no longer get free advice or visit the doctor for free. Access to information about public health issues is a major concern.

In many societies, women are especially at risk because they have fewer opportunities to access independent and trustworthy information about maternal and child health. In some countries, health professionals are predominantly men and this may hinder women's access to medical and public health information. Policy-makers need to be aware of these issues and of ways in which the Internet and community health and access centres, along with radio and television, can serve women and men equally.

Some countries have developed partnerships between governments and civil society organizations (CSOs) working in health care to establish health portals dedicated to helping citizens become better informed in matters related to their own health. An example is the Canadian Health Network[48].

Moreover, the rapid increase in the use of wireless devices presents some opportunities to deliver health messages to patients in appropriate languages and dialects. Short message service (SMS) applications have been developed to remind patients to take their medicine. For chronic diseases such as tuberculosis and AIDS, these applications have proven to be very

[46] Labelle, R. Personal observation recorded during research for UNDP Uzbekistan in preparation of the Programme Area document on Human Development for Change, Tashkent, December 2000.
[47] For more information and resources on ICTs for environmental management, check out the NSF press release at http://morris.canarie.ca/MLISTS/news2003/0164.html.
[48] Government of Canada, Health Canada; see http://www.canadian-health-network.ca/special/aol_home_e_pub.html.

effective[49]. Policy-makers also need to be aware of these specialized applications for the delivery of health services.

ICT AS AN INDUSTRY

The ICT industry is either service-based or focused on hardware manufacturing and/or assembly. Some companies are involved in all aspects of the business. A national ICT policy can contribute to the establishment, development and growth of ICT businesses by providing incentives and support to this sector. This can include giving consumers incentives to buy the products and services offered by the ICT industry.

Incentives could also take the form of encouraging foreign partnerships or joint ventures, including foreign direct investment, as well as empowering local businesses. Encouragement can include tax incentives and reduction or removal of taxes on the import of computer hardware and peripherals on the assumption that the resultant economic benefits will far outweigh the loss of revenue. Other incentives include encouraging access to credit, lowering taxation rates or providing tax holidays, etc. These incentives encourage the creation of a demand and a local market for ICT goods and services.

As already mentioned, a recent report by UNCTAD[50] states that TNCs exert an influence on ICT development and diffusion since they control much of the market for development and sale of cutting-edge technologies. The lack of skills and capital prevents the entry of newer and smaller firms.

Countries may, therefore, want to consider policies that will encourage national investment by TNCs as a way of helping local firms, especially small, medium and micro enterprises (SMMEs), gain the necessary skills and technologies to participate in what is becoming an increasingly closed marketplace. Costa Rica, which succeeded in attracting Intel, provides a good example of this[51] as do many of the Asian Tigers.

Beyond the use of classical fiscal incentives, policies that actively strengthen the capacity of local businesses are also needed. These policies should target those local firms – SMMEs really – that have the potential to become "flyers", as Duncombe and Heeks have put it. Otherwise, the effort may be dispersed. As already mentioned, the creation of business incubators to help build local capacity may be required. Business incubators strengthen the entrepreneurial base of a country or jurisdiction[52]. Governments may support business incubators as part of their policies to promote economic development.

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[49] http://www.Bridges.org, 'Case study: The compliance service uses SMS technology for TB treatment', ICT-enabled Development Case Studies Series: Africa, IICD and Bridges.org, 2003; available at http://www.bridges.org/iicd_casestudies/compliance/index.html.

[50] UNCTAD, *Investment and Technology Policies for Competitiveness: Review of Successful Country Experiences*, Technology for Development Series, UN, Geneva, 2003.

[51] Gonzalez, A. *Key Drivers for Investing in Costa Rica: The Intel Case*, OECD Global Forum on International Investment, New Horizons and Policy Challenges for Foreign Direct Investment in the 21st Century, 2001; available at http://www.oecd.org/dataoecd/53/53/2407839.pdf; Nathan Associates, 2003, 'Successful integration in the global economy: Costa Rica and Mauritius', Research report, USAID; available at http://www.dec.org/pdf_docs/PNACS269.pdf.

[52] UNIDO, 'Business incubators: The concept', 2003; available at http://www.unido.org/en/doc/3736.

Two Approaches to Building the Capacity of Business

There are two approaches that can be considered for building the capacity of businesses.

Approach I: Building the capacity for businesses to use ICTs

This approach would include building capacity to use productivity and efficiency applications as well as collaborative software and other specialized business applications necessary for e-commerce, such as specialized Web- and Internet-based applications, electronic data interchange (EDI) and electronic funds transfer (EFT), among others. For export-oriented firms, the ability to use e-enabled customs trading services, if available, is an important component of SMME capacity building.

Government policies to strengthen and support the competitive capacity of local firms should include support for e-commerce trading and customs clearing applications such as the Automated SYstem for CUstoms DAta (ASYCUDA) e-trading system[53].

This system has been demonstrated to reduce rent seeking behaviour and graft, and help countries collect tax. The advantages are significant and represent an important source of income for the government. An efficient and transparent customs clearing operation greatly contributes to good governance and encourages companies to adopt modern technologies and management practices, to better participate in local, regional and international markets.

The World Customs Organization (WCO)[54] helps its members enhance national economic wealth and social protection by promoting an honest, transparent and predictable customs environment. This allows legitimate international trade to flourish and effective action to be taken against illegal activity. The WCO has developed a customs capacity-building strategy that is downloadable online[55].

Approach II: Strengthening competitive capacity of the national ICT industry

The second approach involves support for the creation and/or strengthening of the national or local ICT industry. This may require some of the interventions already mentioned, as well as an industrial development policy focused on enabling the ICT sector and attracting TNCs. Policies that make it easy for firms in the ICT sector to operate may need to be developed, in a manner consistent with established international and regional trade rules and practices.

Policies to Support the ICT Industry

For larger players, especially international firms such as large financial institutions, policies that encourage and facilitate the use of e-commerce tools and applications will be important. This means policies that legitimize electronic signatures and contracts. It also means policies

[53] See http://www.asycuda.org.
[54] See http://www.wcoomd.org/ie/En/AboutUs/aboutus.html.
[55] See http://www.wcoomd.org/ie/En/en.html.

that establish the basis for secure transactions over the Internet and use of wireless devices, and facilitate the use of EDI and EFT transactions. These are the necessary building blocks for e-commerce.

Smaller, and usually local, firms will need support to develop capacity to use ICTs and benefit from e-commerce. Also needed are policies supporting entrepreneurs in the ICT industry in their efforts to establish firms able to compete locally and abroad. Business incubators may be useful in building the capacity to use generic e-business applications.

More importantly, they can help ICT firms establish themselves by providing logistic and strategic support for business planning and for helping firms tap into networks of contacts and expertise as well as new markets and venture capital.

Incubators can provide coaching and mentoring, some of which may come from investors with the requisite experience and technical know-how, to help the firms establish themselves. This may be easier to come by if efforts are exerted to attract world-class ICT companies and TNCs.

Government policies should aim to support entrepreneurship, especially in the ICT sector. They should help drive the demand side for ICT goods and services, especially PCs, peripherals and related hardware and software, including wireless devices.

Promoting the use of ICTs and the development of the ICT industry will also be closely associated with support for the private sector in general. Businesses need to first adopt sound business practices and develop a sound business plan. Governments need to create conditions that encourage the development of the private sector and recognize the importance of market mechanisms that encourage open competition. For most businesses, ICTs are not ends in themselves but tools to facilitate business processes.

For the ICT sector, policies should aim to strengthen the competitive and comparative advantage of hardware and ICT service providers locally, regionally and internationally. Some countries have policies favouring local companies over foreign-owned companies. Such policies may be difficult to justify under current trading regimes and with the WTO because of their discriminatory nature. Efforts to strengthen the capacity of local businesses, especially SMMEs, are easier to justify.

Many countries have policies supporting and promoting SMMEs because of their potential to create employment at the local level. This applies to all SMMEs, whether in the ICT sector or not.

Incentives to develop demand for ICTs, especially for PCs and peripherals, need to be considered. Many countries have dramatically reduced, if not eliminated, duties on the import of PCs and peripherals. Other policies to encourage greater access to credit are also important to stimulate demand from the public.

International Business Opportunities

The global economy is information-driven and the ability of local firms to compete will be tied to their ability to use appropriate information technologies and management practices. In addition, adherence to WTO agreements will be important in helping ICT firms establish a foothold in foreign markets. Policy-makers seeking to encourage local businesses in the international marketplace need to be aware of these requirements and tendencies.

One of the biggest opportunities for ICT businesses is offshore information technology outsourcing. Ireland and India are the established leaders in this area. Several other countries are trying to establish their presence in this market. However, gaining a foothold does not come easy. In India, revenues have been estimated at US$7.7 billion. However, Indian firms have also spent billions in order to establish the business relationships in the first place.

Many countries have shown great interest in participating in the off-shore outsourcing market. Policies that encourage this outsourcing must be considered, given the potential benefits. Market assessments need to be undertaken to properly determine the opportunities, costs and risks associated with these endeavours. There is great enthusiasm about the opportunities that global outsourcing represents. However, the gains are not easily realized as competition is severe.

Development of ICT Policy and e-Strategies

WHAT ARE ICT POLICIES AND E-STRATEGIES?

National ICT policies help guide a country or jurisdiction in its use of these tools and secure the benefits of the information economy for all. ICT policies require to be planned in order to marry the needs of people with the opportunities and possibilities that are available through the use of ICTs. Policy-making must be based on the best information and intelligence available. It should be undertaken in consultation with stakeholders to help secure beneficial and realistic outcomes.

ICT policies deal with issues related to information dissemination and use as well as issues related to the spread and use of the technology itself. This Guidebook considers both.

Policies alone address specific issues. When considering a larger whole, such as the development needs of a community, jurisdiction or country, it is necessary to think in terms of a strategy, in this case an e-strategy. A strategic approach denotes a process involving analysis of priorities and constraints before arriving at a recommendation for the resolution of a given issue.

One of the main objectives of ICT policies and strategies is to ensure the greatest possible diffusion of ICTs, commensurate with national needs, ambitions, specificities and concerns. Thus, information and ICT policies must take into account local, national and international issues, as well as sectoral concerns.

An ICT policy for national development requires policies for learning and education, government, private sector and industrial development, local and community development, empowering women and other groups, and promoting research and development especially in applied sciences. Only then will it ensure that content on the Internet is relevant and reflects national specificities while protecting IPR, and so on. The strategy to deliver ICT policies has to consider institutional and operational issues. An action plan details the organization required to implement the strategy.

ICT policies and strategies need to be integrated into broad development concerns and mainstreamed into all aspects of society and of development planning. Since these issues are

largely cross-cutting and interrelated, a participatory mechanism is essential to ensure that policies will correspond to real concerns and be supported by stakeholders. For the same reason, it will be useful to consider establishing an independent entity created by the government or identifying an independent organization or a not-for-profit association to manage and implement the ICT strategy.

Definition and Examples of e-Strategies

e-Strategies are plans based on the selection of scenarios and options for applying ICTs to national development. They apply specifically to sectors such as e-commerce, e-government, e-learning (which is sometimes confused with distance learning), e-health (which is sometimes confused with telemedicine), and related e-enabled sectors and activities. Simply put, these e-enabled activities are the application of ICTs to the usual business processes that are specific to each sector and area of human activity. In some cases, the introduction of ICTs radically transforms the way things are done. A good example of this is the introduction of Voice over IP (VoIP) technologies or EDI applications.

Putting Together an e-Strategy: the Components

There are several parts to an e-strategy: the assessment, the vision, the strategic plan itself, the action plan or master plan for implementation and the consultation plan. Also included are the institutional mechanisms for implementation and supervision, as well as monitoring and evaluation.

The assessment is based on consultation, research, facts and figures, perceptions and observations[1].

Consultation, which must be ongoing, is required in putting together an ICT4D e-strategy so that the outcomes have a better chance of succeeding because they are more likely to meet the expressed needs of stakeholders. Steps have to be taken to ensure that consultation is representative and that marginalized groups, such as women, the poor, rural dwellers, youth and the handicapped, are included.

The action plan for implementation can include detailed projects, their outcomes, and indicators of success, intended results and their justification, risk assessment and mitigation, cost and other detailed resource requirements. It also includes a schedule for implementation.

Institutional arrangements for implementation may require that an organization be designated as the agent responsible for the strategy and the action plan. In many cases, this organization is associated with or attached to a high-level government decision-making body such as Parliament or the Office of the President. The dedicated organization has the authority and full support of the chief executive and government. In some cases, the organization responsible for implementation is separate from the institutional arrangement responsible for overseeing.

[1] The World Economic Forum Africa Competitiveness Report is based on perception and observation.

For example, a draft Mongolia ICT Action Plan prepared in 2000 called for the creation of an ICT Advisory Council to oversee the strategy and an ICT Development Agency to undertake the work, including infrastructure development, to make it happen[2].

The strategy and the action plan are dynamic and change over time. They are rolling plans with a continuing time horizon of three years and a medium- to longer-term horizon that is predetermined. The vision, strategy and action plan are also marketing tools used to communicate the intentions of the government and supporters of the strategy to use ICTs for human and national development. Some jurisdictions have created an ICT observatory or equivalent structure with responsibility for monitoring, evaluation and follow-up.

Approach to ICT Policy Formulation and e-Strategy Development

1. Review existing policies and plans.

The starting point in ICT policy formulation is a review of existing vision statements, policies and legislation, as well as proposed policies or policy directions. This includes developing an understanding of national and other development policies and plans, including national poverty reduction strategies.

2. Consider the regional context.

Initial work in learning about the policy environment may also require understanding the regional context. This is important especially if the country in question belongs to or is interested in integrating with a regional or other trading block and/or establishing free trade agreements on a bilateral basis.

Regional agreements may stipulate conditions that affect ICT diffusion. Similarly, as a result of the widespread use of satellite technologies, the growth and meshing of computer networks of various types, and the proliferation of fixed and mobile wireless solutions, cross-border agreements may also have to be considered. Indeed, there may be real advantages to a common approach to the diffusion of ICTs.

Just as in some regional trading blocks, electricity grids are established across national and other boundaries to share regional resources, so may high-speed broadband connections be shared in this fashion as IP networks are considered a public utility.

Indeed, sharing of undersea cabling is essential for justifying the business case for these investments. Today, they represent significant assets and opportunities for countries with the landing rights for the cable access points. In Mongolia, a fibre-optic network crosses the country from north to south as it follows the path of the main railway line. The southern terminus of this line meets a Chinese railhead with its own fibre-optic cable. The potential of linking such

[2]Labelle, R. 'Draft plan of action: ICT development in Mongolia over the period 2000-2003', prepared for UNDP Mongolia, 2000; available at http://www.eurasianet.org/resource/mongolia/links/MnICTPlan.htm.

***Table 1**. Regional Issues and National ICT Policy*

Issues	Comments	Example
Regional broadband connectivity	• Create investment consortia to share overland/undersea fibre cables • Landlocked countries must negotiate access to marine undersea cables	• FLAG, Trans Asia Europe (TAE) cable, etc.
Regional trading blocks	• Treaties and other obligations between neighbours may influence ICT policy	• ASEAN and other blocks
Wireless networks	• Need to ensure interoperability between regional markets • Sharing wireless infrastructure such as towers, hills, tall buildings	• GSM, CDMA
Standards and interoperability	• Use same standards as neighbouring countries	• GSM, CDMA
Regional service operators	• Regional or international satellite service providers may offer services • Policies that encourage/limit access may be required	• DirectWay, Hughes satellite Direct and others
Network security issues	• Adherence to international efforts to combat cyber threats and online insecurity in general	
Internet governance	• Greater involvement in ICANN and regional, and especially national, Internet governance bodies and/or discussions • More transparency in the allocation of IP numbers and domain names	• ICANN • APNIC • APIA
Services available regionally	• Larger economies may provide services to smaller economies	• Satellite and other broadband services

infrastructure exists and the idea of creating another transcontinental fibre link to Russia and Europe via Mongolia could be contemplated.

3. Keep a broad perspective.

As already mentioned, ICT policy-making has the greatest chance of being successful when undertaken in a pro-development way, as the Digital Opportunities Initiative (DOI) report has shown. The DOI, a research project completed in 2001 by UNDP, the Markle Foundation and Accenture, examined the evidence of ICT diffusion around the world while looking at the evidence of success and failure. The next step is to consult extensively with key development stakeholders, starting with government decision-makers and policy-makers. Parliamentarians may also need to be approached.

The Types of Strategies

Although each country and jurisdiction has its own specificities, the development status of a country or jurisdiction is greatly affected by several factors. These may be the level and extent of poverty, instability due to conflict, diseases such as HIV/AIDS, as well as reconstruction and reconciliation efforts in post-conflict situations. The capacity to implement an ICT strategy and action plan under these and similar circumstances is likely to be very limited. Proposals need to be consistent with national capabilities. Does this mean that a different approach needs to be considered when developing ICT strategies for poor or less-developed countries and those at the bottom of the HDI rankings? Based on experience gained in many countries, it is best to avoid generalizations, but there are some issues that need to be taken into consideration.

Even in the poorest of countries, there are opportunities; and leaders and actors at all levels who are prepared to make a difference. The scale and pace of the interventions proposed may need to be reduced, but the opportunities remain. Even the poor have ambitions and can recognize an opportunity when they see one. Take Niger, for example, one of the poorest countries in the world located in the Sahel region of Africa. Here, a surprising level of interest was demonstrated in the use of community radios. Twenty-seven community radios were installed by 2002 and 20 more are planned. The ambition is to install them in 160 different communities throughout the country.

ICT strategies and the accompanying efforts that they entail, including e-readiness and other user needs and market assessments, can lead to novel, workable and promising interventions. For poorer countries or regions, these are not likely to be on the same scale as in countries where there is more capacity. In poorer countries, it is most important to ensure that ICT strategizing takes into consideration efforts at poverty reduction as well as other development initiatives. This, of course, applies to all countries and not only in dealing with poverty. But in poorer countries, ICT strategies must be consistent with national poverty reduction strategies (PRSPs) as well as other national development initiatives. In these conditions, ICT strategies will need to focus on capacity building and especially on education.

Distance learning is another application of ICTs that may have an important role to play in

poor countries as well as those in post-conflict transition, where Internet access is available. In all countries, regardless of poverty levels, parents will do their utmost to help their offspring take advantage of opportunities to learn and advance. Hence, their is a need for a special focus on the role of ICTs in education.

Poorer countries will not have the infrastructure to support their full transformation and inclusion in the information economy. Efforts to support key government departments and sectors of the economy will be a priority. ICT deployment is best considered a part of efforts to strengthen the capacity of government, the private sector and communities. As poorer countries will more likely be faced with human survival issues, several questions will have to be posed. To what extent can the country afford to invest in ICTs when basic human needs are not being met? Better still, how can ICTs assist the country in meeting its basic human development needs at the national, local and community levels and in different sectors across the country or jurisdiction in question?

APPROACH TO ICT POLICY FORMULATION AND E-STRATEGY DEVELOPMENT

Setting Macro-strategic Goals

In planning for the use of ICTs, there is sometimes a tendency to focus on the rollout of technology, especially hardware and computer applications as measured by the number of PCs, the cost of Internet access, etc. ICT statistics, especially Internet diffusion statistics, are readily quoted in the media. Many studies compare the level of e-readiness between countries in terms of the number of PCs per capita or the number of Internet sites, for example. However, it is best to remember that ICT strategies exist to support existing development priorities, not the other way round. The DOI report makes this clear.

Use a development approach, based on the DOI report

When comparing policies adopted by various countries, the DOI report made it clear that those that were most successful in making beneficial use of ICTs for national development had adopted an integrated approach to ICT diffusion. Instead of focusing on ICT deployment in a given sector of the economy, such as software development or industrial development, these countries used a broader and more general approach to ICT deployment to meet their objectives and to ensure that ICT diffusion benefited as many people as possible. This multi-pronged approach builds the capacity of society as a whole to use and benefit from ICTs. The evidence is clear: mainstreaming is the approach to take in ICT policy formulation for national development. At the same time, a cross-disciplinary approach is required, since there are some crosscutting issues related to infrastructure and need.

Policies should be expressed in terms of their development objectives

In practical terms, this means that ICT policies should be directly related to a development objective or outcome. In the ICT strategic planning exercises that we have undertaken, we have found it easiest to explain the intentions of the policies and decisions that accompany

policy proposals, if they can be related to the creation of some sort of public good such as greater access to educational opportunities or jobs. So instead of a policy on infrastructure – e.g., the creation of a metropolitan area network (MAN) – it is easier for stakeholders to speak in terms of the development outcome. This could be to build the capacity of a city, by benefiting from recent information access technologies, to increase the efficiency of local government, attract investment and jobs, strengthen the business sector and enhance competitiveness. The immediate objective here is to create the network.

In summary, the following principles of ICT policy and strategy development and implementation are proposed:

- Promote the greatest access possible to information and ICTs that are consistent with national and human development goals. This means that everyone and every group should be included. Leave no one behind;
- Adopt an integrated and pro-development approach, with positive impacts on people, rather than technology deployment, as the main outcome;
- Base policies and interventions on local needs assessments and on what the market can bear;
- Be realistic. Many national strategies will never be implemented because they do not correspond to local, regional and international realities;
- Adopt a participatory approach in all steps in the development and implementation of the vision and the ICT strategy. Consult widely and often and do not forget the marginalized community; and
- Promote partnerships between development actors, especially public-private partnerships.

Other complementary approaches have also been suggested. Accascina[3] suggests six components as part of a multi-pronged approach to information-driven change within and across developing countries and regions:

- Coordination of ICT policy within and across countries;
- National level assessment of the present ICT situation, problems, opportunities and trends;
- Information access and availability of technical capacity;
- Multi-level human capacity building;
- Government information systems designed for efficiency, transparency and equitable access, including access to social services; and
- Information and communications technology applications and interventions for poverty alleviation.

In a current review of National Information Society Policies, UNDP's approach, which is based on the DOI report, is summarized as follows[4]:

[3] Accascina, G., 'Information and Communications Technologies (ICTs) as Development Tools', background paper commissioned by the Italian Government 2001; avaialable at http://www.it4dev.net/papers/ICT_in_DC.pdf.
[4] Rohozinski, R. 'Draft - Practice note on national information society policies (e-strategies)', UNDP, Version 1.0a 10/07/13 (RR), 2003.

- An accent on development issues;
- The centrality of policy frameworks (the potential benefits of ICTs are conditioned by the existence of an appropriate enabling environment);
- An emphasis on a multi-stakeholder participatory approach; and
- A premium on partnerships.

Micro-strategic Goals and Other Considerations

Sectoral concerns in the development of ICT policies and strategies include:

1. National development goals.
2. National vision.
3. Broad sectoral issues dealing with:
   - government;
   - telecommunications;
   - private sector (e-commerce);
   - health;
   - learning (education, research and training, including lifelong learning and professional development);
   - the ICT industry;
   - research and development (part of learning, but focused on science and technology);
   - the Internet, especially WWW content; and
   - local and community development.

I. Development outcomes brought about by ICTs and access to information

ICTs and information help people lead better and fuller lives. The development outcomes sought contribute to human development and to the achievement of MDGs. The same approach used in development planning, especially in planning human development outcomes, needs to be considered when planning for using ICTs.

Development planning operates on all sectors of the economy, at all levels of society throughout the geographic range of the jurisdiction concerned. Outcomes should benefit all of these sectors and levels and act throughout the country. The same applies to planning for the use of ICTs for national development.

At the national level, the outcome sought will invariably lead to a higher level of development, based on economic indicators and indices of human development such as HDI. Countries will want to promote national self-sufficiency and the capacities of citizens to find meaningful employment.

Malaysia provides a good example. By 2020, Malaysia will be an industrialized country according to accepted norms for defining an industrialized country, that is, norms based on those set by the OECD Development Assistance Committee. This implies a whole set of societal transformations for the development and application of the capacity needed to meet this outcome and overcome any given constraints.

However, it is also important to think in terms of more local areas of intervention and the outcomes that are sought at this level. Local and community development as measured by improvements in access to and/or delivery of some services may be a benefit sought in development planning.

Harnessing ICTs for local and community development means thinking about outcomes that will benefit regions, municipalities, cities, towns, smaller communities and more remote areas. While countries will consider how to transform themselves into information- and knowledge-based societies, communities may want to think in terms of smart cities or regions or in terms of community-based sharing in the benefits of greater access to information and knowledge for local economic and human development.

II. Examples of development outcomes sought

Outcomes for people and communities. There are two overarching outcomes sought for people: ICTs should contribute to self-sufficiency and empower those who use these tools as measured by income, employment, level of education and job satisfaction figures, for example:

- National outcomes. These can include a higher level of development as measured by HDI and economic indicators such as GDP, GNP, etc;
- Increased access to education as measured by the level and quality of graduates, and especially by their employability, based on currently used measures of educational achievement and employability;
- Greater participation in the global economy as measured by figures for trade and exports in goods and services;
- More economic growth and diversification as measured by GDP in general and contributions from many different and diverse sectors of the economy;
- More equitable distribution of economic benefits throughout the country and across sectors of the economy and throughout different levels of society; decrease in poverty levels and marginalization;
- Increased contributions to GNP by specific sectors;
- Increase in employment figures; more women are employed in e-economy related tasks, for example;
- Increase in ICT use: PCs, bandwidth, hosts, servers, cell phones, certified staff, businesses, investment, content five- or ten-fold over time;
- Increase in national or local share of content on the World Wide Web; and
- Increased share of GDP derived from use of ICTs.

III. Government

- Development objective: Modernization or transformation of the civil service into a service-based operation with citizens as the main beneficiary.
  - Collaborative software tools encourage sharing of information as well as the opening up, and development of an information culture in the civil service, both among and between parliamentarians and their constituents;
  - Greater access to government decision-makers and civil servants helps instil a service

mentality among them and helps transform the government into a service-oriented organization.

- Improvements in governance:
  - Government decision-makers are more accessible;
  - There is easier access to government information and services;
  - There is more equitable access to government opportunities: contracts, jobs and procurement;
  - There is better ability to plan;
  - There is greater transparency in government business, including parliament and procurement;
  - There is greater efficiency in government operations, and lowered government operating and carrying costs (i.e., a smaller and more efficient civil service), leading eventually and hopefully to lower taxes;
  - There is increased communication between parliamentarians and their constituents;
  - Support for government decentralization efforts by strengthening communication and collaboration between local, regional and national levels of government; and
  - Governments become more solvent and better able to respond to public needs and contribute in a positive way to economic growth as a result of:
    - Use of e-enabled customs clearance services, which increases efficiency and trade competitiveness, encourages the private sector to modernize and to adopt e-business, brings in much needed tax resources and reduces rent seeking behaviours and other forms of corruption;
    - Efficiencies and cost savings incurred through the use of ICTs;
    - More effective use of civil servants;
    - Reductions in the number of public employees; and
    - Increased efficiency in tax collection as a result of electronic registration of businesses and integration of computerized systems; online collection of taxes may also contribute to improved ability of governments to collect taxes.

IV. Private sector

- The cost of doing business decreases as a result of increased access to and efficiencies resulting from ICTs and telecommunications infrastructure. However, this may not be applicable to all types of businesses. SMEs and businesses that are set up in rural and poorer areas may not have the human capacity or the necessary access to infrastructure to be able to benefit from these tools.
- Markets become more accessible and more efficient. This is brought about by greater access to information about the market and its operation. Business operators and investors at all levels, across a country and even beyond, can participate in a market.
- There are more job opportunities for women in ICT services[5].
- Transaction processing decreases as a result of the widespread use of e-business technologies and practices, and especially as a result of the use of EDI and EFT.
- The economy becomes more open to foreign scrutiny and investment as a result of greater access to information and advice online.
- Opportunities for tourism increase as a result of an increased online presence advocating

[5]UNCTAD, 'e-Commerce for Development Report 2002', Geneva, 2001.

and selling tourist experiences in the country.

- There is more investment, business development and job creation as a result of:
  - The creation of an enabling environment that constitutes a comparative advantage and compels investors to locate their businesses in the jurisdiction in question (e.g., Costa Rica and its efforts to attract Intel to establish a plant in Costa Rica; Singapore creating a business-friendly environment for R&D that has attracted many companies to establish their regional operations in that country);
  - Accessible ICT infrastructure; and
  - Access to infrastructure and incentives, as well as a trained and technically competent workforce.

V. Education and learning

- Better educated citizens as a result of more access to increasingly diverse, more interactive and better adapted learning opportunities as well as resources.
- Better and more learning experiences because of:
  - more interactive resources available online;
  - more appropriate resources available because they are better adapted and accessible in terms of language and format, for example; and
  - more intense interaction between teachers and learners, and among learners through online discussion.
- A better qualified workforce and more qualified technicians and managers, especially.
- Greater access to education and learning opportunities for all, especially for girls and women who have so far not been able to take advantage of these opportunities for cultural or religious reasons in some societies.
- Greater access to cutting-edge technologies and management practices.
- More effective use of teaching resources.
- Increased efficiency in teaching.
- More graduates able to meet internationally accepted educational levels and skills.
- More access to higher education and specialized training.
- More opportunities for lifelong learning.
- Fewer requirements to travel to foreign locations for schooling; more opportunities to use e-learning and related practices such as distance learning, to complete educational requirements. At a time of global instability, when countries are increasing ethnic profiling and screening, e-learning technologies offer an option for those who are or who feel they are excluded or selected against.
- More awareness of international trends.
- Greater involvement in international events, business opportunities, negotiations and networks of all types.

VI. Research and development

- Better quality, increased relevance and capacity of national research.
- Creation of an R&D base to support national ambitions as well as the needs of society as a whole and of the private sector, in particular.
- More research collaboration and networking; increased participation in international research activities, meetings, consortia; improved access to international research grants

and funds, exchanges and public-private partnerships leading to increased investment in R&D.

VII. Health

- A healthier population; a population free of disease and AIDS, as a result of:
  - Increased access to quality health care for all;
  - Increased awareness of disease risks, especially those associated with sexually transmitted diseases (STDs);
  - Increased access to health information and services, including specialized diagnosis and prevention information, as well as increased participation in international disease prevention and early warning networks and systems (World Health Organization, the Center for Disease Control in Atlanta, USA, etc.);
  - Increased health research networking and access to relevant health sciences information and databases; more opportunities to take advantage of health research;
  - Increased effectiveness of health care and disease early warning and prevention efforts, as well as disease treatment (international monitoring and early warning of epidemics); and
  - Better ability and capacity to follow up and treat chronic diseases such as tuberculosis and HIV/AIDS (anti-retroviral treatments and follow-up using SMS).

VIII. Local and community-based groups and organizations

- Viable rural communities as a result of ICTs connecting these communities to the mainstream of economic and social activity. This can be achieved through community-based access services and by connecting schools, health centres, local administrations, local businesses and individual residences to the Internet, coupled with activities such as training and mentoring.

IX. NGOs and special interest groups as well as other social networks

- Improved ability of NGOs to participate in community and national life as a result of increased awareness and access to resources and other like-minded groups and organizations.
- Greater access to resources, including financial resources, as well as partnerships.
- Improved ability of associations of young people, the handicapped, the marginalized and other groups to take advantage of information and knowledge resources for their own purposes, including development and empowerment.

X. Women's groups

- Increased awareness of and access to opportunities in education and work for women.
- More opportunities to work at home and in safer working conditions or environments (e.g., call centres or information processing centres).
- More networking of women on issues of common concern.

e-Readiness Assessments

Most e-readiness assessment methodologies are rapid assessment tools designed to measure the diffusion and potential use of ICTs in a country. This means analyzing ICT use in all sectors of the economy and at all levels of society. Some e-readiness assessment methodologies are undertaken from the perspective of business or economic development. Therefore, they rarely consider the role of ICTs in less productive areas of society such as in remote and rural areas and especially among the poor or less economically productive elements of the economy.

For some, looking at ways of strengthening the capacity of the poor to contribute to the economy is bound to fail. They think that it is better to focus on the productive side of the economy than to waste meagre resources on the non-performing poor. e-Readiness methodologies such as those used by *The Economist* fall under this category[6]. Consider the following:

> "e-Readiness is shorthand for the extent to which a country's business environment is conducive to Internet-based commercial opportunities. It is a concept that spans a wide range of factors, from the sophistication of the telecoms infrastructure to the security of credit-card transactions and the literacy of the population. Countries need to tick off a long list of prerequisites, we assume, before they can stimulate the creative ferment that the US has witnessed over the past five years."[7]

Some e-readiness reports read like a post-mortem analysis. They identify areas of health and those that need to be remedied to reach a higher state of readiness, as exemplified by the achievements of some industrialized countries. This *post facto* analysis is a limiting factor in many e-readiness assessments. Indeed, many assessments, including some listed by www.bridges.org, do not even concern themselves with the requirements of people for ICTs and information. There is a need for a better understanding of what people want and what the market can bear.

A pro-West bias in assessment methodologies?

While undertaking an assessment in the context of an ICT strategic planning exercise, one specialist recommended bluntly to this author that the best way for the country to move ahead and use ICTs was for everyone to learn English.

e-Readiness methodologies should be more people-centred and deal with human circumstances, instead of merely being a prescriptive analysis of a given state compared to what exists in industrialized countries. In-depth user needs assessments and market analyses can be very helpful. In rural areas and among poorer or more marginalized communities, they are essential.

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[6] Economist Intelligence Unit eBusiness Forum, 'The Economist Intelligence Unit/Pyramid Research e-readiness rankings', 2001; available at http://www.ebusinessforum.com/index.asp?layout=rich_story&doc_id=367.
[7] See http://www.bvom.com/news/english/news/index.asp?.sequence=3767&.this=64.

Cultural sensitivity has to be applied as well. Some countries will have to be concerned about the impact that greater – indeed unfettered – access to ICTs may have on the cultural and learning landscape that their citizens, especially their learners and young people, are exposed to.

In some countries, such as Canada, greater access to the Internet and broadband connectivity has prompted the government to seriously consider ways of encouraging consumers to buy at home and not only from US-based online retailers such as eBay, Amazon and others. There is a real concern that the downside of the ubiquitous access to broadband Internet connectivity will lead to the hollowing out of the business sectors of small towns and communities. This aspect of e-readiness assessment is rarely considered, yet it is important.

Methodologies that are more inclusive have been used and adapted to various national situations[8]. Inclusiveness must include measuring society's readiness and potential for taking advantage of ICTs. The Harvard CID Methodology has proven adaptable.

Some methodologies can be applied online without any or very little in-country consultation. In our research, we have undertaken remote analysis of ICT diffusion. With the proliferation of the Internet, such analyses are easier to perform. But do they really paint an accurate picture?

Based on our experience, nothing can equal *in situ*, hands-on e-readiness assessments that include a strong marketing component to really assess constraints, risks and opportunities. Without these, it will not be possible to develop appropriate scenarios and realistic plans. Bridges.org speaks of digital divide analysis as a complement to e-readiness assessments. Without these complementary analyses, e-readiness assessments are largely insufficient in painting a broad-based picture in support of ICT4D.

Strengthening e-readiness assessments

To strengthen the methodology for e-readiness assessments to provide more and better information about human development concerns for creating ICT strategies and action plans, the following is proposed:

- Adapt e-readiness assessments to the needs of all people, including the marginalized, the poor, rural dwellers and others.

Several e-readiness assessment methodologies listed on the Internet are not concerned with the poor and other non-business users. The poor are relegated to the zero column and completely forgotten – they do not compute! It is necessary to strengthen assessment tools so that they better reflect the needs for ICTs strategizing from a human development perspective.

e-Readiness is supposed to be about potential. Information from all people is needed and can often be very important and useful in understanding local specificities, constraints,

[8] These are described at the bridges.org site: http://www.bridges.org/.

opportunities and options. Without information about people's needs and circumstances, the challenges they face, and their understanding of the issues, ICT strategies cannot be complete. e-Readiness assessment methodologies should capture this kind of information.

One way of doing this is by talking to people and asking them about their concerns. In field work undertaken in China and Botswana, several issues were considered important in understanding factors affecting the use of information and ICTs, and the challenges and opportunities that may exist. These were the development status and priorities of the community, its information needs and the communication vehicles used by people who live there.

Stakeholder and Consultative Process

In order to have the greatest chance of succeeding, ICT policies and strategies, like many other social initiatives, require participation and support from all sectors of the economy and all levels of society throughout the country.

Public consultations are the norm in many countries, especially at the formal launch of an event. However, these consultations are often not undertaken on an ongoing basis and in many cases, there is no institutional or legal mechanism that builds consultation into the process. Consultations are needed to ensure buy-in and support, and to limit resistance from various groups. Even then they may not succeed, or may not be possible to carry out for political reasons.

Consultation can take many forms. To ensure the greatest participation possible, a stakeholder participation plan may be helpful, along with a regular and institutionalized process that builds in consultation at all stages of policy and strategy development and implementation.

Models of stakeholder collaboration

Some ideas for stakeholder collaboration and project implementation have been discussed above. Some examples are:

Round table meetings, which are more or less public gatherings of representatives of involved stakeholder groups. Round table meetings discuss issues related to implementation and usually call for many participants to come forward. The consultations can yield useful insights but require much energy to organize and manage, depending on the number of participants. Round table meetings should be organized on a regular basis and involve a core of interested and affected stakeholders.

Focus group discussions involve small groups of people who are selected because they are representative of a given target group. Focus groups can be very helpful in determining whether projects are on track. They can be helpful in trying to understand how the public may react to certain ideas or policies because participants may not be specialists. In some cases, focus groups are relatively homogeneous (for example, they are made up of young entrepreneurs), for the

purpose of getting a preliminary understanding of a particular group or market so that this information can feedback into the planning process.

The participation of representatives of key stakeholders in the governance of the ICT strategy and action plan is another example. This could include participation in the board of trustees, and/or during implementation as part of the implementation team. The former is probably the better solution.

Online consultation and exchanges are another example, but are not that useful in many countries where online access is not readily available. Online consultations, however, do allow for outside consultation as and when desired or deemed appropriate.

Agreeing on priorities: how?

Priorities can be agreed through consultation and negotiation. If the time for negotiation is not right, then launching the ICT initiative may not be opportune or the initiative should be on a smaller scale, e.g., only in part of a jurisdiction or to deal with some specific issue or sector.

The consultation may work at a more local and manageable level and may lead to success in delivering benefits to intended target groups. Then, a visioning or strategic planning exercise and/or consultation can become the basis for a larger application of a process leading to a national strategy or example. In this case, it may be useful to start small before moving to a broader initiative.

Brainstorming ICT strategies – some considerations

Developing ICT strategies is a collaborative effort that requires the participation of many. The quality and success of the strategy-setting exercise will increase with the number of different stakeholders and development actors involved, up to a point. The same can be said for visioning exercises.

In developing ICT strategies, the following should be taken into consideration:

- Think 'out of the box'. Look at information and ICTs in all walks of life, in all sectors of the economy and at all levels of society across the country. It is important to go beyond the technology and think about services, applications and delivery mechanisms that can answer the needs of people.
- Don't forget the rural dwellers and the poor as well as others who may be marginalized for a variety of reasons.
- Engage as many stakeholders as can reasonably be managed.
- At the national level, think about how ICTs and greater access to information can provide an impetus to national development.
- Track development and technology issues using the Internet and learn from that "online intelligence". Identify the trends that are most likely to impact nationally or at the community level.

- Don't forget radio and television as well as wireless technologies. The latter are especially useful for reaching people who are more used to voice-based communications.
- Look for compelling examples and success stories that capture the imagination of people, especially young people. Cite examples: Estonia, China, Hong Kong, India, Singapore, etc.

What scale for national strategies? Should everyone be included?

Strategies for ICT deployment can be undertaken at the national level or on other scales such as a regional or provincial level. In many countries around the world, municipalities have developed ICT strategies that are sometime called Smart City strategies.

The city of Edinburgh in Scotland has developed a Smart City strategy to bring the city council closer to the people, to affect productivity efficiencies, and to deliver a host of services more effectively and efficiently to citizens[9].

In Ottawa, Canada, another approach to the Smart City concept has been developed – SmartCapital. SmartCapital is an initiative to accelerate the development of online services for all sectors of Ottawa. Working in collaboration with numerous partners, SmartCapital is launching services that are transforming the way in which citizens interact with one another, with public and private institutions, and with the world[10].

Participation is needed for development planning to be a success. If participation includes all levels and all sectors, and touches all parts of the country or jurisdiction in question, then it has a better chance of capturing the true needs and concerns of the public and of special interest groups. The national strategy will better reflect local, regional and other concerns. For this reason, a communication and consultation plan should be an integral part of policy-planning and policy-making activities.

However, most national strategies do not include extensive assessments at the local and community levels. The cost of assessing representatives of key groups across a country is a limiting factor. Several assessment methodologies, as mentioned elsewhere in this document, do not consider the less economically or commercially active members of the country. This is also because some of these assessment methodologies are focused on immediate or existing evidence of ICT use. These assessment methodologies are less likely to consider a longer-term horizon and social or developmental issues.

Another reason is that many assessment methodologies focus on harnessing ICTs as an engine of growth, which the poor and marginalized groups are not considered. Rural areas are invariably overlooked, as they are likely to be less industrialized and have inadequate infrastructure. This may lead to ICT policies focused on economic development or on high profile activities. For example, a favourite policy proposal among many national ICT planners

[9] See http://www.edinburgh.gov.uk/CEC/Corporate_Services/Strategic_Support_Services/Smart_City/deliver_smart_city.html.
[10] See http://www.smartcapital.ca/aboutsmartcapital/index.html.

calls for the creation of a Techno Park to attract large international manufacturers in the ICT industry to establish their offices and regional centres in the countries concerned.

In general, the less ICTs have penetrated a society or community, the more important it is to learn from the community about their development needs and circumstances. It is equally imperative to know about their priorities for information (what information they want, why, and how these needs rate on a relative scale of priorities).

As part of this learning process, it will also be important to become aware about the information-sharing behaviour of people in the community: what are their favourite communication media, what use is made of these and what type of information needs do they answer. This has been recognized in the form of information audits and needs assessments, and has been applied with useful results in the case of the Solomon Islands People's First Network (PFNet)[11].

Most countries, regardless of their level of ICT use, have a digital divide to deal with, usually in areas of poverty or where there are few people and little by way of infrastructure and markets. National policies and the strategy must address this.

Because it is impossible to consult with everyone, efforts should be made to communicate with the public, special interest groups and stakeholders about the ICT strategy. Public meetings and the media should be used to inform people, to raise awareness and to build support for the strategy-setting exercise as well as for other aspects of the ICT development plan. As mentioned earlier, a communication plan is part of policy-making initiatives to help build support for the preparation of the policy and its implementation.

As part of the ICT strategy-setting exercises, surveys and assessments need to be undertaken to describe the current situation and to help identify and rate the needs and challenges that planners and strategists must be aware of.

Strategies should be adaptable to scale

A national ICT strategy does not preclude creating strategies that apply to smaller jurisdictions. Beyond the city type of strategic plans such as the Smart City plans, community development strategies that seek to take advantage of ICTs for local and community development should be encouraged. For example, there are communities that have developed and adopted strategies for using ICTs to overcome isolation and a sense that central government cannot deal adequately with their concerns due to lack of awareness. In Jamaica, the Bluefields Peoples' Community Association (BPCA) was created to support the community in achieving its development goals[12]. BPCA allows the community to reach beyond the confines of the local scene and seek resources and collaboration overseas. ICTs are a part of the development strategy of Bluefields and have been so for some time.

[11] Fortier, F. 'Practice note on ICTs for rural poverty reduction', Draft, August 2003, ICTD and Poverty Reduction Groups, UNDP, 2003.
[12] See http://www.bluefieldsjamaica.org.jm/bpca/index.html.

In summary, a national ICT strategy needs to consider everyone.

Parameters of ICT Policy Development (the 5 Cs)

The following parameters have to be considered during ICT policy-making and strategizing.

Connectivity

- Provide the greatest access to ICTs as possible, but ensure that rollout is demand-driven as well as equitable and consistent with the need to ensure universal access. The state and/or privatized telecommunications operators must undertake a market survey to decide on the extent of their investments in connectivity.
- Put in place policies that guarantee a given level of service to the consumer and that mandate regular audits of network performance and service delivery by the regulator. This is part of a requirement for reviewing and revising the needs and rights of the consumer to be protected from fraud and other wrongdoing in cyberspace. Many, if not most, service providers deliver less than the nominal levels of service (bandwidth is the most common or obvious one) that they promise to their clients, and this has to be dealt with by the law.
- Privacy and confidentiality policies, regulations and laws need to be put in place, recognized by the law, and respected. It is important to respect the privacy of people and organizations while ensuring connectivity. Thus, it may not be a good idea to centralize all databases with personal information in one government facility.
- The question of universal access will have to be considered and a model discussed. Universal access provisions are very difficult to guarantee and are usually laid out over long time scales because of the need to pay for the investment and the limited capacities of operators and governments to do so all at once.
- Recognize the role of community or public access: cybercafes and cyber centres, community access centres and telecentres. In many countries, community access centres or their equivalent are the cornerstone of e-government.
- There are special considerations for the private sector. Techno Parks and intelligent buildings may be useful applications and investments if they are backed by comprehensive business and marketing plans and studies. In the case of intelligent buildings, the building code may need to be modified accordingly. Incentives to allow the private sector to connect and to compete are also important.
- Peering arrangements need to be made to ensure that the telecommunications service providers (GSM operators, ISPs, paging companies and fixed line operators) can interconnect their networks locally.

Community

- Promote the use of ICTs for local and community development. This is especially important to help bridge the digital divide and to provide local access to the Internet and other government applications and services.
- Enact policies to encourage community participation at all levels. Non-discriminatory clauses may be required.

- Enact policies to encourage early adoption of computers and related technologies and skills for learning, in association with community resources such as schools.
- Adapt Smart City or Smart Community ideas: local and community- or municipality-based policies to encourage the development of an e-enabled community. Incentives to encourage this may be required, as well as examples of best practices.
- Harness the research and learning community by focusing on policies that will encourage the deployment and use of ICTs in research, development and learning. Special applications can include distance learning and ICT-assisted learning activities in general. The R&D community can benefit from the use of ICTs to access research and grant-making opportunities.
- Promote the use of ICTs by the medical profession, in hospitals and medical centres, as well as in community and other public access sites and facilities.

Capacity

- Develop policies that will encourage learning.
- Raise awareness of the importance of a government and civil service dedicated to serving the public. Develop a service mentality among politicians and the civil service about the role of government as a service and a public good. Training and education are part of this.
- Build capacity for managing change in the public sector as a prerequisite to the introduction of e-government and greater access to public information and services.
- Provide incentives and tax breaks for learning and using ICTs. For example, students, educators and researchers can import and purchase PCs free of tax.
- Encourage ICT manufacturers and others to establish ICT technical training facilities locally. The Cisco Academy endeavour is one example; there are others.
- Encourage the private sector to make educational software and hardware more affordable to students. Apple and Microsoft already have these policies.

Collaboration

- Ensure that ICT policy development takes place in an open and collaborative fashion, consistent with the principles of human development.
- Encourage peering; ensure that networks interconnect locally, where the costs are lowest.
- Strengthen the regulator to make sure that it can intervene to promote a level playing field in the marketplace and to recognize and limit uncompetitive and/or monopolistic behaviour.

Cash

- ICT policies should result in the development of a realistic and doable ICT Action Plan that includes several proposals for bankable projects that can be submitted to and considered by a variety of potential investors, donors and supporters.
- Develop policies that will encourage access to credit for the purchase of PCs and related technologies.
- Encourage investment through fiscal and other financial incentives.

- Encourage public-private partnerships that will bring much needed expertise, management and financing to the table. TNCs have significant skills and resources that countries may more readily access through joint ventures and/or other partnership arrangements.

The Importance of Related Policies

- Policies related to the treatment of investors and especially foreign investors and companies: make sure the rule of law applies in general and to foreign entities especially, and that it is equitable in perception and in fact.
- Policies governing the financial and banking sectors.
- Information policies mentioned previously (these in fact should be considered as part of an ICT strategy).
- Intellectual property rights.
- Local and regional entities and trade groups: consider the establishment of regional telecommunications regulatory agencies as a way of sharing the cost of developing appropriate policies and of regulating the sector. These can also be established under the auspices of regional trading blocks or development cooperation agencies such as the Southern African Development Community (SADC) in Africa.
- Policies dealing with convergence of media, e.g., broadcasting policies designed to recognize and encourage convergence as and when appropriate.
- Policies that permit securing and auditing network operations and performance, especially with regard to cyber security in all its diverse forms and expressions: hacking, spam, viruses and Trojan horses, crime in all its forms including online fraud, phishing, terrorism, pornography, the child sex trade and sexual tourism, etc.

Sectoral Policies

- Banking and the financial sector: without a viable and modern banking sector, able to use the advantage of the latest technologies and management practices, the private sector upon which the ICT infrastructure depends will suffer.
- Trade and economic development: ensuring that this sector is supported by appropriate policies that strengthen the competitive position of the country or jurisdiction.
- Consumer protection policies to ensure that users of the Internet, for example, are protected from scams, spam, identity theft, hacking and fraud.

CROSS-SECTORAL THEMATIC CONSIDERATIONS

A variety of issues must be considered in national ICT policy-making. Some of the most relevant and important are described below.

Information Access Policies

Policies regarding access to information can be contentious. In many traditional societies, information flows are privileged and often restricted, if not controlled. The right to information proceeds on a need-to-know basis, and elders and other traditional decision-makers are

gatekeepers, controlling access to information and decision-making. The colonial legacy has also left its mark. Government officials, ostensibly acting for the public good, have replaced elders and colonial governments have inherited secrecy rules. The rise of the information economy and the knowledge society challenges and undermines this state of affairs, although there is resistance to change.

In the early 1990s when the Internet was just becoming established internationally, UNDP's flagship Sustainable Development Network Programme (SDNP) endeavour was designed to accelerate the introduction of the Internet for development. It was being considered in about 80 countries at one time or another, and was resisted in more than one country. The grounds for resistance were that the Internet was little more than a tool of the West to spy on foreign entities and that, anyway, the Internet was not compatible with the values of many societies. Today, those very same societies are at the forefront of Internet development, innovation and diffusion.

In many countries, including most developing countries, policies affecting the flow of information are a secondary consideration in the rolling out of ICTs. Singapore ranks second in the economic freedom of the world index for 2003[13] but access to information is severely controlled there[14]. There is concern that China restricts access to certain types of information

Box 6: **What Information should be in the Public Domain – the Example of Brazil**[15, 16]

Fundamentally, all information belongs to the public and it should be in the public domain unless compelling reasons exist to withhold it. The ideal approach is seen in Brazil: to create a legal requirement that official information must be made available to anyone who seeks it unless there is good reason to withhold it.

Brazil has no specific law guaranteeing citizens' access to information. However, the Brazilian Constitution guarantees that all citizens have the right to access information held by the State. All acts must be made public. At the federal level of government, there is a wealth of information available to those with the resources to access it. Brazil delivers much more information via the Internet than any of its Latin American neighbours, especially at the federal government level. However, the majority of Brazilians obtain information from television. The public remains largely uninformed about State-related information of relevance to them.

In practice, in Brazil, public officials tend to make access to information difficult, and the need for a law establishing maximum times to respond to requests for information is generally recognized.

[13] Fraser Institute, 'Economic freedom of the world index 2003', 2003; available at http://www.freetheworld.com/release.html.
[14] Ibid.
[15] Pope, J. 2002, op cit.
[16] Abramo, C. W. 'Brazil: Integrity assessment', The Center for Public Integrity; available at: http:/www.publicintegrity.org/ga/country.aspx?cc=br and http://www.publicintegrity.org/ga/country.aspx?cc=br&act=ia.

available on the Internet, as do many other countries. Some view this as a form of censorship.

However, if this were really the case, then why would China undertake one of the most ambitious transformations of society anywhere through its aggressive rollout of ICT infrastructure and access opportunities for its citizens, including the rural poor? The answer is clear. It needs to modernize and compete internationally and, in so doing, raise the quality of people's lives. The thinking here appears to be that once these technologies have been mastered, everyone will gain because of the economic benefits that will accrue. However, the outcome remains to be seen as it is unclear how the average person will benefit. There are several issues related to the operation of markets and regulatory authorities that still constitute a threat to the level playing field. One of the most important is the question of transparency, which itself is an information access issue.

ICT policy-making needs to be concerned about information policies, but not overly so. The business case for ICTs is compelling and most countries realize this.

Related policies include[17] freedom of expression and the right to communicate. Policies to enshrine these should also be considered along with the legal and regulatory frameworks to ensure that these policies and rights are respected.

According to www.Freedominfo.org, over 50 countries worldwide have adopted freedom of access to information laws[18]. In East and South Asia, China, Mongolia, Nepal, Bhutan, Viet Nam, Cambodia, Lao PDR, Myanmar, Democratic People's Republic of Korea and Malaysia have no freedom of access to information laws; India, Pakistan, Republic of Korea and Thailand have laws; and in the remaining countries, approval of the laws is pending.

The implication of information access policies for management of public records

Policies governing freedom of access to information are the cornerstone of e-government. Access to public information and services is partly what e-government is all about. One of the requirements of open access to information policies is the need to organize and structure government records.

The International Records Management Trust (IRMT) has identified the need to improve the management of public records in order to ensure that the public record is maintained. Accessible, complete and well-managed public records are the basis for evidence-based decision-making, a cornerstone of the rule of law[19], and a foundation of good governance. Efforts to ensure this should be a part of ICT development efforts, especially those aimed at building capacity for e-government.

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[17] See James, T. (ed), *An Information Policy Handbook for Southern Africa, A Knowledge Base for Decision-makers*, IDRC, Ottawa, 2001, p. 16; available at www.dbsa.org/publications.ictpolsa/ and www.apc.org/books/ictpolsa/

[18] Banisar, D. *Freedom of Information and Access to Government Record Laws Around the World*, 2003; available at http://www.freedominfo.org/.

[19] International Records Management Trust, Evidence based governance in the electronic age, 2003; available at http://www.irmt.org/evidence/wbabout.html.

Telecom Policies and Regulations

Telecommunications infrastructure and services provide the connectivity upon which the information economy is based. The liberalization of telecommunications markets has meant increased competition among telecommunications service providers as well as increased access to telecommunications infrastructure in and between WTO signatory countries. The growing number and type of interconnections as well as the extension of the global Internet as more countries and markets come online and connect with each other, are key features and drivers of telecommunications liberalization and globalization today.

In addition, as new access technologies, especially wireless technologies, are developed and come into the mainstream, there is an increasing need to ensure that policies opening up and regulating the airwaves – that is, policies respecting the regulation of the wireless spectrum – are compatible within and between jurisdictions, especially national ones. TNCs that manufacture wireless devices must come together to ensure the adoption of common standards such as Wi-Fi and WiMAX. Similarly, countries and trading blocks, especially countries that share borders, should adopt common standards, protocols and regulations in order to ensure and benefit from the greatest interoperability possible.

Telecommunications operators and governments, through national telecommunications regulators, have been reluctant to adopt VoIP. Concerned that this will spell the end of their lucrative telephone monopolies and operations, many governments have banned VoIP outright. However, what you cannot see you cannot ban. These operators have not learned from the experience of Call-back telephone services, which were banned, but which people continue to use.

VoIP is an important technology that is fast becoming mainstream as a result of the rapid deployment of PCs, broadband and freely available bundled instant messaging (IM) services such as Yahoo Messenger and MSN Messenger, including free Internet telephony. As more powerful handheld devices enter the market, and 3G and WiMAX and related wireless technologies come on stream, even mobile phones will have access to VoIP.

Many countries are very aggressive in trying to encourage foreign and local investors to establish themselves in their jurisdictions. Techno Parks are all the rage and every jurisdiction wants to become an international services centre, usually an international financial services centre or some sort of an international e-enabled hub. This is a challenging enough idea, and without the deregulation of VoIP, this will not happen or it will fail.

The following are some of the issues that may need to be dealt with in developing national telecommunications policies:

- Reform and regulation of the telecommunications sector, following global trends but in consideration of local implications: WTO telecommunications policies and reforms and what they mean, with a special focus on GATS and ABT;
- The importance of and need for market liberalization and for putting in place policies

that encourage competition in the telecoms marketplace;
- The creation of an independent regulator;
- Strengthening and supporting the regulator to adequately deal with sometimes very technical or complex business issues such as ensuring a level playing field, competitiveness, supervision of peering arrangements between service providers, frequency checking, etc.; and
- Regional collaboration on telecommunications issues: sharing the burden and the cost advantages and disadvantages.

A competent telecommunications operator is essential for delivering the benefits of the information economy and the supporting infrastructure. However, many telecommunications operators, especially those in smaller jurisdictions, cannot cope with the management and technical requirements of new and ever-changing ICTs. Managing IP networks and services requires high-level technical skills that some operators do not have.

To help overcome this situation, policies that encourage market liberalization and are pro-competition have been enacted in several jurisdictions. With liberalization and more competition, it can be hoped that investors with the requisite technical and business skills will participate in the local telecommunications market and strengthen the level and quality of service. The evidence so far has been positive[20].

China, for example, has established a very aggressive competition policy, pitting former State enterprises, including many former State-sponsored monopolies, against each other in the delivery of ICT infrastructure and services. Large State-owned firms have been broken up and the entities that have been created forced to compete with one another. China Telecom, China Unicom, the railways, the television and other former State-owned entities are competing in a no holds barred fight to gain a foothold in this rapidly growing – indeed the largest – ICT marketplace.

An independent regulator is considered essential to promote infrastructure development and to ensure that the telecommunications market operates on a level playing field. These conditions are considered helpful, if not essential, in making sure that the right conditions for facilitating access to telecommunications infrastructure and ICTs prevail at a rate and pace that is consistent with the capacity of the local market.

The key issues here are the independence, speed of action and reaction, and capacity of the telecommunications regulator. If the regulator cannot act quickly and conclusively, the sector may flounder and languish. When developments take place at Internet speed, the regulator can quickly become a bottleneck and not an enabler. The demands placed on national regulators are invariably extreme because regulatory affairs require such a breadth of expertise to cover business and technological aspects of the telecommunications market. Smaller and poorer jurisdictions cannot readily cope and neither can larger ones. There is a need to strengthen the capacity of these countries to regulate. One way of doing this is to strengthen agencies such as the ITU and the WTO to help countries that are confronted by these and

[20] ITU, 'World Telecommunication Development Report 2002: Reinventing Telecoms', ITU, Geneva, 2002.

related difficulties. Another way may be to encourage regional or shared approaches, although the evidence is not encouraging that these mechanisms work. Experience in southern Africa has shown that this approach is not easy to realize. National policy-makers need to be concerned about feasibility issues. However, technical issues may force collaboration between jurisdictions in order to ensure cross-boundary compatibility and standardization of innovative and increasingly popular wireless protocols and technologies.

The ITU's World Telecommunications Development Report 2002 summarizes some of these issues, as follows:

- Privatization without competition is good, but privatization with competition is much better;
- Introducing private sector players is good, but allowing them the freedom to compete is better;
- Creating regulators is good, but giving them adequate powers and independence is better;
- Creating a duopoly is good, but allowing open competition is better; and
- Introducing competition is good, but introducing it at an early stage of market development is better.

Frequency and radio regulations

Radio spectrum frequencies carry wireless communications. Radio frequencies are finite resources that need to be assigned and regulated. Countries need to develop policies regulating the assignment and use of these frequencies. Licensing regimes need to be developed. Some frequencies are reserved for public use, such as emergency communications. In some countries, certain frequencies have been reserved for military communications. Regulating frequencies requires not merely the development of appropriate policies. There is also a need to have the technical capacity to understand the use of these frequencies for data communications, and to adjudicate disputes, which can arise over issues such as interference between available frequencies and other communication media such as radio and television.

The ITU and other international and bilateral agencies can help countries develop appropriate policies and operational procedures for regulating frequency use by the newer technologies that are transforming wireless devices into those capable of accessing the Internet. Given convergence and the growing importance of wireless devices and of mobile Internet, regulations governing the use of the wireless spectrum have an important role to play in enabling a country's use of ICTs for competitive advantage. The difficulty for regulators and countries with limited resources is the highly technical nature of these applications combined with the rapid pace of technical innovation.

National ICT Development Policies

National ICT infrastructure development policies need to be sustainable. Hence, these policies need to be linked to the marketplace.

Many countries have developed very ambitious plans for ICT implementation. However, many of these plans are divorced from the realities of the national and even regional marketplaces and often fail. A good example of this is the tendency found in some countries and jurisdictions to develop Techno Parks to attract ICT companies, especially the large players.

National ICT development plans need to be based on sound market studies and user needs assessments. They also need to have the support of the business community to succeed. e-Readiness assessments alone will not do. A business planning approach must be taken to understand the needs of the marketplace, what the market will bear, and therefore what products and services will best meet those needs in a sustainable and commercially viable way. Remarkably, many ICT development strategies are not sufficiently anchored in the realities of the marketplace. For example, in many countries the rates for Internet access that are fixed by national telecommunications operators are not based on market studies but rather on an analysis of rates in other countries and jurisdictions.

This needs to change, and policies must reflect the marketplace in which they will operate. Some countries have focused their development strategies on the concept of becoming a services hub. The international financial services centre hub is a model that has gained popularity in a few countries (Ireland especially). In developing plans that are regional or international in nature, it will be important to also study the market from a regional or international perspective, as well as nationally.

e-Commerce Policies and Regulations

In their primer on global electronic commerce, Catherine Mann and her colleagues state that "electronic commerce needs standards, regulations, and laws to create an environment of certainty, trust, and security. Examples include technical communications standards; the legality of electronic signatures and certifications; encryption and interconnectivity standards; and disclosure, privacy and content regulations"[21].

e-Commerce is a major component of the global information economy. According to optimistic predictions, e-commerce would represent about 18 percent of worldwide business-to-business (B2B) and retail transactions in 2006[22]. In developing and transition economies, it is business to consumer (B2C) e-commerce that predominates, although B2B is expected to become more important in the medium to longer term.

Factors affecting e-commerce adoption

e-Commerce and B2C applications are not as important in the developing world as they are in the industrialized world. This is partly due to the fact that the ICT infrastructure is not as well developed as in industrialized countries. Also, the infrastructure required to support the transport of hard or durable goods purchased using B2C solutions, as well as the online payment

[21] Mann, C., Eckert, S.E. and Knight, S.C. *Global Electronic Commerce: A Policy Primer*, Institute for International Economics, Washington, 2000.
[22] UNCTAD, *e-Commerce for Development Report 2002*, Geneva, 2002.

systems, are not always available in less industrialized countries. Similarly, postal services may not be reliable.

Ready access to credit, lack of payment systems, and smaller markets are other factors limiting the diffusion of B2C e-commerce, although this is changing in some larger countries such as China and India, with the growth of the middle class.

The introduction of other forms of payment, based on wireless devices and other electronic payment systems that are better adapted to the situation of consumers in the developing world, is also contributing to the diffusion of e-commerce applications and the development of m-commerce (mobile commerce). The latter is based on the use of portable wireless devices such as mobile phones and wireless personal digital assistants (PDAs).

Even in developed countries, services such as PayPal allow individuals to receive payments via credit card without necessarily having to acquire a credit card merchant account. This is an onerous and expensive requirement for business people everywhere. The ubiquity of the Internet and of applications that promote e-commerce, such as eBay and Amazon and their various regional and national expressions, are the drivers of these pro-business electronic credit services.

Policies are required to accelerate the transformation of business practices and the adoption of these technologies and procedures to facilitate participation in the information economy. Invariably this will require awareness promotion, capacity-building and training, as well as handholding and incentives similar to those already discussed earlier.

In order to help countries with the process of developing legislation to enable the transition to e-commerce, the United Nations Commission on International Trade Law (UNCITRAL) has developed model laws for e-commerce[23]. According to UNCTAD, the Asia- Pacific leads in the adoption of e-commerce in the developing world[24]. One reason for this is that businesses in this region are more integrated into global supply chains and trade flows. Their trading partners in other parts of the world demand their integration through the use of e-commerce applications, including EDI and EFT applications. Another factor encouraging the spread of e-commerce is the diffusion of broadband access technologies in the Asia-Pacific. The three countries with the highest broadband penetration in the world – Republic of Korea, Hong Kong and the province of Taiwan in China – are located in the Asia-Pacific. Governments have also been very supportive of the development of the Internet and of e-commerce.

The global reach of the Internet and related e-commerce applications has necessitated that policies and laws that permit interoperability in applications and technologies between jurisdictions and countries be put in place. These should also be compatible with the international policy environment. Standards and mechanisms need to be set to permit international collaboration on these and related issues. Fortunately, bodies exist for this purpose.

[23] See http://www.uncitral.org/en-index.htm.
[24] UNCTAD, 2002, op cit.

However, some countries need assistance to help them gain beneficial advantage from e-commerce applications.

e-Government Policies and Regulations

e-Government promises to transform the business of government. Below are some of the policies and policy-related issues that need to be considered in transforming and modernizing the government so that it is more responsible, user-friendly, transparent and accessible. Many of these policies and issues are discussed elsewhere in this report.

Policies that promote freedom of access to information, especially access to public and government information, are considered by some people as a cornerstone of e-government. However, as mentioned previously, not all countries have adopted freedom of access to information laws, including many of the strongest e-government performers in the Asia-Pacific.

One policy is the requirement that government be a service-based enterprise for public good. As such, government staff should be approachable to the public, as well as facilitative. In this policy, the intention is that government focus on the public as the client. This is a cornerstone of public sector transformations around the world.

Another policy calls for the modernization of the government through the introduction of computers and networks. In many countries, and especially in developing countries, the value proposition driving e-government is based on easing access by reducing queues and travel to government offices, and by increasing the ease and efficiency of transactions with the government and its employees. Policies that ensure that this happens will have public support.

Policies that allow rural dwellers to take advantage of the benefits of e-government will likewise be necessary. For this, local and community-based access technologies and applications will need to be considered. Online kiosks in government offices or in community access centres will also be required and a national e-government delivery plan will have to be developed.

ICT Industry Policies

As already mentioned, business and investment incentives are needed to encourage the development of the ICT industry.

Universal Access

Commitment to universal access is the cornerstone of efforts to reach out to include everyone in the information economy and is a first step in bridging the digital divide. A funding mechanism to meet the cost of universal access has to be discussed and negotiated by the telecoms regulator and/or the government department/ministry responsible for this. Operators are expected to contribute to the cost of rolling out access as part of their obligations under the licensing agreements they have signed with the local regulatory authority of the government.

In some countries, the universal access policy will be achieved in part by rolling out community telecentres. This is the case in South Africa[25] where it is estimated that to meet universal access obligations, about 5,000 community access centres will be required[26]. It is likely that wireless telephones and other access devices will be the primary way of meeting universal access obligations because wireless devices, such as mobile phones, have had such success.

In industrialized countries, the objective is universal service – that is, access to telephone services in every household[27]. Community-based access centres are likely to be important in many ways in bridging the digital divide and in helping to ensure that all benefit from the growth of the information economy.

[25] CommUnity, Universal access ICT projects in South Africa, 2000; available at http://www.communitysa.org.za/projrev.htm.
[26] ITU, Multipurpose community telecentres - Connecting people from Timbuktu to Kabul: Initiatives in South Africa, 2002; available at http://www.itu.int/itunews/issue/2002/05/southafrica.html.
[27] Bridges.org, 'Spanning the digital divide: Understanding and tackling the issues', Durbanville, South Africa, 2001.

Identifying Priority Areas and Developing Action Plans

HOW ARE STRATEGIES ACHIEVED?

Strategies are achieved using a variety of tools, some of which have already been described. Comparative analysis, including studying and comparing international experience and best practices, is another useful tool. ICT strategies start with the development goals of the country and take into consideration local specificities. Invariably, the goals of national development are to seek, develop and maintain comparative and competitive advantage, especially in economic terms. ICTs are tools to help this happen and to ensure that people are better able to benefit as a result.

A key component of strategic planning for human development is consultation, as mentioned earlier. Consultation is ongoing and iterative and may need to be institutionalized. The telecommunications and ICT regulatory agency can have a role to play here, but NGOs and other observers and participants should also be involved. ICT strategies and their implementation need good governance to succeed. It may be useful to check on progress and to ensure impartiality by bringing in outside or neutral observers to comment and contribute on an ongoing basis.

Addressing the Development Dynamic

Using ICTs is not the goal or outcome of ICT4D projects, programmes or activities. The goal is to promote human development and to reduce and eliminate poverty by bridging the digital divide[1]. The goal of using e-strategies is empowerment through information. The outcome is greater self-sufficiency of people and communities.

Freedom of access to information is a key part of this, along with freedom of expression that allows people to take advantage of these resources and opportunities. In reality, most jurisdictions accept the need to have freedom of access to business information and to other information that touches directly on economic development. Other issues are sometimes better left alone, especially if they touch on politics and society.

[1]Labelle, R. 'Information and communication technologies for development in national human development reports', UNDP, New York, 2003.

ICTs promote human development and help achieve the goal of reducing poverty in three ways:

- By facilitating access to knowledge and information-sharing;
- By helping developing countries catch up and be part of the evolving information economy; and
- By acting as enablers of development by encouraging empowerment.

ICT policies and e-strategies need to address these issues.

e-Strategies for Infrastructure Development

ICT strategies will need to consider telecommunications strategies governing access to the networking and communication media. Of particular concern is the development of Internet access strategies. The key is to ensure the availability of as much bandwidth as is necessary to users in the country at a cost that is as low as possible, consistent with the commercial operation of the telecommunications network. In order to limit expenses for unused bandwidth, bandwidth-provisioning solutions based on dynamic bandwidth allocation may be appropriate. These include ensuring bandwidth coming to the country, and by extension, meeting bandwidth requirements within the country. The development of national ICT infrastructure is the purview of the national operators, but government has a role in developing the policy that will guide and encourage infrastructure development efforts and investments because this is in the public interest. Universal access policies, for example, are intended to do just that. The demand for access to the network will drive the growth of national ICT infrastructures and Government policies will help relate the right market conditions to make this happen.

The concern of ICT strategy should be with ways to spur the growth of national infrastructure in a manner that keeps costs down so that the largest number can benefit from its use. Universal access policies are intended to ensure that all inhabitants of a country are assured of receiving basic telecommunications services. These services have invariably been considered to include access to the telephone but are defined more broadly by WTO (see Box 7 on next page).

Encouraging competition

Probably the most important consideration in preparing an infrastructure development strategy is the need to encourage competing telecommunications and Internet access solutions, services and providers. Competition is key to delivering value and service to ICT users. Past experience has demonstrated that monopoly operators overcharge and may also limit access to the Internet. Consistent with this policy is the need to ensure that peering[2] among and between telecommunications, especially Internet service providers (ISPs), is assured.

A strong and independent regulatory regime

A strong regulatory agency is required. This agency will be responsible for overseeing the

[2] See 'What is peering?'; available at http://iroi.seu.edu.cn/books/ee_dic/whatis/peering.htm.

Box 7: **Basic Telecommunications Services – WTO[3]**

Basic telecommunications include all telecommunication services, both public and private, that involve end-to-end transmission of customer supplier information.

Examples of basic telecommunication services are:

a. Voice telephone services
b. Packet-switched data transmission services
c. Circuit-switched data transmission services
d. Telex services
e. Telegraph services
f. Facsimile services
g. Private leased circuit services
h. Others:
   - analogue/digital cellular/mobile telephone services
   - mobile data services
   - aging
   - personal communications services
   - satellite-based mobile services (e.g., telephony, data, paging, and/or PCS)
   - fixed satellite services
   - VSAT services
   - gateway earth station services
   - teleconferencing
   - video transport

operation of the ICT marketplace. Regulatory policies should help ensure that the ICT marketplace operates efficiently and in an open and equitable manner consistent with the concept of maintaining a level playing field for all operators. This is also consistent with the requirements of WTO agreements on telecommunications.

The challenge posed by current regulatory regimes to many countries is the need for strong technical, managerial and business skills to ensure that the regulator can do its job. Many developing countries, especially the smaller and poorer ones, simply do not have the human and technical assets, experience and skills to adequately meet these requirements. Some consideration has been given to the idea of regional regulatory agencies to pool these skills. For example, the smaller countries of the Horn of Africa, especially Djibouti, have considered this. WTO recognizes the needs of developing countries for technical assistance to bridge this gap. ITU also assists in the provision of technical assistance for this purpose.

Countries should not hesitate to enlist WTO and ITU as well as national operators from industrialized countries to help them develop appropriate regulatory regimes and ensure that these can be implemented. This kind of assistance can be negotiated as part of bilateral aid programmes.

[3] See http://www.wto.org/english/tratop_e/serv_e/telecom_e/telecom_coverage_e.htm.

Some technical considerations

There are two types of telecommunication media that are essential to the exploitation of ICTs for human development:

- Wired infrastructure, which is the preferred way to connect to the Internet backbone for reasons of speed and relative reliability; and
- Wireless telecommunications media that are gaining in popularity and geographic reach with the widespread introduction of mobile phones. The infrastructure for wireless technologies is also much less costly.

Wired or cable-based infrastructure works best for transporting vast quantities of data (audio, video, multimedia and streaming application). It is most appropriate for transaction-intensive environments such as urban areas or Techno Parks. Wireless technologies are also better used in urban areas. However, they are especially beneficial in providing cost effective network access to users in more rural and remote areas where their lower cost may allow for greater penetration. Under such circumstances, wireless devices may be an essential component of delivering on the promise of universal access.

Nearly all countries around the world are now connected to the Internet backbone. These connections are either based on fibre or metal cabling or on wireless, including satellite connections. Fibre cables are preferred because of their capacity, but not all countries are conveniently located near the Internet backbone and international fibre-optic networks, although this is changing somewhat. National strategies should look at alternatives to connect as directly as possible to any of the international fibre-optic networks. Since there is a global oversupply of bandwidth, costs have decreased considerably and there may be good opportunities to exploit this bandwidth glut.

Countries need to develop broadband connections and a key part of ICT strategies ought to be concerned with how to provide as much bandwidth as possible at the lowest cost to enable key applications and to connect the largest number of users. One way is to encourage competition in access to international bandwidth using whatever technologies and providers are appropriate. In South Africa, an Asymmetric Digital Subscriber Line (ADSL) connection is cheaper than a dial-up connection because there is no cost associated with a timed telephone call.

Another concern will be to ensure that the private sector has access to the high-speed connections essential to business today. Many countries are considering, or have already developed, Techno Parks combining high-speed access to the Internet with ICT businesses. This has been aimed at creating clusters of excellence that will hopefully attract investors or at the very least support existing firms by providing grouped services at a reasonable cost. But more important for business are measures and infrastructure that will make it easier for any business to gain rapid, reliable and secure connections to the Internet at a reasonable cost. However, Techno Parks and other facilities intended to attract investors and promote the ICT industry should be based on sound market studies.

The allure of wireless

The rapid diffusion of wireless technologies and the rise of 'mobile Internet' present real opportunities for delivering a host of applications and services for individuals and especially for SMEs and business. Mobile devices offer real advantages in rolling out financial, credit and payment services to customers in many developing countries who cannot acquire a credit card. For health management, especially patient follow-up, mobile devices used in conjunction with applications such as SMS have been demonstrated to help in the treatment of people afflicted with tuberculosis in South Africa[4]. This technology likewise has great potential for treating patients with HIV/AIDS.

Similarly, some banks in the developing world are now making it possible to check one's bank account as well as pay bills online. The potential of SMS is now being explored throughout the world and will undoubtedly support the extension of the wireless network and the Internet. By 2008, ITU predicts that one in three people around the world will own or have access to a wireless device[5].

Encouraging the development of wireless technologies is the introduction of faster wireless access technologies and preparation for migration to IPv6, the upcoming revamped Internet protocol. IPv6 will dramatically increase the number of IP addresses available. It is estimated that, as a result, appliances and technologies of many types will become connected to the Internet. Increases in speed and in the diffusion of Internet-ready mobile devices will lead to the growth of global Internet.

Increases in bandwidth of wireless technologies may be especially useful for developing countries because they will not require investment in hard infrastructure that cable telecommunications require. ICT policies need to consider these opportunities and prepare the ground for the country to take advantage of them and, especially, to allow the private sector to fully integrate these into their business activities for competitive advantage.

Comparative advantage comes from reliable and secure high-speed access to communications, especially the Internet. That the convergence of text, voice and video means that a secure high-speed channel is all that is required to participate in the information economy further confirms this. Building high-speed access infrastructures is the backbone to the value-added applications and services that ICT strategies seek to bring to people and countries.

In summary:

- Infrastructure is essential for information access.
- Appropriate access technologies need to be tested and used. Wireless technologies have significant potential and many advantages. Bi-directional satellite technologies

[4] 'Automated SMS scheduling and delivery'; available at http://www.compliance.za.net/. Case study: the compliance service uses SMS technology for TB treatment; available at http://www.bridges.org/iicd_casestudies/compliance/index.html.

[5] ITU, *Internet for a Mobile Generation*, 2002.

are now appearing around the world and these may offer possibilities for connecting even the remotest communities.

- Policies affecting the business climate and the operation of the telecommunications market will determine the extent to which private investors will underwrite the investments required to develop the telecommunications infrastructure, and to provide the applications and services that create value for consumers, business and government alike.
- Traditional ways of exchanging information as well as non-digital ICTs such as radio need to be recognized in the selection and justification of the access technologies to be deployed. Radio continues to be the ICT with the greatest penetration worldwide.
- Shared community or public access strategies and solutions will need to be considered because it is not possible to provide individual access solutions to everyone.
- Local circumstances such as literacy, language and availability of accompanying infrastructure such as electrical power also need to be considered.

e-Strategies for Human Capacity Development

The lack of people with the technical and managerial skills to use and apply ICTs is a severe constraint limiting ICT deployment around the world. Today, even industrialized countries have an insufficient number of trained ICT technicians and specialists. A severe shortage of skilled ICT labour exists, compounding the problem that many developing countries face because trained personnel from the developing world are ever more likely to seek and obtain work in industrialized countries.

The ICT strategy will have to consider ways of overcoming this situation. There are no easy solutions, except perhaps to provide local opportunities that compete with international ones. This has not proven easy, although there are some examples that are worthy of mention such as the efforts of Costa Rica to attract Intel.

In building ICT skills, the place to start is the schoolroom. China has an ambitious programme to roll out telecommunications networks and infrastructure, and to develop computer literacy at the primary and secondary school levels. Singapore and other countries have also done this.

This implies strengthening the capacity of the formal educational system. While the ministry of education may need to be strengthened, this is only to ensure that it has the requisite human and technical skills to fully appreciate the situation and to understand the options available to remedy the situation. Foremost is the need to strengthen the capacity and ability of teachers and schools administrators.

Educational strategy-setting for ICT diffusion starts with an assessment of human and technical capacity. e-Readiness assessments look at the number of PCs in schools and classrooms as key indicators of ICT training and awareness. But there is a need to go beyond the figures. The questions to be considered as part of the vision-setting exercise, for example, are: What do we want for our children in the future? What vision of an ICT-enabled society is appropriate for the country and how should learning about ICTs be structured as a result? Is there sufficient

information in the local languages to enable the efficient and desired use of PCs and the Internet? Another issue is how to measure results of ICT-supported learning and related policies. Providing computers to schools and developing SchoolNet programmes may not be sufficient.

In many countries where none of the major international languages (e.g., English, French, Spanish) is spoken or used, accessing the Internet may not be very helpful. As when developing curriculum materials and books, exploiting the Internet for teaching at the primary, secondary and other levels requires developing content in the local languages as well.

Teaching basic ICT skills should start in the early years. Primary schools should be able to teach pupils the basics of operating a computer and accessing the Internet. Secondary schools should teach use of the key productivity applications necessary for life in the information economy. ICT skills are life skills.

e-Strategies for Policy Development

Importance of policies

Investors and the international community use the policy environment as a gauge of the true intentions of a government. However, the policy environment goes beyond simply reading and interpreting the laws and regulations governing ICT diffusion. The ease with which investors and others can obtain redress under the law or seek recourse from the regulator, as well as jurisprudence in applying the laws and regulations, are evidence of a government's intentions and of the extent of the rule of law.

The ease with which businesses can register, start operation and obtain financing is another measure of openness to business. Constraints on new entrants can have serious repercussions on introducing innovations because many new technologies are often introduced to the market through the initiatives of smaller, newer and nimbler companies that are usually operated by younger and more technologically savvy individuals. This aspect of national policy is especially important in efforts to stem the brain drain. If young and able business people are not able to unleash their entrepreneurial energy and establish their businesses locally in their home countries, then it should come as no surprise that they leave in search of greener pastures.

Many countries have enacted treaties and legislation, but do not provide mechanisms for applying these agreements or laws. Organizations such as WEF and Transparency International publish assessments of government performance in applying laws and regulations. Preferential treatment and discrimination is readily reported on in publications such as the *World Competitiveness Report* and *Transparency International Corruption Index*.

The strategy for e-policy development

The strategy for policy development may start with the basic issue of freedom of access to information. This will require a definition of freedom of access, including what types of information it applies to, what is restricted and under which conditions. Information deemed

to be of public interest ought to be readily available. Some jurisdictions start with the assumption that everything is in the public domain, with the exception of personal and private information such as salaries, personnel files and information about the health status of the individual.

Similarly, depending on the definition, information deemed to be of importance for national security reasons is considered privileged. In each case, definitions will be required.

Consider the information access policy of the Government of India[6], the intention of which is, "To provide for freedom to every citizen to secure access to information under the control of public authorities, consistent with public interest, in order to promote openness, transparency and accountability in administration and in relation to matters connected therewith or incidental thereto."

The bill makes several exclusions, including information that is "…general in nature or is of such a nature that, having regard to the volume of information required to be retrieved or processed would involve unreasonable diversion of the resources of a public authority or would adversely interfere with the functioning of such an authority...."

Freedom of access to information as well as other aspects of information policy such as freedom of expression or freedom of association is sometimes enshrined in the Constitution. This is the case in South Africa, for example[7]. In countries where basic freedoms are not enshrined, it may be necessary to include them on a case-to-case basis when the opportunity presents itself, e.g., in developing regulations and policies that govern the Internet[8].

The James[9] report lists other information policy concerns that may need to be considered:

- The legal and regulatory frameworks that govern ICTs should be integrated with frameworks governing other media.
- Organizations, communities and individuals should be free to use the Internet to organize and engage in public or political protest.
- Content diversity must be maintained and monopoly limited. In smaller markets and countries, local content may be limited and should be as freely accessible as possible.
- Personal information held by private or public bodies should be protected from any unauthorized disclosure.
- All decision-making processes related to the governance and development of ICTs such as assigning telephone numbers, certification authorities, domain names and numbers should be open and accessible at local, national and global levels.
- ICT-governing bodies such as regulators and government bodies must make information on rights and procedures available.

[6] Lok Sabha (Parliament of India), 'The freedom of information bill 2002'; available at http://www.manupatra.com/downloads/acts/the%20freedom%20of%20information%20act%202002.htm.
[7] James, T. *An Information Policy Handbook for Southern Africa: A Knowledge Base for Decision-makers*, IDRC, Ottawa, 2001; available at www.dbsa.org/publications/ictpolsa and www.ap.org/books/ictpolsa.
[8] James, T. 2001, op cit.
[9] Ibid.

e-Strategies for Enterprise Development

This section looks at strategies that help all enterprises, especially those that can take advantage of resources and tools such as e-commerce and other forms of e-business. It also discusses strategies and approaches that need to be considered to help SMMEs make beneficial use of ICTs. The objective of strategies for SMMEs is to help them harness these tools and associated information management practices to strengthen their capacity to contribute to the economy and employment and, in so doing, help reduce poverty and bridge the digital divide.

Small, Medium and Micro Enterprises (SMMEs)

Larger businesses are more likely to have the capacity to use ICTs for comparative advantage. SMMEs, on the other hand, are less likely to have this capacity. Yet these smaller enterprises are the engines of employment and are on the front lines in the fight against poverty. Strategies that strengthen the capacity of SMMEs are also strategies that support poverty reduction. Strategies that can encourage SMMEs to make greater use of ICTs are therefore important.

In many developing countries, and especially in the poorer and rural areas, information gathering and sharing behaviour is usually informal. Here, small, usually family-run businesses are associated with subsistence or the necessity to make cash payments, e.g., in payment of school fees or the purchase of seed and agricultural amendments. Revenue generation comes from the sale of agricultural products or dry goods, or the provision of some service of local utility for cash.

In these circumstances, businesses are especially challenged because the resources for gathering and sharing information are limited and have a tendency to be based on relationships of familiarity, and to be local in nature and extent. Few appropriate technologies and modern management practices are used, if at all. They are likely to be beyond the reach of the business operators.

In many circumstances, the lack of infrastructure as well as the cost associated with its use also limits access to ICTs, with the possible exception of the radio or the telephone, and in a few but ever-increasing number of cases, the cellular phone.

There are few in-depth studies of the information-sharing habits and ICT requirements of smaller businesses in the developing world. However, the results of the study undertaken in Botswana in Southern Africa are generally relevant even to the Asia-Pacific. Heeks, one of the main authors of this study, is a well-respected ICT specialist who with his colleague, Duncombe of the University of Manchester in the UK, undertook this study in Botswana in part because of the availability of relevant information there.

Duncombe and Heeks report that, in Botswana, 70 percent of respondents to their survey on information and ICTs in small enterprise undertaken in the year 2000 "frequently used fixed line telephone and fax … and about one quarter of enterprises were using mobile telephony and email, though far more service than manufacturing; and far more exporters than non-

exporters"[10]. In characterizing information-sharing practices in Botswana, Duncombe and Heeks proposed a typology of small business types, as follows:

Small Enterprise Types[11]

Survivalists: those who have no choice but to take up the income-generating activity because they have no other source of livelihood. Income provided may be poverty-line or even sub poverty-line. Most 'entrepreneurs' in the late LDCs are of this type.

Trundlers: those whose enterprise turnover is static and who show no great desire or no great capacity to expand. Income provided will be enough to meet basic needs. These form the second-largest group of small entrepreneurs in LDCs.

Flyers: those true entrepreneurs who have taken up enterprise because they see opportunities for growth. Income levels may meet more than basic needs, and enterprises may graduate to the medium-scale category. Only a very small proportion of LDC small entrepreneurs fall into this category.

Duncombe and Heeks further characterize survivalists and trundlers as follows:

> "Survivalists and trundlers more often have characteristics that include: domestic-oriented, citizen-owned, informal sector, smaller, rural, with a narrow customer/supplier base. For these, there is a sense that information is not that critical an issue; there are greater constraints that relate to markets, money, skills and motivation. For some, these constraints are almost intractable. They have the least capacity to meet information needs, and are likely to want to rely most heavily on enterprise-support agencies to meet those needs. They are not approaching the transition point.... They need help building informal linkages. ICTs are of limited value."

Of flyers and potential flyers, Duncombe and Heeks have this to say:

> "The small enterprises that are flyers and potential flyers are more likely to be export-oriented, non-citizen-owned, formal sector, larger, urban, with a diversified customer/supplier base. For these enterprises, information moves up the priority list but they have a greater capacity to meet their information needs. They need help building business linkages. ICTs can be of quite significant value and these enterprises should be the priority focus for ICT interventions: they are better placed than others to make use of ICTs, and they provide a greater capacity to generate wealth, employment, exports and innovations."

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[10] Duncombe, R. and Heeks, R. 'Information, ICTs and small enterprise: Findings from Botswana', Paper no 7, Development Informatics Working Paper Series, Institute for Development Policy and Management, University of Manchester, 2001.

[11] Adapted from Grindle, M., *et al.* 'The framework', in *Seeking Solutions*, 1989, C.K. Mann *et al.* (eds), Kumarian Press, West Hartford, CN; and Mead, D., 1994, 'The contribution of small enterprises and policies to employment growth in Southern and Eastern Africa', in *World Development*, 22(12), pp 1881-94, as cited by Duncombe, R. and Heeks, R., op cit.

Duncombe and Heeks state that the "vast majority of formal sector SMMEs serve local markets and rely primarily on locally generated information". Furthermore, "the evidence shows that it is only in specific sectors, such as technical services, the IT sector and travel and tourism, that information access benefits can be achieved as yet".

In conclusion, it appears that smaller enterprises do not have the capacity to use ICTs effectively. They will not be able to take advantage of ICTs. Policies that will strengthen the capacity of SMMEs to take advantage of ICTs may need to be considered. Policies that will encourage the transformation of local businesses into the flyers and potential flyers may require to be put in place. Awareness promotion and capacity-building activities may also help develop the capacity of SMMEs in poorer and more rural areas. Perhaps there is a need to understand the key drivers that would motivate smaller enterprises to use ICTs.

In Huoshan County, as mentioned previously, agricultural marketing of smallholder produce was the driver for Internet use.

Building the Capacity of SMMEs to Use ICTs

Some approaches to building the capacity of SMMEs, in particular, and of the business sector, in general, are proposed below.

Awareness promotion activities

Given the situation outlined earlier, it is clear that some basic business development activities are required, starting with awareness promotion and, possibly, the provision of business extension services similar to the extension services deployed in agriculture.

Awareness promotion and demonstration activities will help to communicate new approaches to business management. In Huoshan County in Anhui province in China, SMMEs in rural areas – including individual farmers of the type described by Duncombe and Heeks – have shown great interest in the use of the Internet for accessing opportunities to buy and sell agricultural goods and to decide what cash crops they will plant. Mass media and word-of-mouth have been useful in promoting knowledge of and use of the agricultural information service.

Awareness promotion activities designed to encourage greater use of ICTs by SMMEs will benefit from the use of success stories to entice target operators to pay attention. Investments in the basic infrastructure that will make the use of ICTs easier for SMMEs should be part of any ICT promotion and support strategy focused on building the capacity of SMMEs to use ICTs.

In the example from Huoshan, the technology most useful is the telephone and a centrally located access point to the Internet. Participants need not even know about the Internet *per se*, but they need to know about the application – an ICT-enabled agricultural marketplace and information service that depends on the Internet.

As in other aspects of ICT policy-making, it is important to focus on appropriate and useful

applications or drivers that can be enabled as a result of using ICTs. They should also reinforce current business practices and facilitate and render more efficient the operation of locally accessible markets. The agricultural information service described above is one of these and there are likely many others in the region. Unfortunately, no e-readiness assessment will help to identify them. Sound business planning and market analysis are required.

Business incubators

Business incubators provide common access to the resources, support and services that smaller and newer businesses need to establish themselves successfully in a given environment. The National Business Incubators Association of the USA[12] has developed models of business incubators and provides information and links to international sites and resources.

Business incubators are more concerned with business processes than with the use of ICTs *per se*. Many SMEs and SMMEs require assistance in developing their business plans and then building their basic business management skills. ICTs can then be integrated into the operation and management of their enterprises. Business incubators should therefore focus on the use of ICTs in support of the usual business processes, starting with basic business and office productivity applications, before progressing to e-business applications. The latter will probably be of greater importance, at least initially, to export-oriented businesses.

Local and community access centres for business

Local and community access centres can be used by the business community and those wishing to learn basic ICT skills (e.g., word processing).

For business operators operating at the community level, developing a business incubator or other business-focused facility is probably not possible – at least not in every community. Instead, multipurpose community ICT service centres and access centres may be more appropriate. Such facilities can be established in collaboration with telecommunications operators and/or business associations. Some can be established with the support of the community and considered a community asset.

The best way to ensure that these centres are sustainable is to first undertake a market assessment and then a business plan. If the market assessment is favourable, then a business plan will be necessary to ensure viability.

Marketing information services and trade information services

There are examples of ICT-enabled markets that provide easier access to available information about commodities. Operators obtain information about the prices of produce in a given market or via the newspaper. They then broadcast this information using a variety of ICTs, including

[12] The National Business Incubation Association maintains a site with information about international business incubator associations: http://www.nbia.org/resource_center/links_to_member_incubators/intl_inc_associations.php.

radio, voice over wireless devices (users call in to a given number to get the information), and text broadcasts over SMS. Other related information may also be available. For example, fisher people rely on broadcasts of weather information along with broadcasts of market prices. The agricultural information service in Huoshan is a good example of such a service.

In larger and more industrialized economies, ICTs are the cornerstone of the efficient operation of global marketplaces, including the horizontal marketplaces in the Asia-Pacific mentioned previously.

e-Strategies for content and knowledge management

There is a need for locally relevant and appropriate information on the Internet. Policies that recognize and encourage the creation of local content are a cornerstone of the knowledge society. This is because although English is a lingua franca of the global Internet, it is not appropriate for many countries and regions (see Box 8 for the case of Thailand). Moreover, part of the potential value of the Internet is that it can make available information and applications that are locally appropriate. Also, the Internet is supposed to be not only ubiquitous, but also user-friendly.

For smaller language and cultural constituencies, these issues are of great concern. But even in larger countries and jurisdictions, and in industrialized countries and trading blocks, the issue of foreign language and content dominating the Internet is considered a threat to cultural sovereignty. Countries such as Canada and France, and the European Community in general,

Box 8: **Language Limits Internet Penetration in Thailand**[13]

In Thailand, probably the biggest barrier both to Internet and mobile data services usage is language. While Thailand has a high literacy rate for the region – around 95 percent – it is estimated that less than five percent of the Thai population speaks English. The absence of Thai language Internet content is still an obstacle to Thai users. Similarly, the relatively poor uptake of SMS services has been attributed to the lack of Thai language support in mobile handsets. Several other countries with non-Roman alphabets, including countries of the FSU where the Cyrillic alphabet or a Romanized version of the Cyrillic alphabet is used, share this problem to a greater or lesser extent.

are concerned about what they consider threats to their language, culture and values. In these countries, there are policies to guarantee local content by local media such as newspapers and other media outlets, including the production of films and the publication industry.

There is a need for policies that create the incentives for content providers, especially the local media, the government, the education and research community, as well as the private sector, to establish their presence in local languages and to create local content.

Also required are policies that will encourage greater access to educational resources in local

[13]ITU, *Internet for a Mobile Generation*, ITU Internet Reports, Geneva 2002, p 112.

languages and according to local values and beliefs. Translations will not do. Policies encouraging the adaptation of educational resources to the classroom are a must just as they were when developing textbooks in local languages.

Finally, policies to curb the spread of objectionable content such as pornography, violence against children and other groups at risk, racism, religious intolerance, and incitation to violence and hatred are required. The global spread of the Internet has ensured that these policies need to be integrated with global efforts of international police networks and related agencies leading the fight against international criminality and terrorism.

Managing privacy

The pervasiveness of databases and of the Internet, and the tendency to want to centralize these databases, poses serious challenges to the privacy of individuals, companies and other moral and/or legal entities. There are also the security concerns caused by criminal elements as well as hackers and crackers trying to breach the security of the Internet, firewalls and secure applications, including the databases mentioned above. Clearly though, the priority is the privacy of the person and the right to personal privacy.

Some jurisdictions have forbidden the centralization and/or consolidation of citizen databases by governments and by the private sector (that is, insurance companies, banks, medical professionals, etc). They fear that this can lead to discrimination in one form or another, e.g., discrimination because of health history or genetic predisposition to certain medical conditions. Canada is one such country.

Records management

Finally, the issue of knowledge management requires attention to such mundane activities and applications as records management in many jurisdictions. As mentioned previously, public records are the documentary evidence on which the rule of law is applied. Policies to ensure that legal documents are preserved and recorded and made available to the public in an appropriate fashion are essential to the operation of the State and to ensure the rule of law.

Management, Monitoring and Evaluation Arrangements

IMPLEMENTATION AND MANAGEMENT

The National e-Strategy Agenda

The national e-strategy agenda sets forth a timetable and plan for implementation of the policies and the national ICT strategy. The agenda is needed to show that the government is serious about moving ahead. Details of the agenda and the implementation of the e-strategy are given in the action plan.

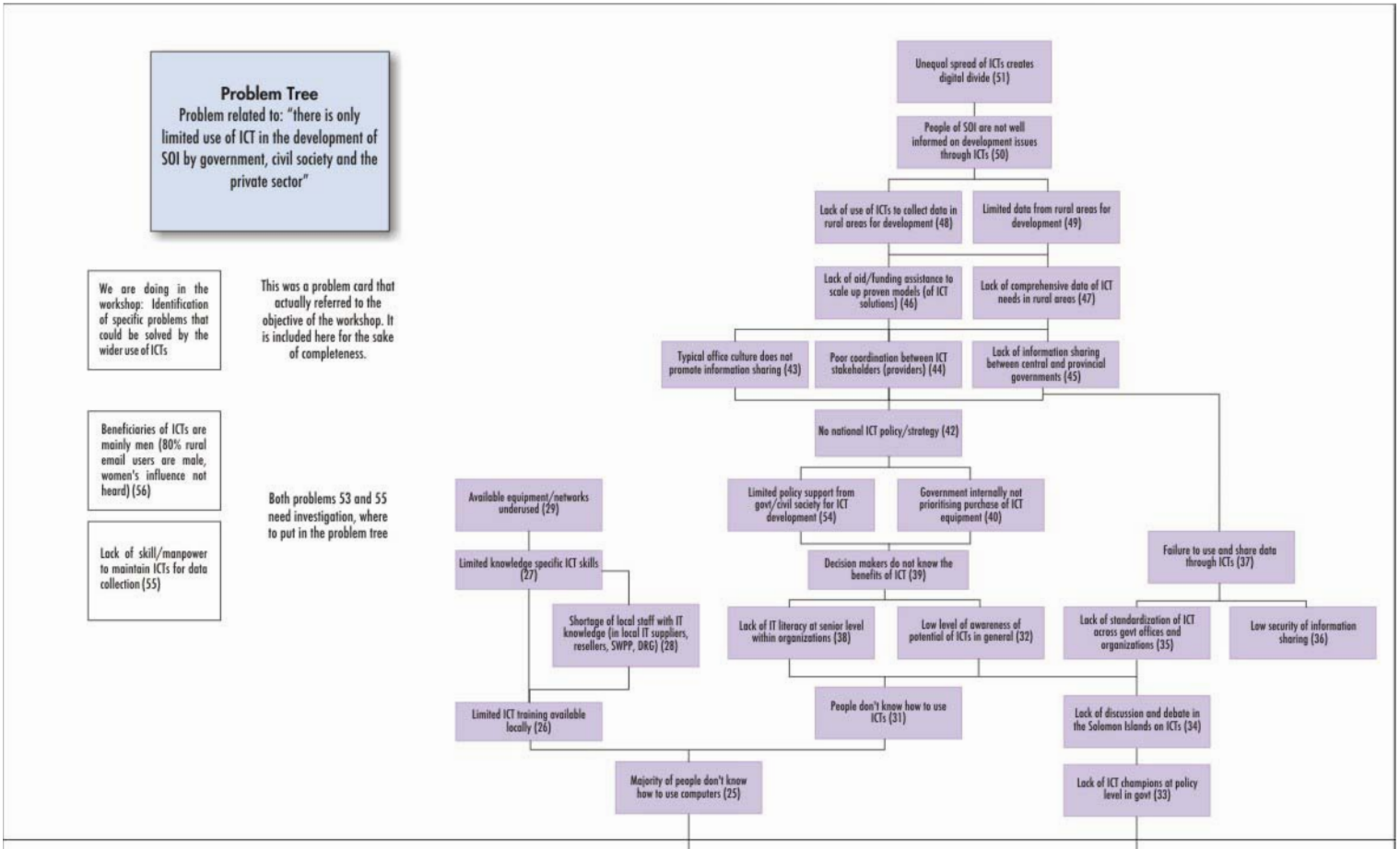
Action Plans

The action plan shows what the implementation of the ICT strategy and related policies will involve and lead to. It should have a list of doable and bankable projects and a list of priorities and their rationalization. The role and involvement of representatives of all stakeholders needs to be recognized. It must be enshrined in the institutional mechanisms and arrangements necessary to oversee the implementation of the action plan. Ongoing review and consultation should be the norm. Monitoring and evaluation needs to be built in. Indicators of success need to be established, shared, commented on and agreed upon in an open and consultative fashion that involves key stakeholders.

Financial arrangements will come from a variety of sources, including existing government budgets and private-public partnerships in some cases. Support from the international community may be available.

Institutional arrangements

Institutional arrangements to implement the ICT strategy and the action plan are usually presided over by government. A national ICT committee or the equivalent is constituted, preferably under the tutelage of the leader of the government or of the country. High profile support and ownership of the ICT planning process is very important. Arrangements for including representatives of stakeholder groups are made. In many countries, these institutional arrangements include strong representation from government ministries. Implementation methods may include a separate implementation agency responsible to the ICT strategy


Problem Tree
Problem related to: "there is only limited use of ICT in the development of SOI by government, civil society and the private sector"
We are doing in the workshop: Identification of specific problems that could be solved by the wider use of ICTs
This was a problem card that actually referred to the objective of the workshop. It is included here for the sake of completeness.
Beneficiaries of ICTs are mainly men (80% rural email users are male, women's influence not heard) (56)
Lack of skill/manpower to maintain ICTs for data collection (55)
Both problems 53 and 55 need investigation, where to put in the problem tree
Unequal spread of ICTs creates digital divide (51)
People of SOI are not well informed on development issues through ICTs (50)
Lack of use of ICTs to collect data in rural areas for development (48)
Limited data from rural areas for development (49)
Lack of aid/funding assistance to scale up proven models (of ICT solutions) (46)
Lack of comprehensive data of ICT needs in rural areas (47)
Typical office culture does not promote information sharing (43)
Poor coordination between ICT stakeholders (providers) (44)
Lack of information sharing between central and provincial governments (45)
No national ICT policy/strategy (42)
Available equipment/networks underused (29)
Limited policy support from govt/civil society for ICT development (54)
Government internally not prioritising purchase of ICT equipment (40)
Failure to use and share data through ICTs (37)
Limited knowledge specific ICT skills (27)
Decision makers do not know the benefits of ICT (39)
Shortage of local staff with IT knowledge (in local IT suppliers, resellers, SWPP, DRG) (28)
Lack of IT literacy at senior level within organizations (38)
Low level of awareness of potential of ICTs in general (32)
Lack of standardization of ICT across govt offices and organizations (35)
Low security of information sharing (36)
Limited ICT training available locally (26)
People don't know how to use ICTs (31)
Lack of discussion and debate in the Solomon Islands on ICTs (34)
Majority of people don't know how to use computers (25)
Lack of ICT champions at policy level in govt (33)

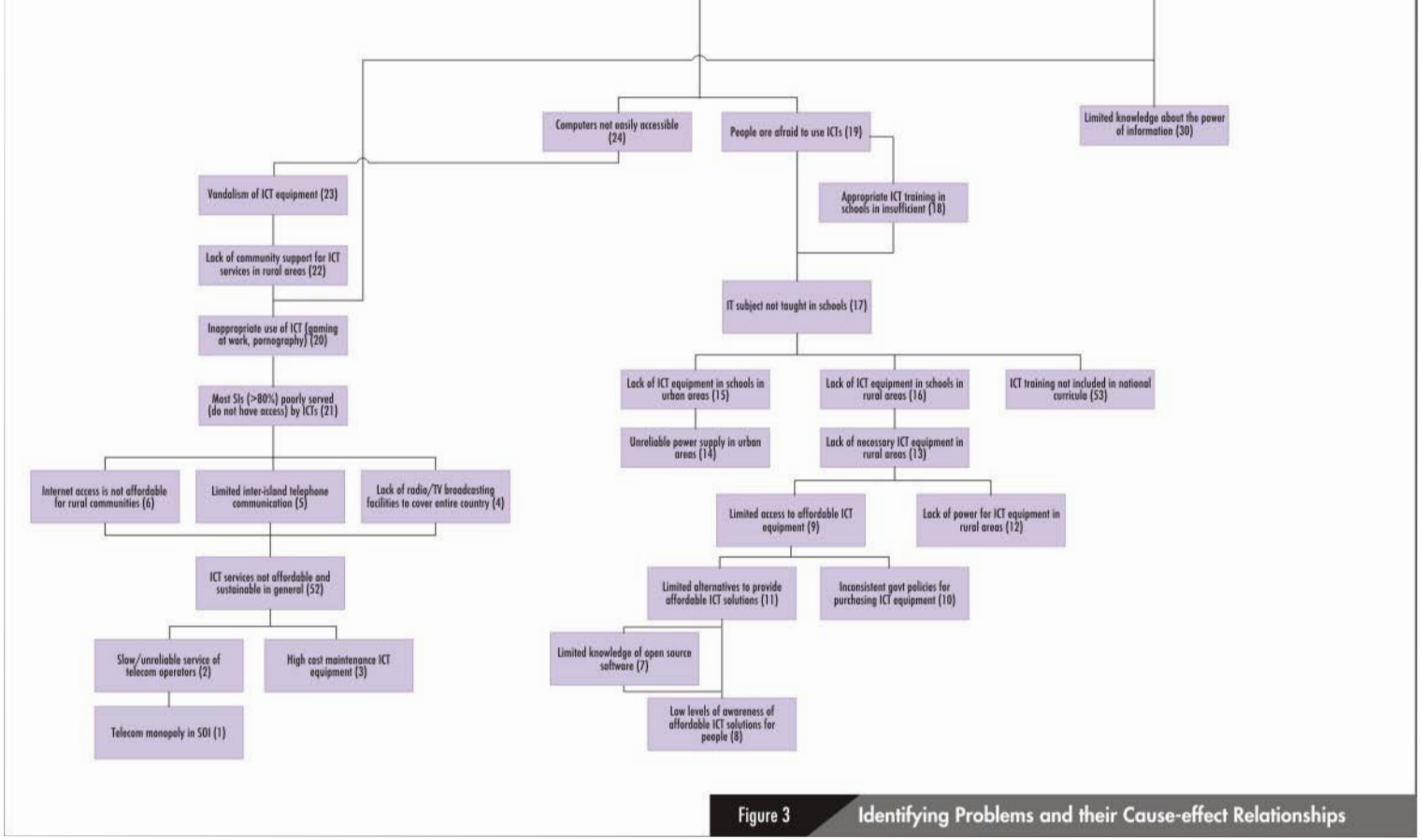
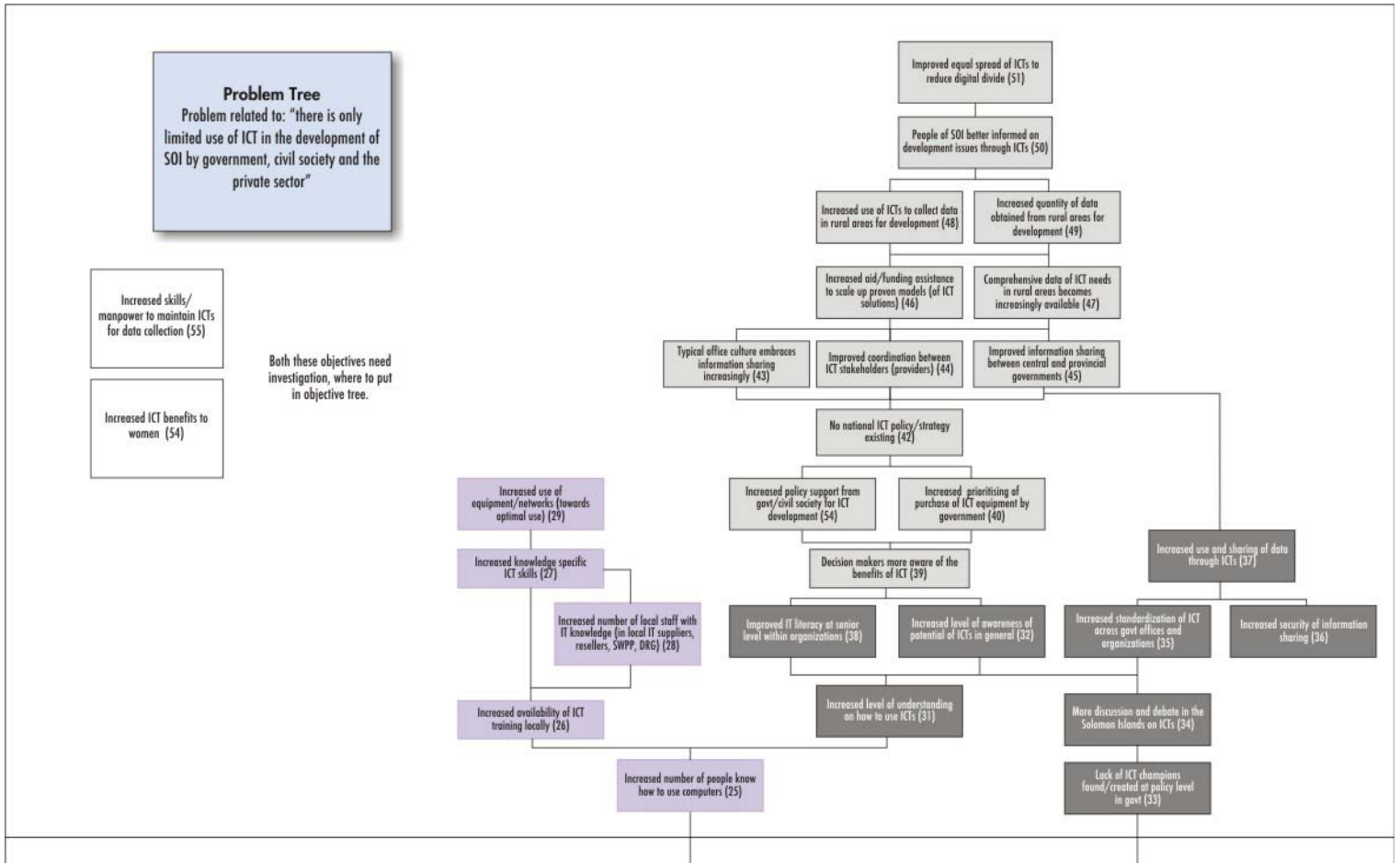


Figure 3 Identifying Problems and their Cause-effect Relationships


Problem Tree
Problem related to: "there is only limited use of ICT in the development of SOI by government, civil society and the private sector"
Increased skills/ manpower to maintain ICTs for data collection (55)
Increased ICT benefits to women (54)
Both these objectives need investigation, where to put in objective tree.
Improved equal spread of ICTs to reduce digital divide (51)
People of SOI better informed on development issues through ICTs (50)
Increased use of ICTs to collect data in rural areas for development (48)
Increased quantity of data obtained from rural areas for development (49)
Increased aid/funding assistance to scale up proven models (of ICT solutions) (46)
Comprehensive data of ICT needs in rural areas becomes increasingly available (47)
Typical office culture embraces information sharing increasingly (43)
Improved coordination between ICT stakeholders (providers) (44)
Improved information sharing between central and provincial governments (45)
No national ICT policy/strategy existing (42)
Increased use of equipment/networks (towards optimal use) (29)
Increased policy support from govt/civil society for ICT development (54)
Increased prioritising of purchase of ICT equipment by government (40)
Increased use and sharing of data through ICTs (37)
Increased knowledge specific ICT skills (27)
Decision makers more aware of the benefits of ICT (39)
Increased number of local staff with IT knowledge (in local IT suppliers, resellers, SWPP, DRG) (28)
Improved IT literacy at senior level within organizations (38)
Increased level of awareness of potential of ICTs in general (32)
Increased standardization of ICT across govt offices and organizations (35)
Increased security of information sharing (36)
Increased availability of ICT training locally (26)
Increased level of understanding on how to use ICTs (31)
More discussion and debate in the Solomon Islands on ICTs (34)
Increased number of people know how to use computers (25)
Lack of ICT champions found/created at policy level in govt (33)

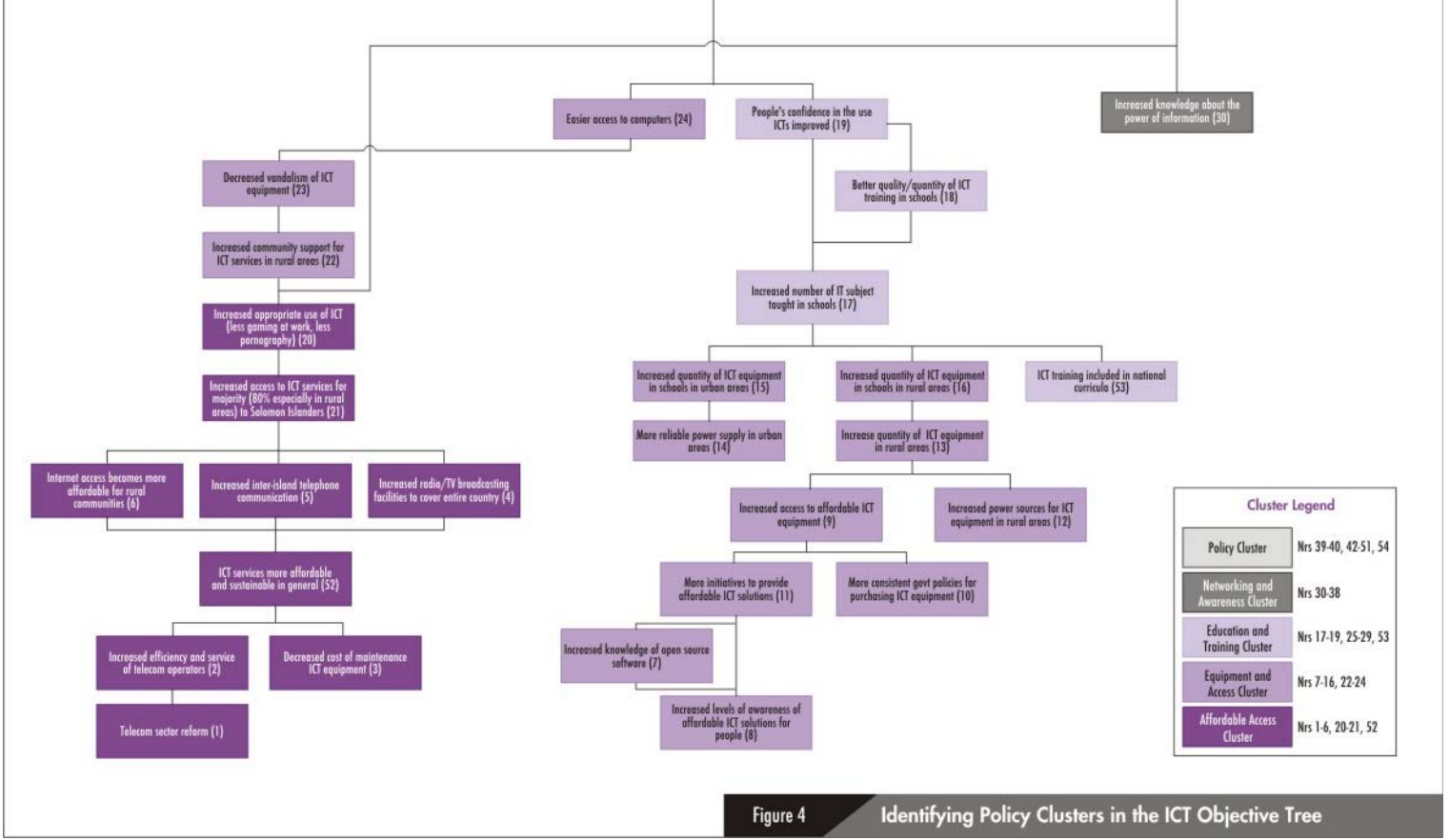


Figure 4 Identifying Policy Clusters in the ICT Objective Tree

committee or its equivalent. In some cases, a national ministry will be responsible for implementation or will act as a secretariat for the implementation agency.

Other stakeholder groups are also involved, but government usually predominates. The involvement of stakeholders can also be assured by the creation of a board of trustees or a management board to which the executives of the national ICT committee and/or the implementation agency must report on a regular basis.

Implementation methods should allow for public bids to be tendered for those activities and projects for which there is funding. In some cases, there may be a need for an entity responsible for supervision and another for detailed implementation (contract supervision, project supervision, etc).

There are many models used, with some involving the creation of semi-public entities responsible for overseeing and sometimes contracting out the implementation of the ICT action plan. This is done to use the implementation of ICT strategy as a way of supporting and building the capacity of the national ICT industry in the process. In some countries of Africa, a separate executing agency structured as an independent organization capable of entering into contractual arrangements works closely with all stakeholders and especially with the government departments and ministries most concerned.

Management tools

Management tools include detailed lists of deliverables. Evaluation and performance indicators, as well as regular reporting mechanisms, are developed and used. Benchmarks are set and surveys undertaken to gauge progress and public support for the policies and the strategy. Focus group meetings may be called to get feedback. Formal and independent monitoring and evaluation procedures should be put in place. This should be separate from the ICT national committee or equivalent. The regulatory agency, if this exists and if it is appropriate, may have a role to play as an impartial observer. Finally, a risk assessment needs to be undertaken and a risk mitigation plan established and acted on.

Object Oriented Project/Programme Planning (OOPP) methodology

Object Oriented Project Planning (OOPP) methodology[1] was used in the Solomon Islands during the National ICT Strategy Workshop[2] . During the Workshop, two priority issues were identified:

- The Solomon Islands did not have a national ICT strategy and there were no regular

[1] See 'Participatory project design to combat trafficking in children and women: Objective Oriented Project Planning (OOPP) as a design tool', International Labor Organization; available at http://www.ilo.org/public/english/region/asro/bangkok/child/trafficking/downloads/tia-d.pdf.
[2] Stork, E., Leeming, D. and Biliki, R. 'Solomon Islands ICT strategy workshop report', UNDP Sub-office, Honiara, Solomon Islands, in *The Electronic Journal on Information Systems in Developing Countries*, Vol 12, No 5, 2003, p 12, 18; available at http://www.ejisdc.org.

meetings for stakeholders; and
- The PFnet project required a clear analysis of the current specific needs and problems relating to ICTs and national development in order to find new strategic areas of intervention.

Through the development and elaboration of problem and objective trees, the workshop was able to highlight and identify the problems that have to be addressed and the subsequent objectives for solving these problems. The current development situation relating to ICT issues was analyzed to lay the groundwork for developing interventions that are more likely to succeed because they correspond to the needs of people. In addition, the workshop allowed stakeholders (government, civil society, donors and private sector) to come together and reach an agreement on all current challenges to take a first step into the development of a common national ICT strategy for the Solomon Islands.

The steps in the OOPP methodology are:

1. Define a clear main problem (or topic) to be addressed in the workshop[3] . This needs to be defined before the workshop is started.
2. Collect from workshop participants an exhaustive list of problems that are felt to be the causes of the main problem defined in step 1.
3. Build a problem tree (Figure 3) that details the cause-effect relationships between the problems identified in step 2. Make sure there is consensus on all cause-effect relationships in the problem tree.
4. Lead the participants in reformulating the problem tree into an objective tree.
5. Cluster or label related objectives with a similar topic from the objective tree into a clustered objective tree.
6. Form groups made up of participants corresponding to the different clusters of the clustered objective tree of step 5 and then analyze the identified clusters and make recommendations.

The following clusters were identified in the Solomon Islands workshop:

- Policy;
- Affordable access (access to affordable telecommunication facilities);
- Networking/awareness (awareness of the power of information and communications);
- Equipment/access (access to affordable equipment); and
- Education and training.

The clusters from the objective tree in Figure 4 can be translated into a more general tree as in Figure 5. Figure 5 tells us that no effective (ICT) Policy (see cluster at the top of the tree) for the Solomon Islands can be developed without first reaching the objectives for *Education and Training* and *Networking/Awareness*. In the same way, no sustainable *Education/Training* can

[3] In the case of the Solomon Islands the main problem was defined thus: "ICTs are only used to a limited extent in the development of Solomon Islands by Government, NGOs, the private sector, communities, civil society and individuals. Why?"

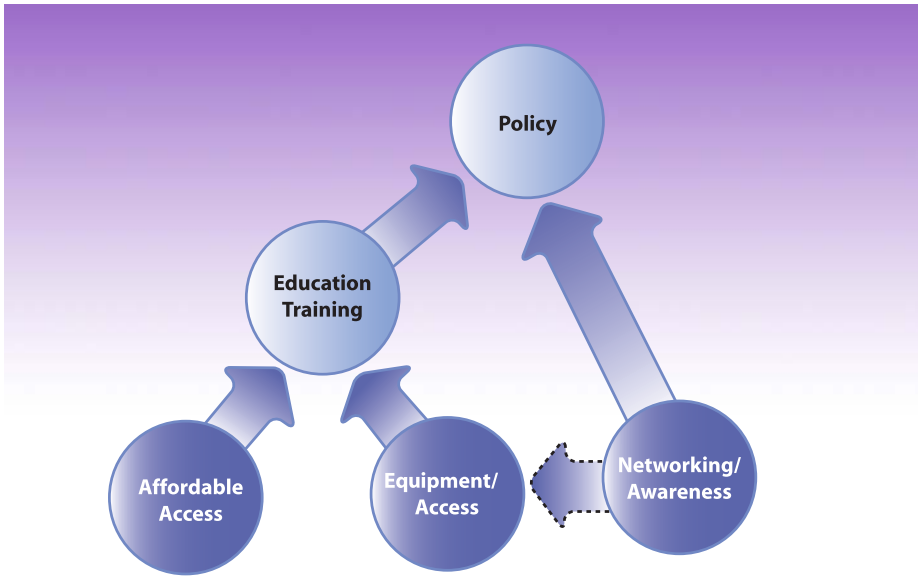


Figure 5 **Cause-effect Relationships between Objective Tree Clusters**

take place without first attaining the objectives of *Affordable Access* and *Equipment/Access* at the bottom of the tree.

In summary, the tree tells us that for the immediate future relating to the original problem (see step 1), the bottom-most objectives (Affordable Access, Equipment/Access, and Networking/ Awareness) need to be realized first before the Solomon Islands can work on achieving the objective of Education and Training in the medium term and effective and sustainable (ICT) Policies can be elaborated in the longer term.

According to this OOPP analysis for the immediate future and its ICT policies, the Solomon Islands should thus work on:

1. Increasing affordable access to information and communications;
2. Increasing access to affordable equipment; and
3. Increasing awareness at all levels of the power of information and communications.

Projects for these three areas of intervention can then be developed using log frame analysis (below).

Logical framework (log frame) analysis

This tool can be used to identify risks and mitigating actions, and provide a rapid overview of these along with the goals, objectives and outputs needed in order to achieve the desired outcome.

The five clusters of the objective tree depicted in Figure 5 can each be transformed in one simple step in a log frame analysis.

As an example, see Figure 6 below. This is the basic logical framework of a possible project resulting from the national ICT Strategy Workshop in the Solomon Islands. Note that the hierarchical cause-effect relationships in the logical framework are taken from the objective tree, meaning that the 'Activities' in the logical framework are on a lower level in the tree than the 'Intermediate Results'. The Intermediate Results are on a lower level in the tree than the 'Project Purpose'. The 'Overall Objective' is on a higher level in the tree than any of the other objectives in the logical framework.

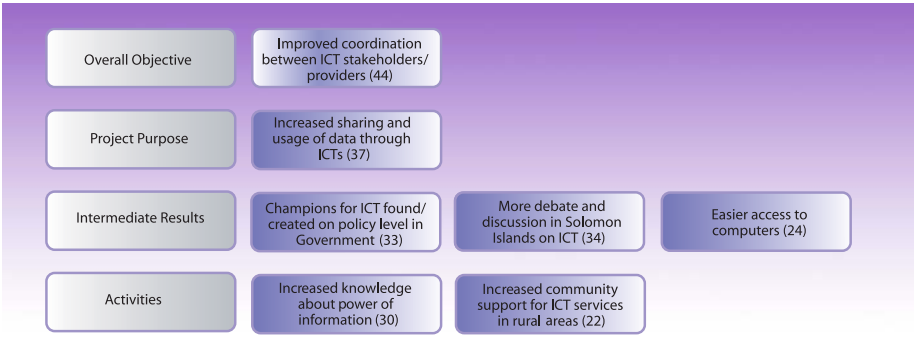


Figure 6 **Start of a Logical Framework from a Possible Project Resulting from t Solo mon Islands ICT OOPP Workshop**

Consider the log frame analysis prepared for a UNDP country office as part of its efforts at ICT strategic planning in Appendix 1.

Impact Evaluations

The measurement of impacts can be undertaken in a variety of ways using different criteria. Log frame analysis methods can be used to bring together the issues, success factors and criteria for measuring success.

However, *in situ* impact assessments are probably the most effective, but costly, way of measuring impact. Focus group meetings, rapid rural appraisal (RRA) and participatory rural appraisal (PRA), and related rapid assessment methodologies are tools designed to help learn from people at the local level. But these tools are rarely applied in the context of ICT policy planning, project design, and monitoring and evaluation. This may be in part because the advent of the information economy is still relatively new. More likely, it is because the efforts to diffuse ICTs have been largely market-driven and focused on where the buying power and the need is – that is, in the urban, industrialized and relatively more developed areas. In these contexts, business plans and marketing studies are the assessment methods used.

In remote and more rural areas, and among the poor and other disenfranchised groups, RRA,

PRA and related techniques will be helpful. There is a significant body of experience in the agriculture and rural development field, where many of these assessment methodologies come from. The planning of ICT for development projects can learn much from this experience. For example, the introduction of Green Revolution technologies has relied on the use of these tools to help design appropriate interventions and measure impacts.

Crawford[4] describes RRA methodology thus:

"Rapid Rural Appraisal (RRA) methodology owes much of its early development to Farming Systems Research and Extension as promoted by the Consultative Group on International Agricultural Research Centres (CGIAR). RRA was developed in response to the disadvantages of more traditional research methods, including: the time taken to produce results, the high cost of formal surveys and the low levels of data reliability due to non-sampling errors. RRA is a bridge between formal surveys and unstructured research methods such as depth interviews, focus groups and observation studies. In developing countries, it is sometimes difficult to apply the standard marketing research techniques employed elsewhere. There is often a paucity of baseline data, poor facilities for marketing research (for example, no sampling frames, relatively low literacy among many populations of interest and few trained enumerators) as well as the lack of appreciation of the need for marketing research. The nature of RRA is such that it holds the promise of overcoming these and other limitations of marketing research."

The main principle guiding these assessment methods is listening to and learning from the people. These approaches are very different from approaches such as e-readiness assessments, which focus on the diffusion of technology and not on the reasons that may motivate people to use or not to use ICTs. In this sense, ICT research in a development context can learn from experiences in RRA and PRA methodologies.

The Institute of Development Studies (IDS) at the University of Sussex in the United Kingdom has been greatly involved over the years in developing and refining these methodologies. The IDS library and information services have documented much of this information, some of which is available online. Other organizations have also contributed significantly.

EVALUATION, MONITORING AND FEEDBACK

Performance Indicators

Before speaking about performance, it is necessary to address outcomes. Concrete and realistic outcomes need to be defined and agreed upon as part of strategic planning and project implementation. Success indicators developed from the earliest stages of project planning and implementation need to be determined. The indicators must be measurable and directly related to the outcomes sought.

[4] Crawford, I.M. Chapter 8: 'Rapid rural appraisal', *Marketing Research and Information Systems*, FAO, Rome, 1997; available at http://www.fao.org/docrep/W3241E/w3241e09.htm.

Apart from realistic and measurable outcomes and success indicators, workable institutional and management mechanisms need to be worked out in consultation with the key stakeholders and those responsible for implementation of the action plan that will realize the strategic plan.

Monitoring and evaluation will consider both issues.

The mechanism for evaluating the ICT strategy should be planned from the very beginning. The institutional mechanism needs to designed and established with the involvement of all stakeholders. In many jurisdictions, the press will follow up but a formal and independent evaluation mechanism needs to be put in place to evaluate the outcomes and, if necessary, help correct the direction the strategic and action-planning process is taking.

Some jurisdictions have established ICT observatories. Observatories in government are mostly concerned with what the government wants. Independent and multi-stakeholder mechanisms better reflect the needs of the community and can also help to ensure buy-in and success.

Other bodies, such as the national regulatory agency, offer another very important mechanism for ensuring that parts of the plan that fall under its jurisdiction are being monitored on an ongoing basis. The regulatory agency also offers a venue for evaluating results and achievements.

Finally, the end users and beneficiaries themselves, potential and actual, will have an important role to play. Local and community-based organizations, including grass-roots organizations, women's groups, youth groups and organizations, NGOs and other civil society organizations have a role to play in lobbying for their development objectives.

INSTITUTIONAL FRAMEWORKS

The ICT policy development chain requires that the institutional relationships between government, privatized operators, the regulatory agency and the line ministries such as communications, be well established.

The regulatory agency is a public corporation or equivalent, funded by government and/or by revenues from various licenses, duties and revenue-sharing schemes (for universal access, for example) that the agency is responsible for or negotiates. Shortfalls to the budget may be funded out of the government budget. Also, the agency is usually run by a board of directors that is appointed by the government. This board should be broadly representative.

In many countries, the independent regulators usually report to line ministries. In India, the Telecom Regulatory Authority of India has an obligation to prepare an annual report to the central government. In some cases, such as in the Republic of Korea, the Korea Communications Commission reports to no one[5].

[5] ITU, *Trends in Telecommunication Reform: Promoting Universal Access to ICTs*, Practical tools for regulators, ITU, Geneva, 2003.

In Singapore, the Info-Communications Development Authority (IDA) is the regulator and has been established as a statutory board. It is governed by the provisions of a parliamentary act, the Info-Communications Development Authority Act of 1999. Its statutory board status ensures that it would not be subject to short budgetary cycles of government ministries. Statutory boards can raise their own funds and set their own budgets, as they are independent of government financing. IDA staff are not public servants and the board has complete autonomy to hire its own staff. The IDA can also be sued in the courts. It reports to the Ministry of Communications and Information Technology[6].

The ministry of communication sets national telecommunication policy, in consultation with the various stakeholders, the regulatory agency, the telecommunications operators, ICT service providers, and representatives of the users. The ministry of communication or its equivalent implements the national ICT strategy, unless there are other institutional mechanisms in place.

[6] ITU, *Effective Regulation Case Study: Singapore 2001*, ITU, Geneva, 2001.

Financing and Resource Mobilization

FINANCING E-STRATEGIES

ICT strategies address public and private sector needs. The need to provide universal access to telecommunications services is considered a public need. On the other hand, the opportunity of adding value to services that exist as a public good (e.g., provision of faster Internet access as well as access to value-added services) may be the responsibility of a private sector entity.

Financing will come from both public and private sources.

A complete ICT strategy will include an e-readiness assessment as well as market studies that attempt to assess, qualify and quantify requirements as well as opportunities. The strategy should distinguish needs that are in the common good, and which should be financed from public sources. It should also provide the criteria for rating priorities.

It should likewise be able to justify when, where and as appropriate, opportunities for self-financing. There should be investment strategies to attract private sector investment and support, as well as support and investment of other partners (e.g., bilateral aid agencies), when and as appropriate.

In some cases, the jurisdiction in question will want to consider securing a loan from one of the international financial institutions (IFIs), such as the World Bank (WB) or one of the regional development banks. This will require not only high-level government approval, but also independent and outside scrutiny and audit in accordance with established international auditing rules and procedures.

In larger markets and usually in urban areas, the ICT applications and services available should be based on market principles as far as possible. In the case of meeting the requirement for providing basic services to those without the buying power or readiness to take advantage of ICTs, the opportunity for recovering initial investments in infrastructure need to be taken into consideration. Public-private partnerships and obligations to ICT service providers to give universal access are the usual mechanisms that apply.

RESOURCE MOBILIZATION – INTERNAL AND EXTERNAL

Policies encouraging private sector investment and competition are important to encourage local and foreign investors. Mobile phone services in many developing countries, for example, have flourished as a result of competition, to the benefit of consumers[1]. If pro-investment policies prevail, businesses will follow. Pro-investment policies will also encourage foreign investors, leading to joint ventures being established and essential sources of technical and management expertise, as well as funds, flowing into the country or jurisdiction.

[1]ITU, 2002, *Internet for a Mobile Generation,* Internet Report, Geneva.

Appendix 1. Example of Log Frame Analysis

Narrative	Success indicators	Means of verification	Risks, constraints and external factors	Risk management actions
DEVELOPMENT OBJECTIVE				
To open up new development opportunities by mainstreaming the use of ICTs	• ICT use increases 5-10 times or more over the next three years: PCs, bandwidth, hosts, servers, cell phones, certified staff, businesses, investment, content • Country's share in the World Wide Web increases • Increased share of GDP derived from use of ICTs	• Publications and mass media • National statistics • Baseline surveys, data	• ICT-based development is not a priority of the government • Lack of resources to implement the programme	• Adopt a planned and incremental approach in consultation and partnership with key decision-makers in all sectors • Accelerate and concentrate on UNDP development approach A2P2 (articulated advocacy and sound advice combined with pilot interventions and strategic partnership) • Flexible and realistic resource mobilization strategy in place
IMMEDIATE OBJECTIVE 1				
To create an enabling environment for ICT development and deployment	• A nationwide consensus on the national policy environment regulating ICTs • Endorsement by the Cabinet of Ministers of a national vision guiding ICT deployment and use	• Decree adopted and national plan/strategic document adopted and developed by government • National action plans, mass media coverage, donor coordination meetings	• Limited or negative ICT perception by the Government • Poor awareness of the benefits of ICTs among consumers • Limited access to data and statistics • Incomplete or incorrect data	• Intensify policy dialogue with the Government (Steering Committees and UNDP Policy Board) • Civil service reform • Institutionalize the use of ICT for financing for development

Narrative	Success indicators	Means of verification	Risks, constraints and external factors	Risk management actions
Components and pilot schemes • A comprehensive national ICT assessment and white paper. Andersen *et al* provide advice pro bono[1] • ICT strategy formulation: using ICTs for national development. Includes awareness promotion activities: Comdex, conference programme with invited speakers. CSO develops the programme with Ministry, UNDP *et al*, - A national policy promoting universal access to the Internet and facilitating access to ICTs (PCs especially) • ICT Action Plan: implement strategy • UNDP umbrella Web site. Web site with info on ICT in country, including results of UNDP interventions. Develop in collaboration with Ministry, Soros or others.	• Clear and complete set of rules regulating investment in and the provision of products and services for Internet development • Share/level of the state/private sector budget for investment in ICT deployment • Investment flowing freely to meet demand in ICT sector • Credit available for ICT investments/purchases • Ability to retain trained ICT professionals (MCSE, etc) • Fiscal & other incentives • Peering between ISPs • Decreased price for ICT access • Number of SMEs using ICTs • Number and nature of SMEs in ICT sector • Access to the international fibre-optic cable for Internet use	• National Human Development Reports • Surveys measuring ICT investments by state & private sector • Market surveys • State budget • National statistics (Statistical office, ITU, PTA, etc) • Legislative body • Salary survey among ICT professionals	• Existing laws and regulations are not applied properly • Rural-urban split • Language issues	• Promote awareness of authorities and consumers by emphasizing economic and educational benefits of an open ICT market • Consider appropriate examples and best practices from abroad

[1] See information about the **opportunITy initiative** and the **Global Network Readiness and Resource Initiative** launched at the G-8 Summit in Japan. Both are designed to help bridge the digital divide. Andersen Consulting expects to contribute approximately US$3 million worth of personnel and other resources to the 12-month project, *pro bono*. The combined commitments of UNDP, Andersen Consulting, Markle Foundation and other partner contributions are expected to total an initial commitment of at least US$5 million. Other partners include World Economic Forum (WEF), Center for International Development (CID) at Harvard University, IBM, and United Nations Foundation (UNF). See http://newsroom.ac.com/news/Dynamicpressrelease.cfm?ID=86 and http://www.markle.org/news/Release.200007251223.1910.html.

OUTPUTS				
A comprehensive national assessment report of resources, issues, needs and opportunities related to ICT use and deployment in country	· An objective and comprehensive understanding of the state of ICT deployment, of the needs for ICTs, and of the potential of country in this area · Report endorsed by all development actors · Report published and readily available to the public and development actors · Increased share of donor support	· Independently recognized assessment criteria, standards and methods · Composition of working group (all development actors) · NHDR 2001 · Report · Surveys and statistics · Media coverage	· Incomplete access to data, people and resources · Inability to use and apply the results in country · Limited circulation · Report perceived as not relevant and/or inappropriate to country	· Ensure close cooperation with government and other national partners · Work with local and primary sources of information · Work closely with Ministry and other key decision-makers · Explain advantages of assessment to government and donors · Involve global UNDP collaborators (that is, Andersen Consulting and others) · Recognize contributions of all · Encourage publicity and media coverage · Involve donors (WB, USAID and others) in the assessment
A national strategy for the rollout of access to the Internet, including an enabling environment for all development actors and for the deployment of the ICT products and services required. This will include national policies promoting access to the Internet for all development actors and facilitating access to ICTs (PCs especially).	· A comprehensive national vision of ICT use for development over the coming years · Financial and other resources required for the envisaged period are made available by government and other partners · Clear guidelines for private investment in the ICT sector · Incentives to users and providers of ICT goods and services	· A strategic planning entity established with members drawn from the public and private sectors, and from elements of civil society · Composition of 'task force' for developing national strategy · Elimination of import duties on ICT goods to permit greater consumer access	· Lack of consultation · Lack of resources from the national budget · Lack of private sector confidence and investment and flight of capital from sector · Perception that government may lose revenue · Inter-ministerial rivalries and bickering and no clear leadership	· Involve key sectors/actors in preparing and executing the strategy · Use national think-tank/ conference/workshop to develop, discuss and develop recommendations · Involve other global UNDP collaborators (that is, Andersen Consulting and others) · Prepare a cost-benefit analysis in time for maximum impact

Narrative	Success indicators	Means of verification	Risks, constraints and external factors	Risk management actions
	· Opportunities for consultation and mechanisms to act on feedback exist	· Allocation in the State budget and line items for implementing the ICT strategy in the national budget · A consultative mechanism · Surveys and statistics		· Assist (UNDP) in bridging interest between private sector and government · Prepare strategy shortly after assessment undertaken and white papers produced · Ensure pilot interventions in the region
National ICT observatory to monitor implementation of national ICT strategy, technologies, market and collection of data other developments (UNDP, Soros, other government departments, National University)	· A representative multi-stakeholder group assembled to undertake and consult widely in preparing the assessment report · National body for ICT promotion and development established	· Relevant programme for Steering Committee's decisions · Status and composition of the national ICT observatory · Amount of time spent by members for work in the observatory	· ICT observatory or equivalent is not created/ delayed and there is continued reliance on outside assistance · Members of ICT Observatory not from all sectors and not sufficiently informed of ICTs	· Close collaboration with UMID Foundation, Civil Service Training Center, EU project to train/reform raise skills of members of ICT Observatory · Use UNDP partners (that is, Andersen Consulting and others: Cisco, IBM, HP, RedHat, Markle, UNITeS, UN ICT Task Force, etc.)
Legal environment relating to all matters concerning import, use, deployment and investment in ICTs	· No confusion in interpreting laws and decrees, especially from the private sector–surveys · Rate and extent of investment in ICT deployment · Strong support from all sectors	· Laws, decrees, rules and regulations · NHDR · National investment plan · Surveys, baseline statistics · ICT expenditures and investments	· Government rules by decree with limited opportunity for consultation · Limited access to data and statistics · Information from surveys not relevant · ICT costs remain very high	· Intensify policy dialogue with decision-makers using UNDP policy tools · Establish ICT observatory to monitor tech developments, market conditions (Ministry, UNDP, Soros, CSOs, national universities)

	· Elimination of barriers to access PCs and related hardware and software		· Access to international fibre-optic cable (TAE) prohibitively expensive	· Take particular care to produce relevant questionnaire based on national context · Increase the use of NHDR as a policy and dialogue tool · Present cost-benefit analysis showing advantages of encouraging market for PCs and software
Awareness building campaign aimed at decision-makers and the public	· The 'Year of ICT' is proclaimed · International organizations reactivate their programmes in ICT · Increased media coverage · Private sector and development organizations join efforts for ICT development	· Policy papers on ICT commissioned by government · Surveys and market research · NHDR · UNIC data, media reports	· Lack of government support · Low nation-wide mass media outreach · Rural-urban split	· Intensify policy dialogue with President's Office · Strengthen partnerships with media through UNIC and other partners · Work with regions, municipalities and communities to prepare campaign
UNDP Web site that integrates information on the country's transformation and development developed **NOTES** **Components and pilot schemes** · Integrated development project information centre	· Web-based advocacy channel established and widely used · Real time access to integrated development information system and up to date development data · Number and nature of documentation and knowledge available online · Quality and quantity of support from other donors: number of donors, funds, etc. · UNDP's capacity to coordinate development aid planning enhanced	· Web site hits count · Online surveys · Data and statistics · Donors' programme/ project and related documents · Share of information in development data system provided by the Government · Publicly accessible Web site via the Internet (id and password protected + publicly accessible area)	· Poorly visited Web site · Limited Internet access in rural areas · Lack of donor support	· Apply high quality advertising techniques for promotion of Web site · ICT observatory supported by UNDP, Soros, Ministry · Present as extension of existing donor coordination mechanism and invite participation based on UNDP proposal · Offer UNDP server and access

Narrative	Success indicators	Means of verification	Risks, constraints and external factors	Risk management actions
IMMEDIATE OBJECTIVE 2				
To enhance information and knowledge sharing among and between users and providers of information in country	· Internet connectivity facilitated for non-profit user groups · Increased volume of information made available online by beneficiaries · Increased numbers of papers based on www information resources · More information about country available from national servers · More interactive national Internet servers	· Project evaluation reports · Media coverage · Internet statistics/surveys · Surveys · National statistics	· Legislative limitations · Absence of basic IT knowledge among researchers · Lack of info culture at the consumer level · Rural-urban split	· Advocacy campaigns targeted at ICT (immediate objective 1) · Training on IT applications · Focus on rural users
OUTPUTS				
Services online provided by Govt (procurement, customs) inclusive of extension to selected pilot provinces **NOTES** **Components and pilot schemes** · Develop e-government strategy. White paper on e-business, e-government. Strategy developed. Andersen *et al* provide pro bono support[2]	· A government-wide e-government policy and initiatives · Incentives for government online including procurement · ICT infrastructure in place in offices across the country · Common design policy in place for portals and Web sites of all government departments	· A white paper on e-business, e-government in country · Most government departments have intranets (LANs) connected together and to the Internet · Most government departments have access to PCs, LAN and Web specialists · Access to relevant Web sites and number of hits	· Resistance to change · Lack of PCs and other equipment in all government departments · Lack of incentives for trained personnel to ensure maintenance of LAN and PCs · Data and baseline are inaccurate or/and non-existent · Questionnaires are not tailored to capture information required · Difficulties in processing data	· Intensify dialogue with government (Steering Committee and UNDP Policy board level) with focus on awareness, strategy and re-tooling to manage change) · Present cost-benefit/ effectiveness analysis to motivate investments in PCs and improved conditions for maintenance personnel · Best practices from other countries (Estonia *Tiger Leap*)

[2]The coalition of partners include UNDP, Markle Foundation, WEF, CID at Harvard University, IBM, United Nations Foundation (UNF). See http://www.markle.org/news/Release.200007251223.html.

· Regional e-government conference. At same time and in collaboration with Comdex/ CSOs. Include e-procurement as theme - Review international experience in this area: EU, AU, US, CA, FSU, etc. · Pilot e-government projects: - Applications: portal info server (decide on subject – business, agriculture, health, water, environment, etc.) - Regional access points (tbd); port the national government portal to selected up country locations, load locally relevant info; select local partners and public access sites (partner with projects developing community based access). - e-Procurement pilot project: Based on previous research and input, propose rules for open procurement and implement a test procurement portal over the Internet.	· Online procurement portal launched for government · Costs of products and services procured online falls and choice increases · Increased access to government information · Increased funding from state budget and other sources. Number of government portals and online directories and databases increases · Number of subscribers to online procurement and volume of business transacted online · At least one government online information access point /region	· Baseline and data · Procurement information users and providers surveys including cost of procurement · State budget and donors commitments/programmes · Evaluation of online procurement site	· Cost to access to international fibre-optic cable (TAE) prohibitive	· Take particular care to produce relevant questionnaire based on national context · Employ specialized personnel to read results of surveys · Involve global UNDP collaborators (that is, Andersen Consulting and others) · Involve middle managers
Internet connectivity provided to academia, NGO and educational institutions	· High-speed Internet channel established · At least 700 users connected and introduced to the modern ICT applications · At least 10 Web sites created by the beneficiaries	· Project evaluation reports · Surveys	· Poor technical capacity of telephone stations to channel connectivity	· Partnership with donors and private companies (that is, Siemens, Daewoo Telecom, etc.) · Extend project funding to key organizations including universities, Academy of Sciences, etc.

Narrative	Success indicators	Means of verification	Risks, constraints and external factors	Risk management actions
A national educational, scientific and research network established	· High speed access to national and international backbone · Increased volume of information made available online by beneficiaries · Number of scientific links established within and without the country · Number of new scientific/ research networks · Greater participation in international research networks · Resources and recognition as a result of collaborative research	· Statistics on scientific Web sites · Scientific publications · Bibliographies of scientific publications · Project evaluation reports · Contents of Forum, conferences, specific networks	· Language barriers · Poor technical capacity of scientific research institutions (PCs, telephone lines, etc.)	· Promote national contents for networks · Enhance language skill development · Use existing sites in Russian and Turkish during transition period · Subsidize during the start-up period · Mobilize additional income through advertising with government and donors
Electronic business (B2B) applications introduced **Components and pilot schemes** · B2B to facilitate trade and customs data processing. Work with trade promotion and customs and related organizations	· A comprehensive assessment of priorities for B2B undertaken as part of the e-readiness assessment · A white paper on e-business · EDI used for B2B transactions in several sectors, not just banking · Lowered cost of doing business · More trade in and outside country	· Lowered customs, trade and transaction related delays and costs, etc. · Less paper	· Rural-urban split · Language · Lack of awareness · Human resources	· Andersen Consulting helps produce white paper as part of UNDP global collaboration · Training via BIs/BACs, Business Woman's Association · Other partners: International Customs Union, etc. · ITU e-commerce for developing countries (ECDC) project · UNDP Fellowships

Community-based use and deployment of ICTs and of Internet access encouraged **NOTES** **Components and pilot schemes** • Community access centres developed in selected locations	· Number of community-based Internet access centres· established in each district of capital and in pilot provinces · Municipal working groups established to link to Internet: schools, hospitals, local government, BIs/BACs, research organizations, etc. · Number of municipalities benefiting from ICT applications (distance learning, etc.)	· Project evaluation reports · Composition of community-based centres · Composition of municipal working groups · Progress report of municipal working groups · Media coverage · Users surveys	· Lack of infrastructure · High costs of services · Lack of financial sustainability · Low quality of services, including facilities (e.g., security, confidentiality and speed) · Language issues	· Subsidize during the start-up period only and mobilize additional income through e-advertisement · Strengthen and facilitate partnership with donors and private companies (that is, Seimens, Daewoo Trlrcom, etc.) · Select communities based on national assessment · Share connectivity costs between projects
IMMEDIATE OBJECTIVE 3				
To enhance national capacity for information and knowledge sharing	· Number of partners enabled to manage the change as a result of training and retooling through ICT · Local capacity to meet all ICT-related service needs	· HRDC evaluation and progress reports · Statistics and data · ROAR	· Low number of ICT trained national partners to make an impact · Low return on investment due to non-conducive environment to apply the knowledge acquired	· Mainstream the focus of intervention and ensure full synergy with and ownership by the government · Extensive training of government managers and procurement officials – in collaboration with other donors. (Strengthening of government administration/ assistance to civil service reform) · Strengthen cooperation with national partners at policy and working level · Expand UNDP fellowship scheme

Narrative	Success indicators	Means of verification	Risks, constraints and external factors	Risk management actions
OUTPUTS				
Capacity of national partners fully developed to implement a framework created with UNDP support **NOTES** **Components and pilot schemes** · Management of Change projects · Civil service training (Public Admin. Mgmt. Dev. Center) on information sharing and ICT use	· Information-sharing institutionalized · Number of UNDP fellows and their supervisors benefiting from increased use of ICT · Viable and informative UNDP fellow network established · Number of highly trained country ICT specialists from all sectors advising, strategizing and realizing ICT vision for country · Number of policy advice papers and plans (prepared by national specialists)	· New structure of national counterpart · Synergy presentations from trained specialists · Project reports · Follow-up on training reports · UNDP facilitating the network · Papers, training publications and manuals	· National partners not aware of ICT advantages · Low absorption by national partners · Poor local technical capacity (Internet connectivity, PCs, software, telephone lines, etc.) for ICT applications	· To develop awareness driven demand in ICT applications and new knowledge networking schemes through specific demonstrations
A national educational strategy for strengthening ICT learning at all levels developed **NOTES** **Components and pilot schemes** · Develop national ICT educational strategy - Strengthen curriculum - Train teachers - Target women - Connect teacher training centres	· A white paper on ICT education and training in country published · ICT curricula developed for schools and adopted by the Ministry of Public Education · Adjustments to national education programme · SchoolNet established in country	· New national curricula · Data and statistics · Teacher/tutor surveys	· Absence of technical facilities to apply new curricula in schools nationwide · Absence of well-trained cadre to deliver and apply curricula · Resistance to change	· A2P2 approach · Involve Ministry of Higher Education and Academy of Science · Involve ICSU, UNESCO, CGIAR · Training and retooling of education cadre (see above)

- SchoolNet, WorldLinks
· World-class ICT training facilities established in collaboration with international IT business sector

Components and pilot schemes
· Establish Cisco and other academies
· Identify best location in consultation with Ministry, Acad. of Sciences, Universities

Components and pilot schemes
· ICT training integrated in curriculum and activities of the Public Admin. Mgmt. Dev. Center:
- Equipment / ICT labs + Internet
- Training
- UNDP Fellowships extended to the Center

Opportunities for distance learning and knowledge networking established and managed	· Center for distance learning, video conferencing and Internet learning facility established · Manual for distance learning developed by UNDP based on national context	· Media coverage · Programme Evaluation Report · Publications and manuals	· High costs of equipment for distance learning courses (video conference facilities) · Installation and run up problems (dedicated lines, etc.)	· Use incremental approach, start small · Involve World Bank distance learning project/ WorldLinks for Development (cost financing) · Connect with SchoolNet initiatives

Narrative	Success indicators	Means of verification	Risks, constraints and external factors	Risk management actions
OUTPUTS				
NOTES **Components and pilot schemes** · World Bank distance learning facility for education and on cost recovery for others **Components and pilot schemes** · Country SchoolNet and participation in WorldLinks (World Bank)·				
Local and community-based ICT training and access centres in selected pilot provinces **NOTES** **Components and pilot schemes** · Community access centres (see above) · e-Government activities in regions_via community access centres - Identify facilities, collaborators - Training - Equipment and Internet connections	· Civil service training centre with access to ICT curriculum and Internet access · Number of ICT community access centres increases steadily · Number of centre users · Number of regional and local government supporting the centres · Focus of civil service training on networking and GroupWare · SchoolNet established in country · At least 1-5 based points of presence (PoP) per region offering access to government info and services online	· Project evaluation reports · Statistics and data · Post offices, governor's or local prefects' offices as favoured location for centres · Media reports	· Lack of capacity and infrastructure · Training centre and access points financially unsustainable	· Select locations with strong support from community leaders · Involve BI, BAC and Business Women's Association and donors · (Soros, USAID, NGOs, etc.) · Service providers may be co-located with BI and BAC at first, if appropriate

- Develop local content - Work with community access centres	· ICT Observatory (or equivalent) working with key government decision-makers			
IMMEDIATE OBJECTIVE 4 (to be substantiated with PA1)				
To strengthen the capacity of SMEs to use ICTs and related applications (B2B, B2C, EDI, etc.)	· Number of SMEs benefiting from the use of ICT · Number of SMEs online · Increased participation of SMEs in local and international trade · At least one private sector supported ICT service per region · Share of private sector investments in ICT training	· National statistics · Internet statistics · NHDR 2001 · Surveys and follow up publications · ROAR · Media coverage · Composition of ICT Observatory (including private sector)	· Non-conducive legislative framework · Non-convertibility of local currency · Training centre financially not suitable	· Proper situation analysis and forecasting · Business to business approach · Business to commerce approach · Business to development approach · EDI
OUTPUTS				
e-Business incubators and venture capital funds established **NOTES** **Components and pilot schemes** · Strengthen network business incubators across country (see above) - Encourage investors to invest in ICTs for BI network - Use the Internet to attract capital and partners - Create an investment fund	· At least one e-incubator and e-venture fund established	· ROAR · Media coverage · Programme Area Evaluation Report	· Failure to attract venture capital · Inability to address the right audience (attract the right donors) · No outside investors	· To use UNDP umbrella mechanism to attract private sector investments · e-Service providers collaborate with BI and BAC in each region and co-locate at first, if appropriate

Narrative	Success indicators	Means of verification	Risks, constraints and external factors	Risk management actions
· SMEs using ICT supported by e-incubators and venture capital	· Number of SMEs able to relinquish support from e-incubators and venture capital · Increased demand for connectivity from private sector	· ROAR · Programme Area Evaluation Report · Guidelines for ICT-based SMEs	· Weak capacity of e-incubators and venture funds to provide substantial support to SMEs	· Optimal use of infrastructure and experience of UNDP Business Incubators project · Develop guidelines for ICT-based SMEs
Networking technologies training facility **NOTES** **Components and pilot schemes** · Regional/ international certified networking technologies training centre - Undertake business plan to measure potential of regional/international network certification centre in country - Implement facility with help of large ICT companies: Microsoft (Gates Fdtn), Oracle, Cisco, Novell, Nortel, Lucent, RedHat, etc.	· Sufficient number of country internationally certified network engineers/ specialists · More e-businesses created · Greater ICT self-sufficiency	· Business plan · Market analysis, including cost comparison · Surveys · National statistics	· Lack of investors · Regulations affecting creation of businesses · Currency convertibility · Regulations affecting Internet access	· Involve opportunITy initiative, UNITeS and Global Network Readiness and Resource Initiative and other UNDP partners · Involve government and other partners

About the Author

Richard Labelle is an independent consultant based in Gatineau, Quebec, Canada. He has over 23 years experience in institutional strengthening and on issues related to the management of information and knowledge in developing countries. Since 1992, he has undertaken missions to over 57 developing countries on behalf of UNDP. In his consulting practice, he has advised governments, international development agencies and other development actors on using appropriate information technologies and management practices for meeting national development goals while dealing with a variety of human, social and economic development issues at the same time. Among these issues, those related to poverty alleviation, local and community development, gender equality, the digital divide and the role of ICTs in dealing with HIV/AIDS are noteworthy. This has included advising on appropriate policies as well as designing, developing, presenting, discussing and negotiating projects that build capacities for sustainable development. He is presently involved in many countries in Africa, the Middle East and Central Asia.

Richard has undertaken a number of evaluations of Internet connectivity and ICT capacity. He has developed ICT strategies and action plans in several countries of Asia and Africa including most recently in Djibouti, Mauritania, Azerbaijan, Uzbekistan and Mongolia. He is part of a team developing the national ICT strategy for Botswana. In 2001 he was involved in assessing ICT based solutions for addressing poverty in 20 villages in 5 different provinces of rural China. In the 1980s, he developed a world-class computerized information and documentation centre on agroforestry (IDRC & ICRAF Nairobi, Kenya). Richard Labelle has been a self-employed and full time international consultant since 1992.

Richard Labelle has a B.Sc. in Biology (Hon) and an M.Sc. in Plant Physiology, from Queen's University, Kingston, Canada and a Diploma in Resource Management from the University of Toronto. Mr. Labelle is fluent in French and English.

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Edo Stork has a Masters degree in Computing Science from Free University in Amsterdam. He has worked as Project Manager of the UNDP/UNOPS regional e-Pacifika project to assist 14 countries in the South Pacific develop their national ICT policies and strategies, and as Programme Officer in the UNDP Fiji Multi-Country Office for 10 countries in the South Pacific. He has also worked for the Dutch government in ICT for Development projects in Peru and Swaziland. Currently, he is working at the UNDP headquarters in New York as a Management Specialist in the fields of business intelligence and internal consultancy.

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