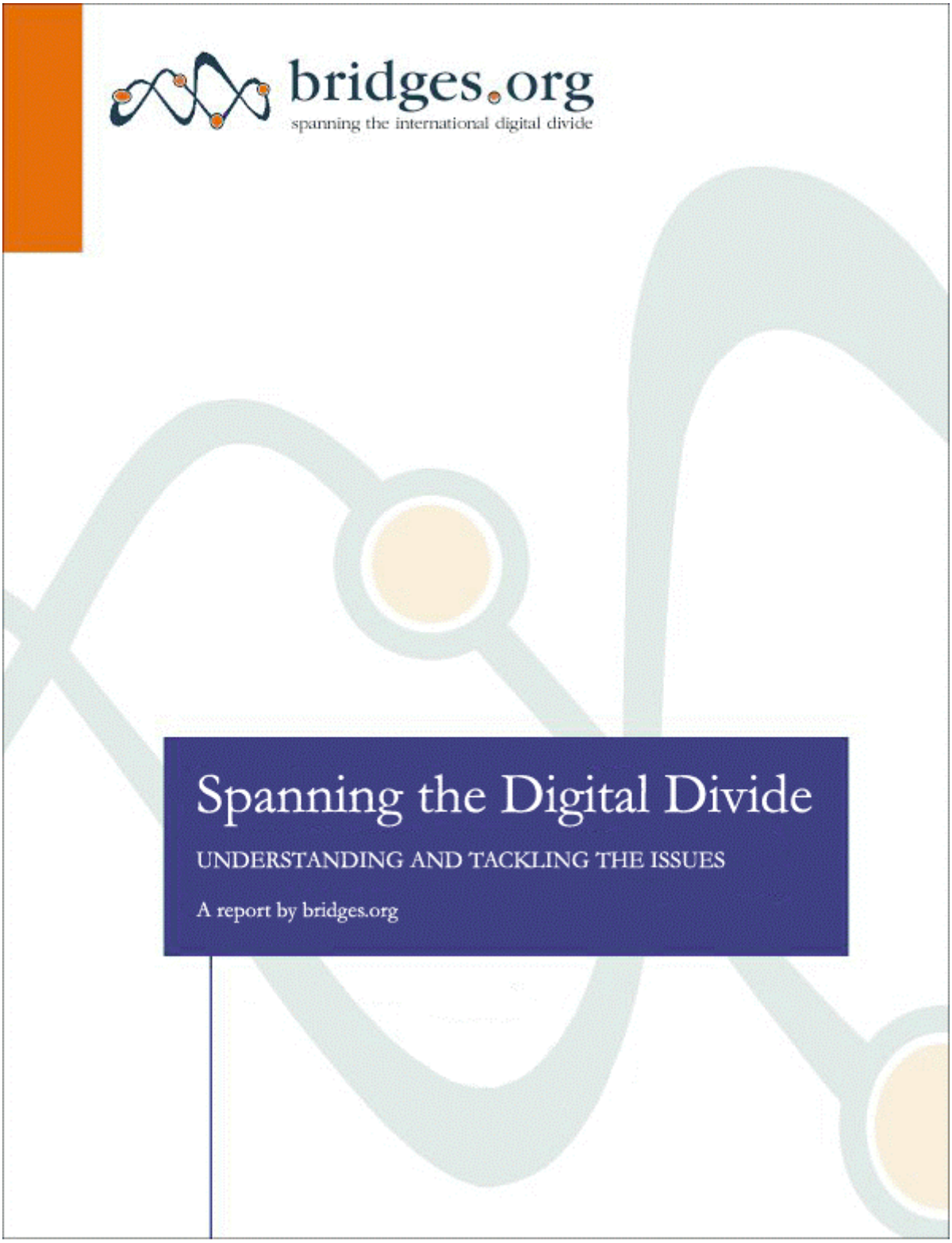

Contact Person: *Teresa Peters, Executive Director*
tmpeters@bridges.org

South Africa: *P.O. Box 4163, Durbanville 7551*
+27 21 970 1304
United States: *2000 P St NW Ste 240, Washington DC*
+1 202 776 0120
URL: *www.bridges.org*

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Executive Summary

1. Introduction

There is a great deal of hype and fervour about the digital divide. It is difficult to gain an overall understanding of the problem, the different approaches to solutions, and what is really making a difference when there are multiple definitions of the "digital divide," conflicting reports of whether it is growing or shrinking, and a range of opinions on the key factors affecting it. What is clear is that the disparities between the "haves" and the "have-nots" is growing, and the potential impact on society – whether good or bad – will be exacerbated by technology. In fact, the digital divide is a complex problem that manifests itself in different ways in different countries. It presents both practical and policy challenges. Moreover, it is apparent that solutions which work in developed countries cannot simply be transplanted to developing country environments: solutions must be based on an understanding of local needs and conditions.

This report reviews some of the basic facts about ICT access and use, and provides an extensive list of resources for further information. It goes on to examine the major approaches to the problems, describing the various on-the-ground initiatives and considering government policies that play a role. It reflects on what is working best and what is failing – and why. Finally, it illustrates the key elements necessary for integrating technology into society in an effective, sustainable way so that people can put technology to use to improve their lives: what we call "*real access"* to technology.

2. International and Domestic Digital Divides

Real disparities exist in access to and use of information and communications technology (ICT) between countries (the "international digital divide") and between groups within countries (the "domestic digital divide"). There is a wealth of real and anecdotal evidence to support this statement. The volume of statistics is impressive and persuasive: "In the entire continent of Africa, there are a mere 14 million phone lines – fewer than in either Manhattan or Tokyo. Wealthy nations comprise some 16 per cent of the world's population, but command 90 per cent of Internet host computers. Of all the Internet users worldwide, 60 per cent reside in North America, where a mere five per cent of the world's population reside"(Nkrumah). "One in two Americans is online, compared with only one in 250 Africans. In Bangladesh a computer costs the equivalent of eight years average pay" (The Economist). Underlying trends are often lost in the heated debate over how to define the problem, but a pattern emerges from within the statistics.

There is an overall trend of growing ICT disparities between and within countries:

- All countries, even the poorest, are increasing their access to and use of ICT. But the "information have" countries are increasing their access and use at such an exponential rate that, *in effect*, the divide between countries is actually growing.
- Within countries, all groups, even the poorest, are also increasing their access to and use of ICT. But within countries the "information haves" are increasing access and use at such an exponential rate that, *in effect*, the division within countries is also actually growing.

In highly developed countries a different process *appears* to be occurring, but upon further examination, it is the same pattern of growing ICT disparities:

- In certain rich countries (such as the US and Finland), saturation points for baseline technologies such as PCs have almost been reached for some groups. Therefore, since the underserved are increasing baseline technology access and use, the gap between the information "haves" and "have-nots" *appears* to be closing.
- A closer look shows that even when the gap for a particular technology appears to shrink, underlying disparities remain. When new technologies are introduced, the actual divide is re-

illustrated because only the "information haves" can afford to acquire, and have the skills to use, the technology quickly, and they derive exponential benefits.

Underneath the apparent widening and narrowing of the ICT divides, the underlying trend is that privileged groups acquire and use technology more effectively, and because the technology benefits them in an exponential way, they become even more privileged.

- The infusion of ICT into a country paints the existing landscape of poverty, discrimination, and division onto the new canvas of technology use. Because ICT can reward those who know how to use it with increased income and cultural and political advantages, the resulting digital divide shows up in increasingly stark contrast.
- Therefore, ICT disparities usually exacerbate existing disparities based on location (such as urban-rural), gender, ethnicity, physical disability, age, and, especially, income level, and between "rich" and "poor" countries.

The digital divide is not a single thing, but a complicated patchwork of varying levels of ICT access, basic ICT usage, and ICT applications among countries and peoples.

- Each country and group has a unique profile for how technology is used, or not. While a few countries rate low on many of the metrics for ICT use and readiness, most have a mixture of positive and negative ratings.
- Divisions can only be effectively tackled by looking at these specific deterrents; gross measurements of ICT usage available in most reports on the digital divide do not provide a coherent plan of action to address the inequities they describe.
- E-readiness assessments are a valuable tool with which to gain this more informed, region-specific understanding, and to develop an action plan.

Generally, there are three main approaches to the problems of the digital divide: studies and recommendations, on-the-ground efforts, and policy reform.

3. Studies and Recommendations

Governments, businesses, individuals, and organizations have studied the issues at stake in the digital divide and drafted a range of valuable reports – from statistical analysis to in-depth case studies. Most offer recommendations for tackling the problems, usually suggesting specific ground level initiatives and policy reforms. Many also cover the wider issues that impact on digital divides, such as e-commerce, information society, and international trade. Major international initiatives such as the G8's Digital Opportunity Task Force (DOT Force) have brought together leaders and decision-makers from around the world for a consultation process to determine the key factors and how to address them. Several organizations have undertaken "e-readiness" assessments to determine a country's readiness to integrate technology and e-commerce and establish a benchmark for regional comparison and public and private sector planning. **Unfortunately, there is significant duplication of effort in these studies and recommendations[1], and too few of the suggestions are followed up in practice.** There is a lot of talk, but not enough action.

4. On-the-ground Efforts to Bridge the Digital Divide

Numerous on-the-ground initiatives are working to provide technology access and help put technology to use in underserved populations. There are an enormous number of efforts, ranging from telecentres to telemedicine to training to innovative business applications, and they are driven by the smallest NGO in Myanmar, Burma to the largest multinational corporation, such as Hewlett Packard's US$1 billion "E-Inclusion" initiative.[2]

[1] Notably in the field of "e-readiness assessments." See *Comparison of E-Readiness Assessment Tools*, and *E-Readiness Assessment: Who is Doing What and Where*, bridges.org, March 2001, www.bridges.org.
[2] Annex 4 includes descriptions and references for over 100 initiatives that were analysed for the report.

Many initiatives address specific aspects of the range of issues, but too often they neglect related factors that limit their success. For example, too many telecentres providing computers and connections in rural locations do not become self-sustaining because local people do not use their services – often they have failed to address the role of the centre in the local economy or the need for locally relevant content. There is a need for a holistic approach to cover the range of issues to create effective and sustainable uses for technology that are integrated into local society.

Access to technology must mean more than just computers and connections: Bridges.org's *real access* criteria

We looked at a large selection of on-the-ground initiatives and examined what works best and what fails – and why. Providing access to technology is critical, but it must be about more than just physical access. Computers and connections are insufficient if the technology is not used effectively because it is not affordable; people do not understand how to put it to use, or they are discouraged from using it; or the local economy cannot sustain its use.

We have set out the following issues which we believe are the determining factors in whether or not people have "*real access*" to technology; i.e. access that goes beyond just physical access and makes it possible for people to use technology effectively to improve their lives.

- **Physical access.** Is technology available and physically accessible?
- **Appropriate technology.** What is the appropriate technology according to local conditions, and how people need and want to put technology to use?
- **Affordability.** Is technology access affordable for people to use?
- **Capacity.** Do people understand how to use technology and its potential uses?
- **Relevant content.** Is there locally relevant content, especially in terms of language?
- **Integration**. Does the technology further burden people's lives or does it integrate into daily routines?
- **Socio-cultural factors.** Are people limited in their use of technology based on gender, race, or other socio-cultural factors?
- **Trust.** Do people have confidence in and understand the implications of the technology they use, for instance in terms of privacy, security, or cybercrime?
- **Legal and regulatory framework.** How do laws and regulations affect technology use and what changes are needed to create an environment that fosters its use?
- **Local economic environment.** Is there a local economy that can and will sustain technology use?
- **Macro-economic environment.** Is national economic policy conducive to widespread technology use, for example, in terms of transparency, deregulation, investment, and labour issues?
- **Political will.** Is there political will in government to do what is needed to enable the integration of technology throughout society?

Overall, a pooling of resources and experiences is needed. Dealing with the digital divide is beyond the scope of any single initiative. While it is important for organizations doing community ICT projects to meet the needs of their clients as comprehensively as possible, the issues at stake in international and domestic digital divides are huge, and organizations should cooperate to tackle problems collaboratively.

Private sector programs are vital. For-profit programs are successfully expanding access to technology to increasingly larger groups, but often fail to adequately address the needs of the poorest

countries, and the poor citizens within countries. In isolation they can exacerbate divisions within countries since privileged groups are more able to afford and use the technology.

Donation and other philanthropic programs are necessary. Donations and philanthropic programs have demonstrated the useful application of technology among underserved populations, but in many cases they have failed to produce sustainable, widely replicable models.

The digital divide is not a new problem. We should learn from previous experience in fields such as economic development, technology transfer, and sustainable development. Many of these ongoing programs have an impact on digital divides, and coordination will benefit both sides.

5. Policy and Digital Divides

National governments can play a fundamental role in creating an environment that will foster technology use and encourage national and international investment in ICT infrastructure, development, and a skilled workforce. Government action is also important in spreading the benefits of technology throughout society, and governments have the power and mandate to balance the needs of their citizens for long-term economic growth and social prosperity.

***Real access* to ICT is affected by nearly all aspects of policy, ranging from digital signatures to collective bargaining and general macro-economic policies, which places "the digital divide" debate in a wider context.** Relevant fields of policy include:

- **ICT Infrastructure and Supporting Systems.** Policies that affect basic ICT infrastructure and its productive use in society, notably: Telecommunications Licensing and Regulation, Telecommunications Privatisation, Spectrum Allocation, Internet Domain Management, Banking and Financial Sector, Standards Setting, Customs Standardization.
- **Trust.** Policies that effect business, government, and consumer trust towards ICT and each other online, including: Electronic Signatures, Data Security, Cybercrime, Privacy, Intellectual Property, Regulation of Content, Consumer Protection.
- **Capacity Building.** Policies that build the necessary capacity to use ICT effectively, including Curriculum and Materials, Technical Education.
- **Taxation and Trade.** Taxation, tariffs and trade barriers, foreign direct investment.
- **Employment and Labour.** Collective Bargaining and Other Labour Policies, Brain Drain Counter-Measures.
- **Technology Diffusion.** Universal Service, E-Government, Private Sector and Civil Society ICT Use.
- **General Government Environment.** Government Structure (e.g. democracy, transparency, independence of judiciary and regulatory authorities), Discrimination Policy.

Other major stakeholders and actors in the policy-making process include: a wide range of organizations and companies, including, international organizations (e.g. UN, UNCITRAL, ITU, World Bank, WTO, ICANN, W3C), consumer rights organizations (e.g. Consumers International, TransAtlantic Consumer Dialogue), regional Internet registries (RIPE, ARIN, APNIC), private businesses *(*e.g. Telecom companies, Internet service providers, Financial sector companies, Certification Companies), business forums (e.g. Alliance for Global Business, International Chamber of Commerce), and online rights organizations (e.g. Electronic Frontier Foundation, Privacy International, Global Internet Liberty Campaign).

The G8's DOT Force initiative is by far the largest, most clearly and comprehensively targeted at the digital divide, and most likely to impact on government policy.

Policy directions must be adapted to the local context. Often basic policy principles are agreed at the international level, or policies are transferred from highly industrialized countries to developing

and emerging countries. The local context – in terms of local needs and skills and local political issues – has a significant impact on whether generally accepted policy reforms are actually adopted and put into practice. Even national governments that have the political will to drive change, often struggle with the process of putting policies into effect. Policies and processes that are grounded in real life experience, in local circumstances, based on real user needs, and addressing the multiple issues of *real access* to ICT have been more effective than those that have not.

6. Conclusions

There are real disparities between countries and socio-economic groups that are benefiting from information technologies, and those that are not. While information technology use is growing around the world, the disparities are also growing. Whether or not one chooses to label these disparities as digital divides is immaterial: the disparities remain.

There is a disconnect between on-the-ground efforts and policy-making processes. Both ground-level initiatives and policy reform are necessary, and information flow between them will make both approaches more effective. Many ground-level programs are limited by the lack of a supportive legal and policy framework in the countries where they work. Most policy-making related to ICT issues would benefit from a clearer understanding of how policy affects the technology end user. Unfortunately, there are few models that effectively bring the two together. Government, business, society and current and future technology users must understand and acknowledge each other's position and responsibilities.

At the macro-level, the digital divide could be described as a failure at three levels.

- **A failure of development initiatives.** Development initiatives[3] have been essential in providing basic access to underserved populations, but have failed to provide sustainable, replicable models for community ICT use, and often err with top-down approaches that are not grounded on the needs, interests, and participation of local residents. They would benefit from involving the private sector in an effective way so that the results of their efforts are integrated into the local economy to ensure sustainability. They could also leverage their experiences gained on-the-ground to effect change in government policies or laws that hinder the effective implementation of their programs.
- **A failure of market forces.** The private sector has slowly spread technology to middle income groups, but on the whole has failed to see the developing world and underserved populations as valuable markets which require targeted products. [4]
- **A failure of the government.** Government policy has often tried to meet the short term demands of their constituencies, but failed to provide a coherent long term plan for prosperity, or hindered the efforts of development initiatives and the private sector to address ICT disparities.

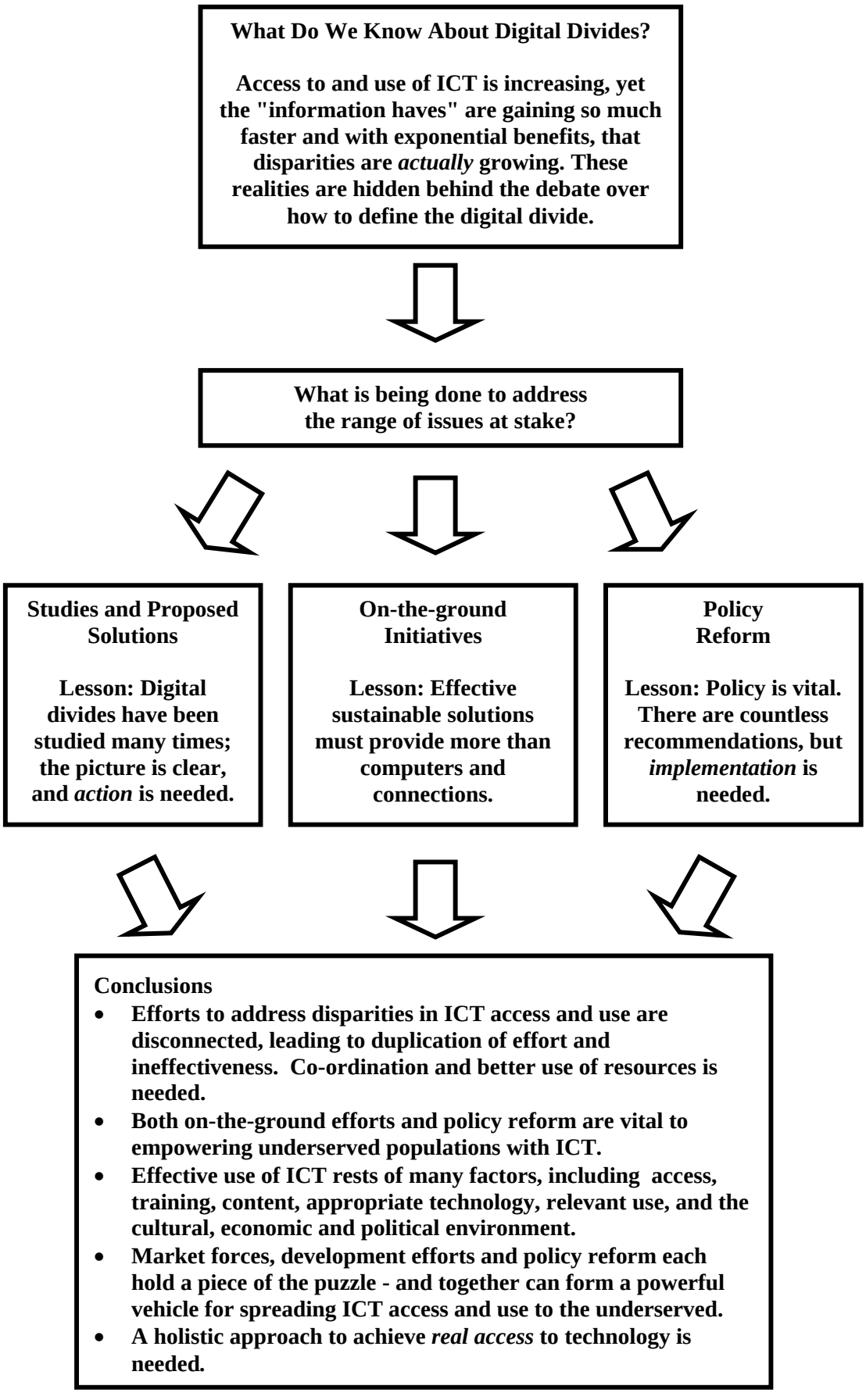
All three failures need to be turned around if we are to bridge the divides with effective, practical applications of technology. Without entrepreneurship, and government policy encouraging and supporting equity, development initiatives face insurmountable tasks and no funding to finance them. Without basic electrical and telecommunications infrastructure programs and universal service initiatives by government, ICT companies will have little incentive to develop new products to meet the needs of people who cannot use or afford their existing services. And, government policies are useless without ground-level programs to take advantage of them.

[3] Whether by "development agencies" such as USAID, national governments, private sector donation or corporate responsibility programs

[4] There are examples of business approaches that have taken low-income markets seriously to develop appropriate products, and they are reaping the benefits and improving the lives of people in a tangible way: e.g. pre-paid wireless telephones, and micro-finance.

A holistic approach which aims for *real access* to technology is needed. The 11 determining factors that we outlined above provide a roadmap to a digital divide approach aimed at integrating technology into society in an effective, sustainable way so that people can put it to use to improve their lives.

ROADMAP TO THE REPORT



1 Introduction

1.1 The fervour about the digital divide

Stories about the digital divide have flooded news reports, journals, and conferences over the past few years. Statistics have been computed and reports published to try to quantify and describe what is happening and who is affected and how, especially in the developed world. It is all about how the information revolution is changing the world and what happens to the people who do not have access to information and communications technologies. And the potential impact is profound: as one report states, "there are more telephones in New York City than in all of rural Asia, more Internet accounts in London than all of Africa. As much as 80% of the world's population has never made a phone call"(DigitalDividends 2001a).

Many initiatives label themselves as "digital divide programs,"[5] ranging from Hewlett Packard's one billion dollar "E-Inclusion" initiative, to the smallest sub-Saharan Africa non-governmental organization (NGO) teaching 5 villagers how to use a computer, to the "Digital Bridges" policy initiative of the Global Business Dialogue on Electronic Commerce. Even the G8 countries have taken an interest and created the Digital Opportunity Task Force (DOT Force) to study the issue and recommend an action plan. Hundreds of authors have put pen to paper to share their experiences and perspective on how the world should address the divide. News reports are rife with poignant tales of digital divide initiatives using computers to transform people's lives and new government policies that will conquer the digital divide for all. There is less said about the donated computers that sit unused because teachers do not know how to teach *with* them, the unsustainable telecenters that shut down when the funding dries up, and the scarce resources spent on e-readiness assessment studies that duplicate the efforts of others.

1.2 What is the real problem?

The discussion of how to bring the opportunities offered by ICT to the people who need them most has been muddled by arguments over exactly how to define the problem: is it about insufficient access to PCs? training? local content? poverty? There are many perspectives on the digital divide with different connotations and focus. Some argue that computers, connections and training will solve the problem, but there is disagreement about whether they should be provided by government, non-governmental organizations (NGOs) and the private sector, or if the market will solve the physical access problem on its own. Others contend that government action (or inaction) hinders the development and use of ICT, and until policies are changed, the digital divide can not be solved. Many see beyond the physical access problem and focus on lost opportunity for people that are unable to effectively use ICT because they do know how to use it or they do not understand how it can be relevant to their lives. Underlying social issues like basic literacy, poverty, and healthcare also loom large, and some question whether and how technology can become part of the solution to these critical problems.

In fact, the digital divide is about all of these things. It is a complex problem that manifests itself in different ways in different countries. It presents both practical and policy challenges. Moreover, it is apparent that solutions that work in the developed countries can not simply be transplanted to

[5] A number of large-scale programs and countless smaller-scale projects have been undertaken, and are well documented. See the DigitalDivideNetwork.org with its database of over 20,000 programs.

developing country environments: solutions must be based on an understanding of local needs and conditions.

1.3 Why another report on the digital divide?

It is difficult to gain an overall understanding of the various approaches and what is really making a difference when there are multiple definitions of the "digital divide," conflicting reports of whether it is growing or shrinking, and a range of opinions on the key factors affecting it. However, underneath the fervour and hype surrounding the digital divide, some good work is being done toward putting technology to use in sustainable ways in underserved communities and ensuring that laws and policies foster technology use.

The goal of this report is not to quantify or explain the digital divide, which is an enormous task that has already been undertaken by numerous others (see Annex 3 for a list of links to other digital divide reports and analysis). However, we do begin by reviewing some of the basic facts about ICT access and use, and we point out where data is missing and further research would be valuable. And we provide an extensive list of resources for further information. We look at the digital divide between countries (the international digital divide) that is usually measured in terms of teledensity, personal computer (PC) density, and the number of Internet and mobile phone users. And we examine the digital divide between groups of people within countries (the domestic digital divide) that is usually measured in terms of race, gender, age, disability, location, and income. More importantly, we examine the major approaches to problems of the digital divide, by describing the various on-the-ground initiatives and considering government policies that play a role.

Unlike other reports that propose new solutions, this report focuses on learning from best practices. We highlight what is working best and what is failing – and why. We draw on concrete examples to illustrate the key elements necessary for an effective, sustainable digital divide initiative that helps people use technology to improve their lives. This report concentrates on the use of ICTs in the developing world, which has been studied less but has far greater need; however, many of the lessons learned can be applied in developed countries as well.

1.4 Our Suggestions For What Is Needed

Finally, we outline specific suggestions for what is needed. Providing access to technology is critical, but it must be about more than just physical access. Computers and connections are insufficient if the technology is not used effectively because it is not affordable; people do not understand how to put it to use or they are discouraged from using it; or the local economy cannot sustain its use. What is needed is *real access*, access that goes beyond just physical access and makes it possible for people to use technology effectively to improve their lives. We have identified the eleven criteria that must be met to provide real access, and built them into an approach that delivers a practical solution.

The bridges.org approach to the digital divide is characterized by Bridges.NeTWORK, a model for integrating technology into society in an effective, sustainable way to achieve *real access* for people to put technology to work to improve their lives. Bridges.NeTWORK avoids the pitfalls of traditional development efforts by addressing the role of business, government, and civil society as an integral part of its design. In general, the project aims to establish relationships between the various stakeholder groups that will foster technology use; facilitate productive local use of technology to generate demand for content and services developed and delivered through technology; and demonstrate this demand to the public and private sectors. There are three essential elements necessary to implement such an approach: local partnerships, community-based technology access points, and a localized "problem-solver" unit that provides services and support. Without any one of these elements, the chances of success are lessened.

Adopting the Bridges.NeTWORK model does not in itself guarantee success. All of the elements must be in place if it is to succeed. And the most critical element is people, the people who use and benefit from the technology, and those who help them to achieve success. It is not about the technology, it is about the people.

2 International and Domestic Digital Divides

This chapter examines what is known about the uneven distribution of ICTs, and trends in ICT use. Real disparities in access and use of information and communications technologies exist between countries and socio-economic groups. However, the term "digital divide" is a misnomer — there is a complicated patchwork of varying levels of ICT access, basic ICT usage, and ICT applications among countries and socio-economic groups; many disparities are getting larger even as all countries and groups are increasing their overall use of ICT. The chapter first outlines those disparities, drawing on current statistics of the divisions between and within countries, then outlines the possible future of these disparities.

Summary of Findings[6]

Real disparities exist in access to and use of information and communications technology (ICT) between countries (the "international digital divide") and between groups within countries (the "domestic digital divide"). There is a wealth of real and anecdotal evidence to support this statement. The volume of statistics is impressive and persuasive: "In the entire continent of Africa, there are a mere 14 million phone lines — fewer than in either Manhattan or Tokyo (Nkrumah)." "One in two Americans is online, compared with only one in 250 Africans. In Bangladesh a computer costs the equivalent of eight years average pay "(Economist). Underlying trends are often lost in the heated debate over how to define the problem, but a pattern emerges from within the statistics.

There is an overall trend of growing ICT disparities between and within countries[7]**:**

- All countries, even the poorest, are increasing their access to and use of ICT. But the "information have" countries are increasing their access and use at such an exponential rate that, *in effect*, the divide between countries is actually growing.
- Within countries, all groups, even the poorest, are also increasing their access to and use of ICT. But within countries the "information haves" are increasing access and use at such an exponential rate that *in effect*, the division within countries is also actually growing as well.
- These trends are repeated on many levels – in use of ICT, in affordability, in training, in relevant content, and in participation and growth of the ICT sector.

In highly developed countries a different process *appears* to be occurring, but upon further examination it is the same pattern of growing ICT disparities:

- In certain rich countries (such as the US and Finland), saturation points for baseline technologies such as PCs have almost been reached for some groups. Therefore, since the underserved are increasing baseline technology access and use, the gap between the information "haves" and "have-nots" appears to be closing.
- A closer look shows that even when the gap for a particular technology appears to shrink, underlying disparities remain. When new technologies are introduced, the actual divide is re-illustrated because only the "information haves" can afford to acquire, and have the skills to use, the technology quickly, and they derive exponential benefits.

[6] Each substantive chapter of this report has a two-part executive summary to make the information more accessible. First, a brief paragraph in *italics* summarizes the chapter; second, a "summary of findings" section outlines the major conclusions and lessons. The rest of the chapter provides the background information, research, and analysis.

[7] The question is often asked: is the "digital divide" closing or widening? The digital divide debate is too rife with polarized emotions and arguments to directly answer that question. In reality, the answer depends on how one defines the digital divide (between countries versus within countries, OECD versus non-OECD countries, ethnic divisions versus income, etc). Annex 1 describes common perspectives on the digital divide and how people believe it may develop.

Underneath the apparent widening and narrowing of the ICT divides, the underlying trend is that privileged groups acquire and use technology more effectively, and because the technology benefits them in an exponential way, they become even more privileged.

- The infusion of ICT into a country paints the existing landscape of poverty, discrimination, and division onto the new canvas of technology use. Because ICT can reward those who know how to use it with increased income and cultural and political advantages, the resulting digital divide shows up in increasingly stark contrast[8].
- Therefore, ICT disparities usually exacerbate existing disparities based on location (such as urban-rural), gender, ethnicity, physical disability, age, and, especially, income level, and between "rich" and "poor" countries.

The digital divide is not a single thing, but a complicated patchwork of varying levels of ICT access, basic ICT usage, and ICT applications among countries and peoples.

- Each country and group has a unique profile for how technology is used, or not. While a few countries rate low on many of the metrics for ICT use and readiness, most have a mixture of positive and negative ratings.
- Divisions can only be effectively tackled by looking at these specific deterrents; gross measurements of ICT usage available in most reports on the digital divide do not provide a coherent plan of action to address the inequities they describe.
- E-readiness assessments are a valuable tool with which to gain this more informed, region-specific understanding, and to develop an action plan.

Current estimates are based on the status quo. Concerted efforts by governments, the private sector, organizations and individuals to diffuse information technology and put it to effective use could completely change the current situation.

[8] The use of ICT is more unevenly distributed than other technologies – "Although the average OECD country has roughly 11 times the per capita income of a South Asian country, it has 40 times as many computers, 146 times as many mobile phones, and 1,036 times as many Internet hosts" (Grace et al).

2.1 What Are We Measuring?

There are many different perspectives on the digital divide, some defining it as a lack of Internet use between countries, and some focusing on gaps in access between socio-economic groups within countries. **The goal of this report is not to argue one definition of the digital divide or another, but rather to point out the real existence of disparities – whichever way they are looked at.**

Authors describe disparities in ICT access and use in a variety of ways. This chapter summarizes some of the major findings along the following criteria:

Table 1: Criteria used to measure ICT Disparities

Criteria	Description
Number of users or computers	How many people use the technology in various countries?
Infrastructure, Access	What telecommunications networks are in place, how many people have access to PCs to web-enabled phones to other handheld devices, where are PCs located (homes, workplaces, community centres)?
Affordability	Is the technology affordable, and to whom?
Training	Do people know how to use the technology? Is it taught in schools, in vocational programs and are these programs affordable?
Relevant Content	Is there content in local languages that addresses the immediate needs and interests of the population?
IT Sector	How large is the local ICT sector and integration of ICT into existing industries in terms of jobs, GDP, and trade?
Poverty	What challenges exist to widespread ICT use, such as illiteracy, infant mortality, and poor water quality?
Geography, race, age, religion, gender, and disability	How is access to and use of technology distributed across demographic lines?

Unfortunately, it is an immensely difficult task to measure the distribution of ICT around the world. While it is relatively easy to estimate how many computers are out there, replicating this for all the countries in the world and segmenting that data by socio-cultural divisions (race, income, religion, etc.) is an enormous problem. Apart from physical access to technology, it is hard to define *effective* use and even harder to measure. Finally, there are many technological "divides" that could impact on the equation, such as number of computers, Internet access speed, pricing, radios and televisions.

The result is a number of approximations of ICT distribution that are incomplete, but paint a common picture. These statistics have been gathered and published in numerous reports. This report cites the major statistics and provides resources on where to find more information[9].

Our research is not exhaustive, but most statistics point towards the same fact — there is a vast gulf between the information “haves” and “have-nots” and in most cases the gulf is becoming increasingly worse.

[9] Annex 2 describes common statistics used to measure the "digital divide" and Chapter 3 provides an overview of existing studies and reports.

Effective ICT use as part of the solution to broader problems

Common sense, backed up by practical experience, shows that a number of practical factors hinder wide scale technology use. A community that does not have electricity and whose residents are illiterate will struggle to incorporate conventional ICT in their everyday lives. More subtly, people must have their basic needs met before they will be able or willing to use computers. As Bill Gates said, "do people have any concept of what it means to live on less than a dollar a day? There's no electricity...These people are trying to stay alive. There is no need for a PC" (Bernant). Although many argue that these issues need to be addressed head-on in order to have effective ICT use, the very same technology could be used to help overcome many of these obstacles. By appropriately integrating ICT as part of the solution, more effective solutions to the delivery of basic services can be found and a further gap between information “haves" and "have-nots" can be avoided.

The following are a few of the statistics authors cite to show the severity of existing poverty and the real challenges some areas face to using conventional information technologies:[10]

Table 2: Basic Poverty Statistics

Indicator	Statistics
Poverty	66% of the population of Zimbabwe does not have access to sanitation (World Bank 2001a; 1990-6 data); Almost half of the world’s 6 billion people live on less than $2 a day, and over 1 billion people live on less than $1; In Nigeria, 70.2% of the population lives on less than $1 (World Bank 2001a; 1998 Data, 1997 Data for Nigeria); Up to 80% of the world’s population has never made a phone call (World Resources Institute).
Literacy	Roughly 25% of adults in the world are illiterate (18% men, 32% women) and in South Asia 35% of men and 59% of women are illiterate (World Bank 2001a; 1998 Data). According to Kevin Watkins of Oxfam, more than half of primary-age children in Sub-Saharan Africa receive only a rudimentary primary education and less than one third go to secondary school (Keegan).
Employment	Unemployment in countries such as Armenia is estimated at 20%, and Zimbabwe at 50% (CIA Factbook; 1998 data).
Health	In a number of sub-Sarahan countries such as Botswana, one in three adults is infected with HIV/AIDS, which will devastate its society, economy, and government in the coming decades (Agence France-Presse).
Debt	Dozens of countries are crushed by foreign debt, such as Syria with a debt of 136% of their Annual GDP and Nicaragua, 262% (World Bank 2001a; 1998 Data).

[10] Data on these factors can be found from a number of organizations including the World Bank and World Health Organization. See Annex 3, "Reports Measuring the Digital Divide", for references to such sources.

2.2 Disparities in ICT Use Between Countries – the International Divide

Numerous measures of international technology use exist. They fall into two broad categories: basic technology usage, factors that affect use, and advanced applications of technology.

For basic access and usage of ICT, we review the following:
(1) Internet use (2) Phones (3) Number of Computers (4) Internet Bandwidth and Speed

For factors which affect ICT use, we look at:
(1) Pricing (2) Technical training and human capital (3) Relevance of content

For advanced applications of technology, we look to:
(1) E-Commerce (2) Industrial Information Technology

And finally, we examine the role of **ICT in the Economy.**

By any measure, the indications are clear that wide disparities exist, and are growing in many instances.

A. Overview: Basic ICT Use

Internet use
The total number of users is a good place to start to provide a context for more detailed statistics. In digital divide studies, Internet usage numbers are most often cited to describe the divide. Nua's most recent data on how many people have used the Internet recently shows a clear division.

Table 3: Number of Internet Users

Region	*# Users (millions)*
Africa	3.11
Asia/Pacific	104.88
Europe	113.14
Middle East	2.40
Canada & USA	167.12
Latin America	16.45
World Total	**407.1**[11]
Source: http://www.nua.com/surveys/how_many_online/index.html[12]	

Over time, this division between developed and developing countries has increased, even as all countries have steadily increased their number of Internet Users – as illustrated by Figure 1, from the G8's Digital Opportunity Task Force. The spread of Internet users among the world's population is much more unequal than that of the use of other ICT such as TV or telephones. The inequality of

[11] At the time of writing (May 2001), Telecordia Technologies estimates the number of Internet users at 440 million. See http://www.netsizer.com/. For "daily" statistics on numbers of hosts and estimates of users, check http://www.netsizer.com/daily/TopCountry.html.
[12] As Nua states, "The art of estimating how many are online throughout the world is an inexact one at best. Surveys abound, using all sorts of measurement parameters." These estimates differ from the number of people who theoretically have *access* to the Internet, as described below.

Internet usage is even bigger than the spread of GDP between the world's rich and poor countries, and larger than disparities in other technologies such as televisions, as shown in Figure 2.

Figure 1: Number of Internet users over time

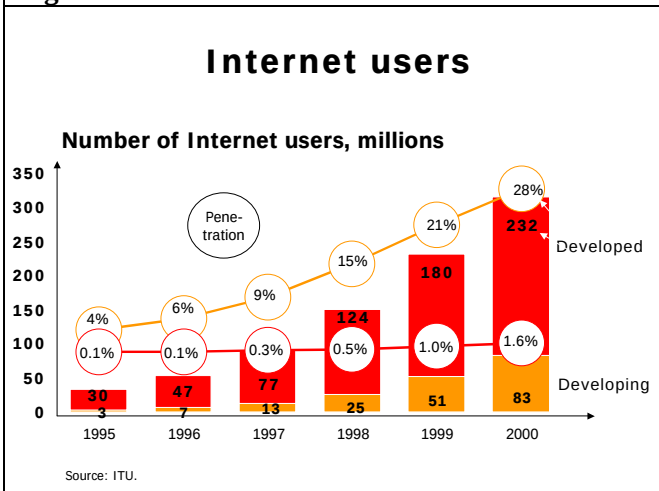
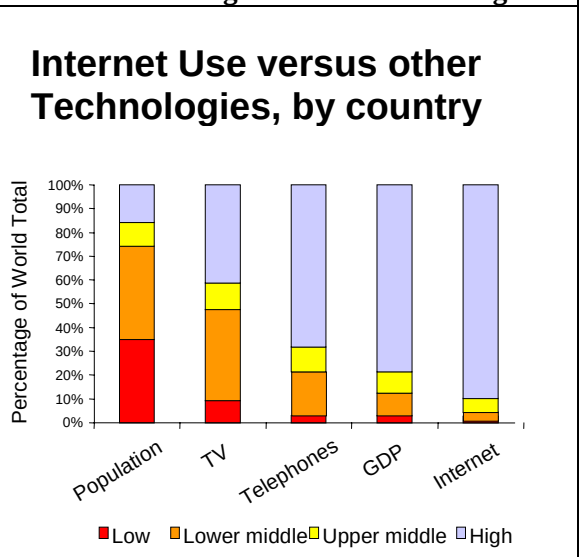


Figure 2: Internet usage and other technologies



Source: DOT Force

Access to the Internet is often gauged by the number of "registered online computers" – computers with valid IP addresses on the Internet. The division between countries is evident here as well. By far the most registered online computers are in the United States, with other developed nations close behind. In April 2001, Netsizer estimated there were 77,170,600 in the US, 5,866,360 in Japan, 5,267,270 in Canada, 3,911,990 in the UK, and 3,682,640 Germany (Telecordia 2001b)[13]. A number of countries have less than ten (Bangladesh, Angola, Chad, Iraq) or even zero (Burundi, Benin, Syria) computers registered under their country code[14].

This basic pattern of disparities is repeated again and again with other technologies such as:

- **Telephones**
  There is a wide disparity in access to phones. In 1998 there were 146 telephones per thousand people in the world, but only 19 per 1000 in South Asia, and only 3 per 1000 in countries such as Uganda (World Bank 2001a; 1998 Data)[15]. Mobile Phones show a similar disparity[16], for every 1000 people in the world, 55 had mobile phones in 1998, but only 1 person in 1000 had a mobile phone in either South Asia or Uganda (World Bank 2001a; 1998 Data)[17].

[13] The number of internet hosts per 1000 people shows a similar disparity – with the United States at approximately 230 hosts per 1000, and Turkey and Mexico with less than five (OECD 2001b; Oct 2000 data), As of January 2001, there were 109,574,429 valid Internet hosts (http://www.isc.org/)
[14] Source: Internet Software Consortium (http://www.isc.org/). See http://www.isc.org/ds/WWW-200101/dist-bynum.html
[15] To put teledensity and phones access in perspective, consider this statement from the World Resources Institute: "80% of people in the world have never made a phone call", let alone used a computer.
[16] With exceptions, of course.
[17] According to the US Internet Council's State of the Internet Report, mobile phone access rates of 64.4% occur in Finland and 19.4 % in Germany, and more extreme variations occur in Asia – from Hong Kong's 54.4 % to Indonesia's 0.9% (US Internet Council p11)

- **Computers**
  Basic access to computers is usually measured against the total number of computers in a country, or number per capita – both of which illustrate stark divisions. For example, for the world, there were 70.6 PCs per 1,000 people, with 311.2 per 1,000 in developed countries, 7.5 / 10000 in Sub-Saharan Africa, 2.9 / 1000 in South Asia, and only 0.7 / 1000 in countries such as Mali (World Bank 2001a; 1998 Data)[18].

- **Bandwidth and Speed**
  International bandwidth, including submarine and other international cables and satellite links, is an important but often ignored factor in most digital divide reports. The amount of bandwidth a country has tells how much information can quickly travel from one country to another[19]. International bandwidth is vital since non-US users of the Internet are effectively limited by their country's total international bandwidth[20]. The vast capacity of the Internet is distributed highly unevenly throughout the world. By late 2000 the bulk of Internet connectivity linked the US with Europe (56 Gbps) and, to a lesser extent, the US with the Asia-Pacific region (18 Gbps). Africa had extremely little bandwidth reaching Europe (0.2 Gbps) and the USA (0.5 Gbps) (Source: Telegeography).

  Between countries there is also a wide variation on internal access rates. For example, a 256Kbps line in South Africa (which has considerably more advanced technology that the rest of Africa) is a speedy connection to the Net, while a DSL or T-1 (1.5Mbps) connection is a *minimum* small business connection in the United States. The slower the connection, the longer it takes to retrieve information over the Internet, the less information and benefit a person can effectively gain[21].

B. Factors affecting ICT use

In the affordability of ICT, levels of training, and relevance of content, there are similar disparities:

- **Prices**
  Two basic disparities exist in the affordability of ICT – in the basic cost of the technology, and in the cost of the technology relative to per capita income. Access costs (ISP, and telephone call

[18] The amount of actual access people have to computers is misrepresented because of telecenters and other group access means in the developing world, and multiple computers per person (e.g. business and home) in heavily industrialized countries.

[19] The amount of bandwidth a person or company has is literally the amount of information that can travel over a particular connection in a time interval. Because of the nature of the Internet, the more information that people try to get through a cable, the slower it effectively goes. Other issues complicate how "fast" a connection is, but bandwidth is a rough range speed.

[20] The vast majority of web servers are located in the US, so users surfing the web outside of the US must connect over international lines. Additionally, for a person to access web pages on the Internet, their computer must translate between the "name" of the website, such as www.yahoo.com, and its Internet IP address. This translation requires accessing (primarily) US or European servers, meaning that a person in Paraguay trying to view a local web page still has to access computers in the US over International lines! In other words, no matter how fast a person's local Internet connection is, they are limited by their country's international connection.

[21] The State of the Internet report provides a practical example of how connect speed effects download time:

> "Download Times Using Different Transport Speeds/Technologies: Titanic Movie
> 28.8 Kbps modem 42 hr., 30 min
> ISDN (128 Kbps) 9 hr., 14 min.
> T1 line (1.5 Mbps) 49 min., 20 sec.
> DSL (1.5 Mbps) 49 min., 20 sec.
> DSL or cable modem (4 Mbps) 18 min., 30 sec.
> DSL or cable modem (8 Mbps) 9 min., 14 sec.
> Cable modem (10 Mbps) 7 min., 23 sec."
>
> Source: US Internet Council, "State of the Internet 2000". Data from "Center for the New West, 1999"

costs) are almost four times as expensive in the Czech Republic and Hungary as in the United States (during off hours; peak prices are even higher) (OECD 2001b).

Outside a few select countries, only wealthy individuals and sections of the middle class can currently afford access. The majority of people in developing countries cannot afford the technology, even when it is available, so usage remains low: "Poverty remains the greatest barrier to Internet growth in Africa. The monthly connection cost for the Internet in Africa exceeds the monthly income of a significant portion of the population (US Internet Council)"; "In the US, Internet access costs a user only 1% of average monthly income, whereas in Uganda it costs more than a month's average (per capita) income"(Keegan).

The registration of country specific domains (i.e. '.hr', .'za') is largely controlled by monopolies, and prices vary widely from country to country – with 220 USD per year for Hungary and 11 USD per year in Denmark (OECD 2001b).

- **Access Speed, Cost, and Web Surfing**
  In nearly all developing countries and developed countries, phone calls are charged by the minute, and are often extremely expensive[22]. When people in these countries use dial-up connections to reach the Internet, they must then pay access fees as well as these phone charges. Since the speed of their Internet connections is relatively slow, it takes longer to download email and web pages – which means it is more expensive, and fewer people can participate.

  Additionally, web pages (and email) are becoming increasing graphic-heavy and "large" in terms of file size. For the United States and Europe, with steadily increasing bandwidth, this is not a problem. For other countries it means that, all other things remaining equal, it can actually become *more* expensive to use the Internet over time.

  Many analysts have noted that the per-minute phone charges mean that people in these countries don't "surf the web", and cannot reasonably explore the Internet to become more comfortable with it, learn new information, and gain its full benefit.

- **Technical Training and Human Capital**
  McConnell International rated the overall levels of "Human Capital" in its "E-Business report", incorporating the education system, emphasis on knowledge-based subjects, the society's culture of local creativity, and the skills and efficiency of the workforce. Europe (including Eastern Europe) and Latin America rated well on this scale, whereas the Middle East and Africa needed to significantly develop their human capital. Asia had a mixed scorecard – with South Korea, Taiwan, India, and China, for example, rating well to medium, and countries such as Indonesia and Vietnam rating low (McConnell 2000b).

  International disparities in technical training build on long standing divisions on investment in education, including such factors as staff development programs, technical training in schools, and secondary and tertiary enrolment.

[22] Relative to per capita income; especially when compared to the US.

The Knowledge Assessment Matrix of the World Bank has detailed information on these (and many other) statistics. A few are included below:

Table 4: Technical Education

	Africa	East Asia	Europe	G7	Latin America	Middle East	North Africa	South Asia	Transitioning Economies	US
Public expenditure on education, % of GNP[23]	5.01	3.51	6.77	5.27	4.24	4.62	5.93	2.94	5.52	5.40
Tertiary enrolment, % of age group	4.64	24.50	53.14	58.71	23.00	18.80	12.67	5.40	33.92	81.00
Employee training (1-7; 7=most staff development)	4.44	4.54	5.39	5.25	4.19	3.98	NA	3.69	3.81	5.56

- **Relevance of Content**
  From the beginning of the Internet, the English language has predominated, despite the underlying and increasing diversity of its users. Just over 50 percent of all Internet users are native English speakers. Yet, "seventy-eight percent of all websites are currently in English, while 96 percent of *e*-commerce sites are in English....Over the last decade U.S. users and English language content have defined the Internet as a U.S.-centric environment" (US Internet Council). Though it is a rough metric, consider that "70 percent of all websites originate in the U.S. and the vast majority of these are in English"(US Internet Council).

  The dominance of English, and especially US content, makes it less useful to other countries. Additionally, non-English countries produce less local content making the Internet less relevant to their lives, and less of a tool of self-expression and *local* communication.

[23] Public expenditure on education: 1997 data; Tertiary enrolment: 1997; Employee Training: 1999 data.

C. Advanced Applications of ICT

Advanced uses of ICT such as E-Commerce show even greater disparities than in basic access to computers.

- **E-Commerce**
  E-Commerce is dominated by the United States and to a lesser extent some European countries. According to Netcraft, the United States has 64% of all secure servers in the world; the next highest is the United Kingdom, with only 5.32%, and the vast majority of countries have less than 0.1% (Netcraft, January 2001 data). Per capita, the numbers are similar – the United States has by far the largest number of secure servers with approximately 24 per 100,000 people and Mexico and Turkey less than one (OECD 2001b).

  A number of small projects have allowed small entrepreneurs in rural areas of the developing world to bypass middlemen and sell their projects directly through e-commerce (see Chapter 4, "On the Ground Efforts"). Although these have been highly touted, they still are a tiny minority. The United States and US companies are dominating the Business to Business, Business to Government, and Business to Consumer markets.

- **Industrial Information Technology**
  For Industrial Information technologies such as CAD, CAM, and Numerically Controlled Machinery, the data is sparse, but points to a similar divide (James). Unfortunately, there is not any comparable research into the use of other industrial and applied information technologies, in fields such as agriculture or waste management.

Realistically, the larger divisions for advanced ICT applications are to be expected. For example, without considerable infrastructure, access, training, and resources to develop and administer e-commerce websites, significant e-commerce is simply impossible. And, without knowing English, most people cannot participate in e-commerce, since “English is, overwhelmingly, the language of e-commerce” and 94% of pages pointing to secure servers (sites capable of doing e-commerce) were in English. (OECD 2001b)

D. ICT in the Economy

ICT can increase the productivity of existing industries and create high-paying and new employment in a local ICT sector. For the US, “the Department of Commerce also acknowledged that the use of IT contributed close to 50 percent of the total acceleration in U.S. productivity in the second half of the 1990s (US Internet Council)". Additionally, a local ICT sector can provide new technologies which address the unique needs of the country such as the "Volkscomputer" in Brazil (Smith, James).

As with all other indicators, the growth of local ICT sectors is highly uneven, with North America, Europe, and East Asia leading. The World Bank's Knowledge Assessment Matrix provides some sample statistics on the larger issue of technical sectors and research and development:

Table 5: World Bank Statistics for Technical Sectors

	Africa	East Asia	Europe	G7	Latin America	Middle East	North Africa	South Asia	Transitioning Economies	US
Professional and technical workers as % of labor force[24]	6.66	14.98	29.55	24.86	11.49	13.62	NA	6.10	22.49	28.50
Scientists and engineers in R&D per million	4.64	6.22	7.87	7.92	5.37	4.93	4.83	4.62	7.44	8.21
Total expenditure for R&D as % of GNP	0.44	0.75	2.09	2.27	0.49	0.28	0.30	0.56	0.72	2.63
High-Technology products as % of manufactured exports	2.40	22.10	22.57	21.00	7.27	0.60	1.00	1.25	6.23	33.00

- **ICT Sector Revenue**
  For ICT sectors, there is a relatively consistent distribution within OECD countries: Telecommunications revenue in the United States and Norway was nearly 1,100 USD per person in 1999, but approximately 100 USD per person in Poland and Mexico (OECD 2001b).

- **ICT Sector Employment**
  See Table 5 above.

- **ICT Sector Spending**
  Spending on ICT is likewise distributed, according to the US Internet Council: "Global spending on ICT in 1999 exceeded $2.1 trillion according to a joint study conducted by the World Information Technology and Services Alliance (WITSA) and IDC. This study also forecast that global spending will surpass $3 trillion by 2003. North America spent the most in 1999, reaching $796 billion"(US Internet Council). Finland devotes over 50% of its total business sector R&D expenditure to ICT, and Canada 44%, while Mexico devotes only 0.2% (OECD 2000).

- **Technology Development**
  Professor James notes that with the exception of Eastern Asia NICs (Newly Industrializing Countries) and India, the vast majority of countries outside of the Triad (US, Japan, Europe) do not produce significant levels of technology. Currently, OECD countries account for more than 80 percent of global ICT production (US Internet Council). Low-skill ICT services sectors have been increasingly farmed out – especially data entry, call centres – to second tier Asian countries like the Philippines and the Caribbean. Additionally, some diffusion of research and development in technical fields has occurred away from highly industrialized countries, especially in biotechnology and microelectronics – but this has been limited to the top tier of industrializing countries (James). James states that lack of sufficient infrastructure has kept (and will continue to keep) other countries, especially in Africa, out of the IT services market because of the high costs involved in setting up machinery and training

[24] Professional and technical workers: year 2000 data; Scientists and engineers: 1987-97; Total expenditure for R&D as % of GNP: 1987-97; High-Technology products: 1998 data.

people to compete in the technology development field. So, current deficits will continue into the foreseeable future. James believes that this will doom developing countries to the ineffective use of technologies not designed for their settings.

Nonetheless, a number of projects geared for the developing world offer promising new technologies and adaptations. India's "Simputer" and Brazil's "Volkscomputer" are often cited examples of locally produced, locally appropriate technologies that fit the needs and budgets of the developing world. Two developed world projects are also seeking to produce new "developing market" technologies – the MIT Media Lab, and HP's 1 Billion dollar E-Inclusion project. On the software side, India is the prime example of a country that has succeeded in developing a globally competitive IT sector – though the replicability of their success is doubtful for other countries (James). Chapter 4, "On the Ground Efforts", describes these initiatives in more depth.

- **ICT and Business Size, Alliances**
  James notes another aspect of digital divides and businesses – ICT enables multinational corporations (MNC) to expand the scope of their operations to a hereto unknown scale and coordinate alliances with other MNCs. These expanded companies are at a significant advantage over non-IT enabled companies, (especially when developing world trade and investment barriers are lowered). For example, "major ASP (Application Service Provider – a growing field in e-commerce) industry leaders, Hewlett-Packard, SAP, and Qwest have already formed an alliance to provide ASP services (US Internet Council)"; they are all US and European companies.

- **Trade in ICT**
  Trade in ICT shows radically different distributions. Many highly industrialized, ICT heavy countries import far more ICT than they export – such as the United States, Canada, and Germany – while others are next exporters, such as Japan and Korea (OECD 2000). In some OECD countries ICT are a major component of trade – Ireland is the most extreme example with 33% of trade being ICT related, while Spain, Austria and Italy had roughly 7% of trade in ICT (OECD 2000).

- **Telecommunications Investment**
  Public telecommunications investment also shows a complex distribution – with a number of developing and developed countries investing heavily. For example, Mexico spends 40% of its public telecom revenue on investment. The Netherlands is highest at 44.1%, while Sweden (12) and Belgium (10) rank low (OECD 2001b). Per person, the United States spends 324 USD, the Netherlands 299, Mexico 46, and Turkey 21 (OEDC 2001b)[25].

- **Overall ICT Business Climate**
  Assessments by the Economist Intelligence Unit (EIU) illustrate that a country's overall "ICT business environment", based on existing infrastructure and connectivity and government policies, mirror the divisions described above. North American, Northern European, and some East Asian countries are considered the best location for ICT businesses, and are thus most likely to have increased investment and ICT business. For example, US rates 8.73 on a scale of 0 to 10, Sweden 7.98, Singapore 7.87, Ecuador 3.30, and Pakistan 2.66 (EIU).

[25] Investment in telecommunication as percent of GDP shows that many developing and emerging countries are investing far more in ICT than highly industrialized countries. Transitioning economies of Central and Eastern Europe spend 1.03 % of GDP on telecommunications investment, while G7 countries only spend 0.44%. On the other hand, the Middle East, with 0.26% of GDP invested, ranks lowest (World Bank 2001c). The inadequacy of existing telecomm infrastructure and the lower (overall) GDP of developing countries are important factors in these statistics.

2.3 Disparities Within Countries – Domestic Divides

Within countries, there are significant divisions in the use of ICT along the lines of education, income, race, gender, age, language, and disability. Overall, these divisions mirror existing inequalities in the society, but there is disturbing evidence that ICT is distributed more unevenly than other technologies and further exacerbate inequality. Divisions within OECD countries, especially within the United States, have been studied far more than non-OECD countries. The scant studies and anecdotal evidence indicate that these inequalities are far more pronounced outside the OECD.

Most reports on disparities in ICT access within countries look at the problem according to socio-economic criteria. We focus on the following socio-economic factors:

- Race
- Income
- Geographical location
- Education
- Age
- Gender
- Disability

Race

Many early reports on "the digital divide" studied the United States and focused extensively on race. In the US, there was seen a vast disparity between the usage by European and Asian Americans versus Hispanic and African Americans. Jesse Jackson called it "the digital apartheid", and called for massive government programs to bridge the divide. The most often cited study is the four-part "Falling Through the Net" report by the US Department of commerce, which states:

> "Large gaps also remain regarding Internet penetration rates among households of different races and ethnic origins. Asian Americans and Pacific Islanders have maintained the highest level of home Internet access at 56.8%. Blacks and Hispanics, at the other end of the spectrum, continue to experience the lowest household Internet penetration rates at 23.5% and 23.6%, respectively."
>
> "The Internet divide between Hispanic households and the national average rate was 18 percentage points in August 2000 (a 23.6% penetration rate for Hispanic households, compared to 41.5% for households nationally). That gap is 4 percentage points wider than the 14 percentage point gap that existed in December 1998"
>
> *from "Falling Through the Net: Towards Digital Inclusion", Department of Commerce, October 2000*

Ethnic and racial divisions in ICT use are much less studied outside of the US, but some reports do exist. As a survey by Webchek of black South Africans stated in 1999: “The findings highlight the fact that PCs and Internet have not even begun to make inroads into this market". "Only 2 out of the 2000 [black african] men interviewed had Web access at home (0.1%) and only 24 out of the 2000 had Web access at work (1.2%). 1.3% have a PC at home and 4.7% have a PC at work (Webchek 1999).[26] Since the overall South African Internet user population was 1.8 million in 1999" (roughly 4.3% of the population), a considerable gap exists between black South Africans and white South

[26] For black South African women: "Only 5 out of the 4000 [black african] women interviewed had Web access at home (0.1%) and only 24 out of the 4000 had Web access at work (0.6%). 0.9% have a PC at home and 2.9% have a PC at work." (Webchek 1999)

Africans, who are 76.7% and 10.9% of population respectively[27] (Acuity Media Africa, Statistics South Africa).

Disparities in telephone access are better documented, and follow the same pattern[28].

Income

According to the OECD, income is a key factor in PC and Internet access. Access rates between the lowest and highest brackets range from country to country[29] within the OECD – from 3 times more likely to10 times more likely.

Outside the OECD, the differences are more pronounced. The World Bank's Living Standard Measurement Survey (LSMS) indicated that households in the wealthiest quintile in Panama and South Africa are respectively 43 and 125 times more likely to have private telephones than those in the poorest quintile. For Nepal, only 0.5 percent of the poorest quarter of households had access to a telephone, while 11 percent of the wealthiest quarter of households did (Grace et al).

Further analysis on the digital divide has lead a number of researchers to state that the gap between computer usage among racial groups is almost completely explained by income differentials – i.e. In the United States, wealthier individuals, who are disproportionately white, are most likely to have and use the technology than their poorer, disproportionately black and Hispanic counterparts (US Internet Council)[30]. There is still considerable debate on this issue though, and conflicting reports. "Falling through the Net" states that income and education differences among groups only explains half of the difference in ICT use among different racial or ethnic groups (US Dept of Commerce).

Geographical Location

Major cities are far more likely to have Internet, phone, and PC access than smaller cities and rural areas. Grace et al cites a number of studies from around the world:

> 10.4 percent of homes in urban Nepal had private telephone access compared with 0.11 percent in rural areas, a 100 to 1 ratio. The ratio is the same in South Africa and 6 to 1 in Panama (see Table 1). There are almost 4 times as many telephone lines per 100 in the largest city of lower middle-income countries as in their rural areas, and more than 5 times as many lines per 100 in the largest city of low-income countries as in their rural areas. These gaps are even more significant given the fact that more than 50 percent—and as many as 80 percent—of the population in poorest countries, live in rural areas (Grace et al)."

The role-out process may eventually equalize access to particular technologies for rural populations[31], but new technologies follow the same urban-rural divide. The Broadband Access Project of the Center for Democracy and Technology (CDT) notes that "a significant – and possibly growing – disparity exists between the telecommunications services available to affluent city and suburban dwellers, and the services within physical and financial reach of inner city and rural communities" (CDT). Where rural areas do have access, connection speeds are lower (employing earlier technology) than in the cities. This will grow even larger as new broadband technologies reach the cities. Access to new technologies such as broadband show pronounced divisions (US Internet Council, CDT), especially between urban and rural areas.

[27] Internet use numbers for Coloured, Indian, and other ethnic groups not available.
[28] For example, statistics for Western Cape Province of South African can be found in "Cape Online Market Analysis, Western Cape Statistical Information" by Leonie Vlachos.
[29] As do the boundaries of "highest" and "lowest", making the comparison only a rough gauge.
[30] While a divide still exists, an economic-based divide is often considered much less of an issue than a solely racial one, and given less political weight.
[31] As has almost occurred in the United States – See "Falling through the Net" by the US Department of Commerce.

Education
Differences in education levels are also highly correlated with PC and Internet access – those with higher levels of education are more likely to have ICT at home and at work. Education is closely correlated with income, which facilitates the purchase of ICT and inclusion in the work environment. However, when income levels are taken into account, "those with higher educational attainment will have higher rates of access."

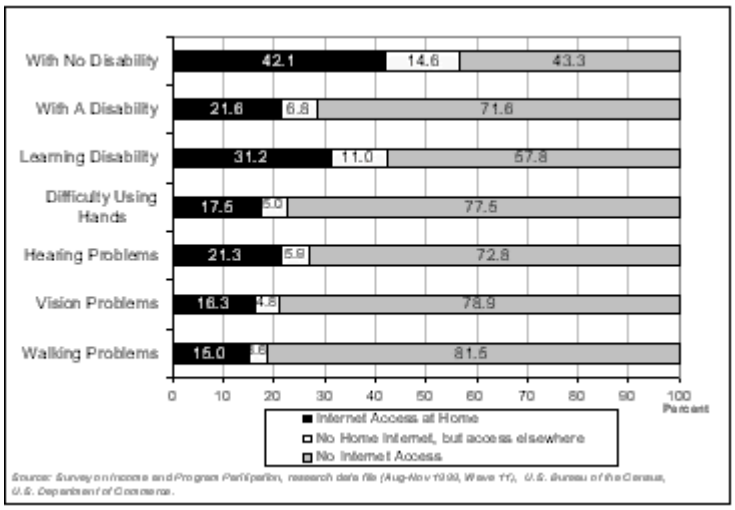
It appears that education-related divisions are greater outside of the OECD. A study by Capacity Building for Electronic Communication in Africa stated that that 87 percent of Zimbabwean and 98 percent of Ethiopian Internet users had a university degree (Grace et al,; 1998 data). An Australian study showed that people with a university degree were roughly three times more likely to access the Internet from home than those with a secondary degree. ICT sector jobs are disproportionately available to the highly educated as are jobs in e-commerce. Since knowledge of English is often highly segmented in a society (wealthier, better educated, male), existing content is far more relevant to their lives.

Age
Overall, the highest number of users is in the 35-45 age group, though some countries such as Australia have more users in lower age groups. According to the UNDP's *Human Development Report*, the average Internet user in China and the United Kingdom was under 30 (World Bank 2000; 1999 data).

Gender
According to a *Wall Street Journal* report, only 38 % of urban Latin American computer and Internet users are women. A greater disparity is found in Africa – Capacity Building for Electronic Communication found that 86%, 83%, and 64% of Internet users in Ethiopia, Senegal, and Zambia, respectively, were male (World Bank 2000). According to Noeleen Heyzer, director of the UN Development Fund for Women, only 4% of Internet users in the Arab world are women (UNESCO 2000). In OECD countries, gender-based gaps appear to be smaller. In the US they are equal or women are leading in usage, while in Japan there are twice as many men online as women, but women are catching up (OECD 2001c).

Disability
Some disabled individuals show especially low levels of Internet use. To a large extent, the technology to make access feasible is not available or is not affordable. The type of disability a person has greatly influences overall access rates, as Figure 3, from the US Department of Commerce, shows.

Figure 3: Internet Access by Disability Status, 1999



Source: Survey on Income and Program Participation, research data file (Aug-Nov 1998, Wave 11), U.S. Bureau of the Census, U.S. Department of Commerce.

For example, the visually impaired are facing increasing difficulties using the Internet as web pages change from text to incorporate an increasing number of graphics (text is easily rendered in other media, graphics are not). Technologies such as smart cards and Internet kiosks are rarely designed for people with disabilities, thereby excluding them. Disabilities are also limiting training and job opportunities:

> "..if the webmaster herself is a person with a disability, she will also find a lack of web authoring applications that she can utilize. This is especially true for webmasters with

> mobility disabilities requiring voice, eye tracking or keyboard input/output features in web authoring applications."
>
> Cynthia Waddell, "*The growing digital divide in access for people with disabilities"*

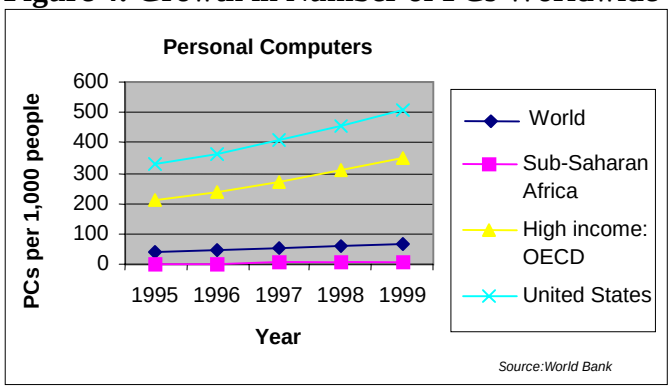
As Waddell describes, involving people with disabilities can reasonably overcome many of these barriers with proper web page design and in product development.

2.4 The Future of Digital Divides

Whether international and socio-economic divisions appear to be increasing, decreasing, or staying constant really depends on where one looks. The use of information technologies are increasing across the board – in access rates, in content, in e-commerce, e-governance; almost regardless of ethnicity, age, gender, etc. All appears to be well. Unfortunately though, in most categories the relative gap between countries and groups is increasing. To review the statistics:

- **Physical ICT Access between countries –** The number of PCs, amount of internet bandwidth[32], number of telephone main lines, mobile phones, and other information technology are slowly rising for all countries, but the "information have" countries are growing fastest, thus widening the divisions. Figure 4 illustrates the pattern for the number of PCs[33].

Figure 4: Growth in Number of PCs Worldwide



- **Pricing –** Computer and Internet access prices are decreasing around the world, putting these technologies within reach of increasing numbers of people[34]. Nonetheless, Within OECD countries at least, the lowest income households are increasing their computer and Internet levels faster than the highest income groups – in part since high income groups already had high penetration rates and lower incomes groups had greater room for increase (OECD 2001c).

  Will lower prices be enough for everyone in developing countries to have a PC in every home? The answer, unfortunately, is no. Even a $600 PC or $100 Wireless Application Protocol (WAP) phone is far beyond the reach of the vast majority of the world's population, when nearly 3 billion live on less than $2 a day. Lower prices will help facilitate other one-to-many access programs, such as telecenters, described below, and middle-income people will be increasingly able to purchase and use the technology.

- **National Infrastructure** – Network infrastructure is slowly growing around the world, and information "have-nots" will gain increasing bandwidth and telephone access. But as new technologies come along, especially in broadband infrastructure, they will remain "behind the curve" and be years behind the information "haves".

- **Internet Usage –** In terms of Internet Hosts, the relative gap is increasing – the gap between North America and Africa was a multiple of 267 in 1997, by October 2000 it was 540 (OECD 2001b). The entire African Continent has 0.25% of all Internet Hosts, the majority of which are in South Africa, and the overall percentage is *decreasing*. (OECD 2001b). Nonetheless, the *total* number of users in all areas is *increasing.*

[32] While internal and international links in general are increasing, so is the gap – links between the US and Europe are growing faster than others. Currently the US-Asia link is larger than US-Latin America links; the latter is expected to overtake the former (Source: Telegeography).

[33] For a more detailed study of the increasing gaps in technology between countries, see Rodriguez and Wilson "Are Poor Countries Losing the Infromation Revolution?". They conclude, as this report does, that wealthy countries have increased their levels of information technology more rapidly than poor countries and will likely continue to – inequality between countries is increasing (Rodriguez).

[34] Much of the drop in access prices is attributed to the deregulation of telecommunications and removal of monopolies (OECD 2001c). These issues are described in detailed in Chapter 5, "Policy and the Digital Divide".

- **US Dominance in Users, English Language –** Because of the sheer numbers of new people starting to use the Internet, the US will lose its predominance on the basic metrics of number of users and English as the majority language. "Regional growth forecasts estimate that by 2003 Asian users will surpass North American and European users and exceed 200 million." (US Internet Council Chpt 1, p12) "Current predictions indicate that Internet users could exceed the 1 billion mark by 2005, with 700 million located outside North America.... [the Internet is] becoming multicultural, multilingual, and multipolar "(US Internet Council) and Asia will grow to 20% of world e-commerce.

  However, even as the "language divide" decreases in term of the relative number of non-English websites, English is still the lingua-franca of e-commerce and most heavily funded resources on the Net. As the Net diversifies, the language of the business community and related websites can be expected to reflect the existing use of language in non-online groups (with some delay), which often excludes non-English (and especially non "major language" speakers).

- **ICTs in the Economy –** While a few countries have successfully developed local ICT sectors and captured a significant portion of international ICT trade, it seems unlikely that many new countries can compete in this arena. Nonetheless, technologies specifically targeted for underserved populations hold great promise for easing divisions in ICT access.

  According to economist Jeffrey James, the last 30 years of globalisation, and specifically ICT related trade, has been characterized by a concentration of export-oriented trade among a few countries in East Asia. During this period, the % of GDP involved in trade actually decreased for most other developing countries (and had overall *less* global integration). As James later warns, existing players in IT sector production – notably Eastern Asia NICs have a massive advantage in future production and trade – and it would not necessarily be wise for other developing countries to lower their barriers, invest heavily in IT production, and try to compete head on.

- **Divisions by Education** – In countries with already high internet access rates among the highly educated, those with lower education levels are increasing ICT use more rapidly than those with the highest levels of education (which have higher ICT use) – in part because they are growing from a smaller starting point (OECD 2001c). Nonetheless, a gap remains, and may reoccur with new technologies. In countries were Internet access is only starting to take off, one can expect that those with higher education will use the technology first, increasing local divisions.

- **Divisions by Ethnicity –** In the US at least, ethnic differences in technology have decreased significantly – but only when income is taken into account. In other words, ethnic groups of the same income level have relatively the same average usage of technology. On average though, African and Hispanic Americans have lower income than European Americans, and similarly *lower* technology usage. A pattern is not clear outside of the US.

- **Divisions by Gender –** The gender divide will steadily decrease, at least in terms of users of the Internet. In South Africa for example, the number of women online recently surpassed the number of men. According to Webchek, fifty-one percent of South African Internet users are women, up from 38 percent in March 1999 (Webchek 2001). It can be reasonably expected that the ratio of women online in these countries will reach levels similar to the country's overall gender and power balances – which is often quite unequal, but should be considered in that larger context.

  However, the "number of users" online statistic is only a small part of the "gender divide". Male users of information technology at the corporate level and IT professions are still in the vast majority and receive higher pay for the same jobs, and will likely remain so for some time to

come[35].

- **Rural – Urban divisions –** Experience to date has shown that new information technologies are usually adopted first in central cities, and slowly disperse to peripheral cities and rural areas. This appears to be because of higher infrastructure costs, lower average wages, and a lower likelihood of jobs in rural areas using computers (OECD 2001c). In countries where a particular technology has recently reached the capital cities, divisions with rural can be expected to *grow* before they significantly disperse. Additionally, new technologies show gaping new divisions – as is occurring with broadband access in some countries.

- **Age –** In newly adopting countries, youngish groups will get the technology first, the divide is then expected to disperse as the "Internet generation" ages and the overall number of users increase.

- **Disability –** unless significant new technologies are developed or people design their pages better, visually disabled people, especially, will likely fall further and further behind.

Basic access and use of technology does not demonstrate the full extent and future of ICT divides. For example, as basic use of technology increases, high end technology, and control over content generation and network standards will likely remain constant. For example, the builders and owners of e-commerce sites and news services appear to be increasingly concentrated in developed countries (or in India and some newly industrialized countries) for a long time to come. While end users are diversifying, the designers and maintainers of ICT are changing much less slowly.

However, these estimates are based on the continuation of the status quo and will likely prove to be highly inaccurate. **In reality, international and domestic divisions in ICT use will be shaped by**:

- New technology solutions:
  For example, automatic translation services may make the dominance of English irrelevant far before demographic shifts break it, and inexpensive wireless phone based Internet access may circumvent problems such as poor fixed-line infrastructure[36].
- Government Policy Actions:
  Some say the central cause and only hope of a solution is in government policies. The preceding discussion is best described as – what would happen if the status quo remained. All bets are off when overarching policies change. Chapter Five, "Policy and the Digital Divides", examines in depth what policies are suggested, and what potential impact they may have.
- Concerted ground-level efforts to diffuse the technology and help people use it effectively:
  including telecenters, training programs, infrastructure projects, telemedicine, and e-government. Chapter Four, "Bridging the Digital Divide – On the Ground Efforts" describes these initiatives in more depth.
- Wider Policy and Economic Issues beyond our scope:
  The international digital divide hinges on macro-economic issues such as trade policy. The currently dominant vision states that free trade and increased interweaving into the global economy is the key to successful growth, ICT-enabled or otherwise.

[35] These realities represent a deeper gender divide in the IT profession and corporate management around the world.
[36] Technology solutions and government programs to adopt them are especially necessary to increase usage for people with certain disabilities

Shaping the Future of the Internet – Internet Governance and Standards Setting

Another key factor in how disparities in ICT access develop is Internet Governance – and who is able to make vital decisions on the future of the Internet. The Internet is based on a number of fundamental standards which are vital to the interoperability and inclusion of users around the world, including the Internet Protocol (IP) and the HTML (Hyper Text Markup Language) specification. The Association for Progressive Communications (APC) provides an important example of how China wants to change the IP standard to exclude people:

> "The Chinese government wants a one bit change in the underlying IP code of the Internet. The state of this single bit could determine whether something was accessible in China or not, thus censoring the Internet for several hundred million people.[37]"
> http://www.apc.org/english/rights/governance/index.shtml

The Internet Corporation for Assigned Names and Numbers (ICANN), which administers the allocation of IP addresses and Domain Names, has been the focus of significant controversy and has been accused of being undemocratic and exclusionary. While it has recently held "At Large" elections, and included five representatives from different regions of the world, the eighteen member board of directors is controlled by unelected, and some say unrepresentative, officials (CSIF). ICANN can have a significant effect on non–English web domains, the effective distribution of IP addresses and the availability and cost of setting up local websites around the world.

Other governance bodies are viewed less harshly. For example, the Internet Engineering Task Force (IETF) sets technical standards for the Internet and is widely respected for its open, participatory nature. The World Wide Web Consortium sets standards for the World Wide Web and HTML, and has endeavoured to keep standards open (though major companies are at times the real driving forces behind changes in HTML). Nonetheless, even the most open and participatory Internet organizations still reflect the uneven composition of the Internet community as whole and are thus largely dominated by IT specialists in developed countries.

[37] Policy issues such as these are discussed under "Policy and the Digital Divide"

Will Divisions Close or Merely Narrow?

In highly developed countries, some domestic divisions between income, education and ethnic groups are decreasing for basic access to PCs and the Internet. The most ICT rich groups, especially the wealthy and educated, have almost reached saturation – the majority of people who want to have computers and access to the Internet have it[38]. Therefore as the underprivileged are gaining access, the gap appears to close. Will these divisions disappear or merely decrease and stabilize with an entrenched division between groups? In developing countries, where on the whole domestic divisions are increasing, will this trend turn around and show underserved groups catching up?

Between countries, a similar question arises. Technology use is increasing across national boundaries, but divisions in the relative number of users and computers online are still increasing. Moreover, will the poorest countries ever "catch up"? Will countries that are crippled by poverty, HIV/AIDS, foreign debt and corruption ever have the resources and political will to invest in ICT, or ever be considered "good markets" for foreign ICT investment? Can development projects ever reach the size and scope needed to address an entire country's digital divide, let alone that of dozens of countries? Or, will the poorest countries simply fall further and further behind? Unfortunately, since widespread adoption of ICT is so new, and many say ICT is fundamentally different than previous technologies, there is no way to answer these questions.

[38] As Pew Internet and American Life Project points out, not everyone *wants* ICT. In the US, a quarter of the population is not interested (Lenhart).

2.5 Analysis

A. Are Disparities About a Single Technology?

A fundamental question must be addressed before one can state whether inequalities in ICT are growing or closing: Is the inequality a lack of an existing technology, or is it because of the relative gap between “haves” and “have-nots”, regardless of the particular technology?

On the whole, current technologies are diffusing across national, ethnic, gender, income and age boundaries, but new technologies are causing new divisions. Adoption of broadband (from fiber connections to wireless broadband such as Ricochet's new service[39]) access has followed the same pattern as that of the computer – primarily among wealthy, white individuals and large companies. Since the technology is newer (and more expensive), it currently shows an even wider gap around the world. Internet enabled phones have shown a similar pattern – though here Scandinavian countries lead instead of the US.

Another relevant technology is Voice over IP – using the computer (and Internet) to replace telephone calls, especially internationally. Since many developing nations have telephone monopolies, and restrict or ban VoIP since it could circumvent the monopoly, this policy issue threatens to cause a continued divide. But some have commented that VoIP may be outdated before it becomes widely used.

Underneath the apparent widening and narrowing of these divides, the underlying trend is that privileged groups acquire and use technology more effectively, and because the technology benefits them, they become more privileged. This occurs even when a particular statistic about technology use shows a narrowing because of saturation, and it occurs between countries and within countries.

- The infusion of ICT into a country paints the existing landscape of poverty, discrimination, and division onto the new canvas of technology use. Because ICT can reward those who know how to use it with increased income and cultural and political advantage, the resulting digital divide shows up in increasingly stark contrast.
- Therefore, ICT disparities usually exacerbate existing disparities based on location (such as urban-rural), gender, ethnicity, physical disability, age, and, especially, income level, and between "rich" and "poor" countries.

Although the use of current technologies are becoming more diffuse, when new ICT is introduced to a country, the empowered are normally first to benefit causing existing divides to increase.

B. Falling Behind or Staying In Place? What effect does a lack of ICT really have?

Another difficult and highly contentious question surrounding domestic and international digital divides is whether the "have-nots" are remaining at existing levels of growth and prosperity, or whether they are actually worse off because of the information revolution.

Underserved populations are missing out on the boons of ICT, such as new ICT sectors with new well-paying ICT jobs, and the possibility for developing countries to leapfrog economically or use IT

[39] http://www.ricochet.com/

in "facilitating the delivery of basic services, such as health and education (ITU)[40]". However, it appears that technology will diffuse between countries and, eventually, within countries. It also appears as if the comparative advantage of current ICT leaders will grow. If ICT competition is a zero-sum game, then the have-nots will in fact be worse off. If not, then some will be better off than others.

Some have calculated that while information “haves" are benefiting, there is an actual loss of income and jobs for the "have-nots". Instead of all communities advancing, the information revolution is merely yet another form of competition, with winners and losers. "Those developing countries whom the Internet has passed by, will be doubly hit by all this. They will not be making any of the new economy goods that people increasingly want to buy, while at the same time their traditional markets (such as commodities) will be squeezed by the price deflation brought about by the creation of giant electronic marketplaces on the Internet." (Keegan).

Similarly, Information technology is a key component of globalisation, according to A.T. Kearney's "Measuring Globalisation" report. It allows cheaper communication between buyer and seller across national lines, increases the comparative advantages of domestic companies, forms a growing component of international trade itself, and facilitates the growth and Foreign Direct Investment of multinational corporations. To the extent that countries are left behind in information technology development and use, they are also less likely to globalise, or at least, less likely to be competitive in a global market. (James). James sees a strong correlation between teledensity and global integration for this reason (James). Overall though, conclusive data is lacking on the effect of ICT on growth (Grace et al)

There are wide ranging claims on how ICT, and the Internet especially is "transforming our lives" by "bring[ing] far-flung families together"(ITU), and opposing claims about ICT deskilling economies and eroding traditional communities. These give the digital divide a strongly emotional element which polarizes audiences. It is notoriously difficult to measure "progress", and even harder to measure quality of life issues. Many analysts focus on the economic changes, such as the size of the IT sector, number of jobs, GDP [41], but these economic indicators are far from clear (James, Grace et al)[42].

C. *Reconciling the Divides – How are International And Domestic Divides Interrelated?*

The greatest irony of the digital divide debate is that when divides between countries shrink, domestic divisions often increase. The early adopters and benefactors of ICT in developing countries are usually large and foreign companies, and educated middle-upper class workers from privileged socio-political groups in the capital cities (James). These companies and groups therefore benefit relatively more from ICT than others.

Large local and foreign companies have the resources to invest in ICT, middle-upper class workers have the income to buy ICT and the requisite skills to fill ICT enabled jobs. However as ICT raises the wages and competitiveness of these workers and companies, they exacerbate inequality within a country, but appear to narrow divisions with respect to developed countries (James 103), since total ICT usage increases.

[40] Of course, in practice many of the possibilities of IT never materialize – especially in case of leapfrogging (James).
[41] So, one question for some one studying the digital divide must be – in what ways has the Internet actually helped people, and if it has had minimal positive effect on the people's quality of lives, beyond economic changes, then there is no divide – no divide that we want to cross!
[42] One attempt to measure quality of life is the "Genuine Progress Indicator" by Redefining Progress (www.rprogress.org). This author is not aware of any cross tabulation of quality of life with ICT, unfortunately.

Case studies of the Philippines, Sub-Saharan Africa and Brazil show that urban elites, rich expatriates, and subsidiaries of transnational companies are the main beneficiaries of IT (James). As wages for these workers increase with ICT enabled jobs, the separation between rich and poor in wealth and ICT use increases. For example, wages in the U.S. Internet economy are considerably higher than the national average. The average Internet economy worker earns $46,000 a year, as compared to the national average of $28,000 a year (US Internet Council).

New ICT-enabled industrial processes such as computer-controlled machinery *can* replace less skilled labour and cause layoffs, again increasing the income gap[43]. ICT such as CAD and CAM raise the demand for skills, which raises wages for the skilled. This became "a major driving force behind rising wage inequality in the United States" (James). IT users in similar jobs are paid 10-15% more (James). Yet, these incrementally increasing skills are necessary for the long term uplifttment of larger segments of society, as has occurred in East Asian Newly Industrialized Countries (NICs).

In many countries, income and class disparities align with racial, geographic, gender, and other disparities. One "side" or "group" is wealthier than others. With wealth usually comes the education and disposable income needed to take advantage of ICT (as discussed above). The wealthier group, whether they are Anglo-Saxon or Ibo, Protestant or Abangan Muslim, benefits disproportionately from ICTs – and the racial, geographic, sexual, etc, digital divide grows.

Nonetheless, disparities of income are not enough to explain the growth of the domestic digital divide. Discrimination and the long-standing legacies of discrimination exist in nearly all countries. Where women are not allowed to learn to read, let alone use a computer, the incorporation of the computer into that society will only benefit men, thus increasing inequality[44]. According to the World Bank, 59% of women in South Asia are illiterate, but only 35% of men are; a gender digital divide should be expected, and attacked even more vigorously.

Many ICT proponents correctly argue that computers *can* level the playing field for everyone and especially help people out of poverty. Indeed, they can – and on the small scale, they have – as this report examines in the "Ground-level initiatives" chapter. But on a country-wide level, and around the world, the statistics indicate that computers simply have not played that role. When computers are introduced in a country, they exacerbate inequality.

The distinction between international and domestic divides should not be overstated. The growth of the domestic digital divide as the wealthy adopt ICT is somewhat of an illusion – without ICT, there is no information technology gap between rich and poor within the country, but there is a tremendous gap between anyone in that country and developed countries. The adoption of ICT is, by definition, necessary to bridge *both* digital divides. Usually, it will reach the rich first, raising total PC penetrations, ICT users, etc – and make the international digital divide shrink. Whether ICT spreads to the poor and underserved as well in a country is not certain either way – it depends on government policy, businesses, and individuals working together to make ICT accessible and usable by all.

In the short term, the market-driven spread of ICT appears to mirror or even exacerbate domestic inequality. Before ICT is significantly adopted in a country, by definition, there is no domestic digital divide. The infusion of ICT into a country paints the existing landscape of poverty, discrimination, and division onto the new canvas of technology use. Because ICT can reward those who know how to use it with increased income and cultural and political advantage, the resulting digital divide is shown up in increasingly stark contrast. **The long-term effects of ICT and domestic digital divides is considerably less clear.**

[43] This process is especially powerful when it enables businesses to break labor unions in manual and industrial trades, further driving down their wages.
[44] This is but one possibility – ICT can upset existing power balances, and cause greater *equality*, which is discussed further on.

Long Term Effects of ICT and Domestic Inequality

What overall effect does this process have on society? Since large and foreign companies benefit first from ICT, they gain comparative advantage over their rivals. ICT-enabled management and accounting processes facilitates their mergers, acquisitions, and strategic alliances with competitors, leading to increased size and consolidation of ICT-enabled businesses. Some argue that this would increase the competitiveness of these companies in the global market, since they can leverage wide resources against similarly large international rivals. This would benefit the original country by drawing in jobs and allowing companies to invest in long term R&D in ICT. Thus a virtuous cycle is created whereby the country enters the global market place and bridges the (international) digital divide at the same time. The economic boon in the country will facilitate the slow diffusion of technology and training throughout the population, thus bridging the internal digital divide as well. In short, ICT are one of the fundamental driving forces behind globalisation (A.T. Kearney) and that globalisation will solve international and domestic digital divides.

Another interpretation of these events exists though. ICT enabled companies will beat their smaller, less international competitors. Most countries will simply be shut out of the global competition – they won't have the existing resources and investment to develop local ICT sectors, and only a few countries will be able to develop strong ICT-fuelled economies (India, Brazil). If the adoption of ICTs does lead to increased inequality, underserved populations and countries will fall further and further behind. While the international and domestic digital divides may shift – including a few new countries and a slightly larger segment of society – the gulf between the “haves” and “have-nots” will deepen[45].

Will either of these visions occur, or will something completely different happen? The answer is of course unknown – no one knows the long-term effects of market-driven diffusion of ICT on domestic inequality and the digital divide. These visions are based heavily on the status quo – major policy changes, technologies, and initiatives by government, NGOs, and businesses could completely change the landscape.

Other implications of the Digital Divide – Local Content and Free speech

The Centre for Democracy and Technology notes one potential outcome of the growth of broadband technology. Since CDT sees many broadband content systems being proprietary to large (developed world) companies, there will be increased inequality in content distribution which could "ultimately destroy the rough equality among speakers worldwide so vital to the Internet's promotion and facilitation of democracy". Citizens of the developing world, on the far end of broadband adoption and without any control over broadband production, would be primary losers (CDT).

[45] "Obsolete" workers will struggle to retain their positions and confound efforts to embrace "labour-saving" ICTs, and social unrest can increase; further cutting less ICT-enabled countries off from foreign and local investment.

2.6 What Knowledge is Missing?

Additional research could be valuable, especially for more detailed statistics on socio-economic divisions within developing countries, on use of technology in healthcare and other fields, and the diffusion and use of other information technologies such as hand-held devices and CAD.

For practical reasons, current statistics focus on the raw numbers of PCs or numbers of people using a technology. They do not measure well how well people are using the technology, and whether the impact is positive or negative for themselves and their communities. As Mansell et al writes in Knowledge Societies, "Even if the huge task of measuring the installed base of computers in all countries and regions of the world could be accomplished, this would tell us very little about how they are being used. It would not tell us whether they are sitting idle, performing at a small fraction of their capacity, or at work night and day. Nor would it tell us how well they are being used, whether they are being used productively or are contributing to confusion and disorder"(Mansell). Finally, current statistics do not adequately gauge the wider context of technology use, and social constraints hindering equitable use. Further work should address questions such as: Is it culturally acceptable to use the technology? Does the political culture allow or encourage people to use the technology creatively and speak freely?

Nonetheless, while the current set of statistics can only provide rough estimates of how technology is used between countries and socio-economic groups, more than enough information is known to show that these divisions exist (many are growing) to spur reasoned action. The problem is that such statistics do not provide a clear plan of action. E-readiness assessment, combined with conventional "digital divide" statistics could provide this action plan.

A Deeper Understanding of ICT Use – E-Assessments and E-Readiness

In any given country, different sectors of the population are putting information technology to productive use and the categories of race, gender, income and so forth do not capture the full complexity of this unequal use. Nor do these categories really identify what barriers exist in different communities and countries against people using information technology more effectively. On the national level – any given country has a number of factors in place to benefit from information technology and other areas that aren't using ICT – the divide is not simply developed versus developing world, nor are all factors missing in one country, and present in another. For example, in South Africa, high access prices are seen as a significant barrier even among people with access to computers.

A deeper understanding of ICT use can be gained from the wealth of "e-readiness" assessments around the world. The e-readiness assessments seek to gauge how ready a country is to participate in the information economy or information society. In the process, the assessments draw upon many of the statistics used above as well as many more, including use of computers in schools and in healthcare[46]. Each assessment gauges "readiness" differently, but a number of conclusions can be drawn:

- each country has a unique profile on how technology is used or not. These metrics should include use of ICT in schools, businesses and government, training, and government policies. While a few countries rate low on many of these metrics of ICT use and readiness, most have a patchwork of positive and negative ratings.
- divisions can only be effectively tackled by looking at these specific deterrents; gross measurements of ICT usage do not provide a coherent plan of action to address inequities.

[46] A few e-assessment groups, such as USAID and Mosaic, provide in-depth case studies of particular countries which are especially valuable.

A quick look at McConnell International's ratings of "Global E-Readiness" shows how complex the reality of ICT use is. For example, Mexico rated poorly on connectivity, but reasonably well on human capital, information security, government policies and the business climate. The Philippines had good human capital, but rated poorly in all other areas (McConnell 2000b).

E-assessments ask some of the vital questions that are missing in most digital divide reports – namely, how is the technology used in everyday life? Where and how often is the technology used in schools, businesses (internal technology and e-commerce), government (internally and e-government), and in health care? Unfortunately, e-assessments do not generally discuss socio-economic divisions in a society. A more comprehensive look at ICT use would combine both e-assessments of the sectors of society (i.e. schools, businesses, health care) and studies of socio-economic divisions (i.e. ethnicity, income, gender). If socio-economic issues are not studied and addressed, then the practical use of ICT will remain the province of a privileged few. However, without the detailed action plan that e-assessments can provide, efforts to put technology to effective use throughout society may struggle to be successful and miss key elements needed to make computers and access *effective* for people[47].

[47] For a more detailed look at these e-assessments, see www.bridges.org/ereadiness.

3 Studies And Recommendations

This chapter describes current initiatives to study digital divides and their proposed solutions. *These initiatives range from statistical studies to policy recommendations and come from a large set of authors, including multinational bodies such as the G8 and small NGOs. There is significant duplication of effort in current studies, and too little translation into action.*

Summary of Findings

Governments, businesses, individuals, and organizations have studied the issues at stake in the digital divide and drafted a range of valuable reports – from statistical analysis to in-depth case studies. Most offer recommendations for tackling the problems, usually suggesting specific ground level initiatives and policy reforms. Many also cover the wider issues that impact on digital divides, such as e-commerce, information society, and international trade. Major international initiatives such as the G8's Digital Opportunity Task Force (DOT Force) have brought together leaders and decision-makers from around the world for a consultation process to determine the key factors and how to address them. Several organizations have undertaken "e-readiness" assessments to determine a country's readiness to integrate technology and e-commerce and establish a benchmark for regional comparison and public and private sector planning. **Unfortunately, there is significant duplication of effort in these studies and recommendations[48], and too few of the suggestions are followed up in practice.** There is a lot of talk, but not enough action.

3.1 Who is Measuring Digital Divides?

Existing reports and recommendations can be organized as follows[49]:

- Measurements of Digital Divides, including
  - Statistical Studies of ICT usage, teledensity, and so forth
  - Case studies and Anecdotes of the gap in ICT access and use
  - Surveys of Current ICT Policies
  - E-readiness assessments of current ICT use and policies
- Recommendations on how to bridge digital divides with policy and ground-level programs, which often include case studies and statistics.

Statistical studies of digital divides count technology items (i.e. the number of fixed-line and mobile telephones, computers, internet hosts and websites), the number of users (i.e. of fixed-line and mobile phones, of computers, of the Internet), the number of ICT workers, sales figures (revenue from ICT), trade figures (import and export), relative type of the technology (bandwidth)[50]. These can be gathered on a country-to-country basis, or within countries along demographic lines (such as ethnicity and gender).

Country-wide statistics are usually collected or aggregated by international organizations such as the World Bank, International Telecommunication Union, and the Organization for Economic Cooperation and Development, or by ICT organizations such as Internet Software Consortium, Telecordia Technologies and Nua (on narrow issues like the number of Internet users or hosts). Out

[48] Notably in the field of "e-readiness assessments." See *Comparison of E-Readiness Assessment Tools*, and *E-Readiness Assessment: Who is Doing What and Where*, bridges.org, March 2001, www.bridges.org.

[49] Naturally, any given report will combine elements of more than one aspect, such as citing case studies of ground-level initiatives to back up recommendations.

[50] More detail on these metrics is available in Annex 2 "Statistics used to measure the digital divide"

of necessity these surveys often draw upon the results of many narrower reports which different methodologies by national governments (such as Departments of Communications or Census data), trade organizations and forums (such as WITSA or chambers of commerce), local advocacy organizations (especially for demographic divides), research foundations (such as the Pew Foundation) or private companies (such as Jupiter Research and Dataquest).[51] A wide number of authors then draw upon this data to form the basis of their reports, ranging from the US Internet Council's State of the Internet Report to New York Times reporters.

The results of some of these statistical surveys have been incorporated into Chapter 2 "International and Domestic Digital Divides".

Policy surveys seek to gauge what policies are currently in place that impact on digital divides around the world. Unfortunately, no comprehensive picture of current policies exists. While numerous policy surveys have been conducted, each highlights different aspects of the 'policy divide', reflecting their authors' divergent goals.

Two types of surveys have tried to evaluate policies relevant to the digital divide: world-wide surveys of a particular policy and detailed case studies of policies in a particular country[52]. World-wide surveys are usually targeted to a particular issue, such as Internet Law and Policy Forum's (ILPF) survey of digital signature laws or the Electronic EPIC's survey of online privacy laws. Detailed case studies examine the economic social and political environment in a country, including policies relevant for the digital divide; USAID and Mosaic have conducted dozens of these case studies around the world. References to individual surveys are available in Annex 3.

E-Readiness assessments measure a country's ability or "readiness" to integrate and utilize information technology and e-commerce into its economy or society. E-assessments often combine policy surveys with statistical studies and measurements of existing infrastructure and ICT use. In many ways, e-assessments are similar to surveys focused on "the digital divide", but with a greater focus on government policies, and the integration of ICTs into different sectors of society (business, schools, government), as opposed to different socio-economic groups (ethic, class, etc). E-readiness assessments include detailed case studies and questionnaire based method such as the Center for International Development (CID) at Harvard's "Readiness for the Networked World" survey, to statistical methods such as The Economist Intelligence Unit's "E-Business Readiness" assessments. A reasonably comprehensive list of e-readiness organizations is available in Annex 3, and comparison of e-assessment surveys is at www.bridges.org/ereadiness/.

Various other **case studies** and **anecdotes** draw on personal experiences and individual stories to make digital divides more poignant and persuasive. They are as varied as their author's experiences themselves.

[51] For example, see http://www.nua.com/surveys/how_many_online/asia.html for the component surveys used by Nua's estimates of the number of Internet users.

[52] While many of the surveys are not formally geared towards the digital divide, they survey and urge action on the many policies key to the digital divide described above.

3.2 Who is Recommending New Policies and Programs?

Several task forces and countless individual authors have made digital divide recommendations, many others have made suggestions on wider uses that will have significant impact on the spread and use of ICT. The recommendations are often based on case studies and statistics, and they combine policy proposals with guidelines for on-the-ground programs[53]. Generally they are targeted at the following categories of issues:

- **Digital Divides**, aiming to span the international (and or) domestic digital divides. The G8's DOT Force is the most prominent body producing recommendations;
- **E-Commerce**, aiming to promote this narrow aspect of ICT use, but they are often billed as bridging "the digital divide";
- **Information Society and Information Economy,** seeking to establish a vision and policy foundation for long term use of ICT throughout society, such as the EU's "eEurope" project;
- **Other ICT issues,** aiming to address a particular ICT issue, such as the Council of Europe's draft cyber-crime law, and trade recommendations**,** which specifically push for trade liberalization, but often have much wider policy ramifications, such as the WTO agreements and rulings.

A. Digital Divide Recommendations

The G8's Digital Opportunity Task Force is the leading body studying and recommending action on the digital divide. ("DOT Force"). At the Kyushu-Okinawa Summit in July 2000 the G8 leaders created the DOT Force, to integrate G8 activities, facilitate international discussion, and promote international co-operation on initiatives to bridge digital divides. The task force must report back to the G8 at its July 2001 meeting in Genoa, and the G8 will use its findings to shape G8 programs on information technology and digital divides for the coming years. Their recommendations will likely have significant impact on policy and programs in the G8 and other countries. A number of related projects are seeking to provide input to the DOT Force's process, including consultations seeking input within individual countries[54], and third party statements to the DOT Force[55].

Additionally, a number of national governments have launched digital divide initiatives. Japan has promised a total of US$ 15 billion over five years in aid towards bridging international digital divide, and pushed other governments to focus on the digital divide at the G8 summit in July 2000. Other national initiatives range from United State's e-rate program to connect schools around the country, to Burma's "e-National Task Force" which is studying the ICTs and divide and drafting policies and project suggestions (Myanmar Times)

The UN, OECD, and other organizations have held a series of conferences that informed policy makers on the digital divide, and built consensus on solutions. Some were specifically directed at digital divide issues, while others were part of a larger goal – such as the UN Millennium Summit. Other conferences have included the Economic and Social Council (ECOSOC) meeting on information technology in July 2000, the joint OECD/UN/UNDP/World Bank Global Forum entitled "Exploiting the Digital Opportunities for Poverty Reduction" in March 2001, UNESCO's International

[53] This category is really a mixture of research, best practice case studies, and finally recommendations. Some task forces such as the World Economic Forum progress roughly in this order – starting with background research, compiling information on current initiatives, and supporting particular projects or advocating new ones. See http://www.weforum.org/whatwedo.nsf/documents/what+we+do?Open.

[54] For example, see the Markle Foundation's DIGOPP list for the US (http://www.edc.org/GLG/Markle/dotforce/), Japan's forum hosted by GLOCOM (http://www.glocom.ac.jp/dotforce/index.html), BellaNet's DOTCIV list for Canada (http://www.bellanet.org/dotforce/),

[55] Such as "The Public Voice and the Digital Divide: A Report to the DOT Force", http://www.thepublicvoice.org/dotforce/report_0301.html.

Seminar and workshops on the Digital Divide held in Sri Lanka in January 2001 (ECOSOC 2000b, UNESCO 2001b). The UN Millennium Summit also set high goals for the coming two decades, including a pledge to close the international digital divide by 2020 (Mason). The "Creating Digital Dividends Conference" in Seattle, October 2001, brought together business leaders to discuss and advocate market solutions (DigitalDividends 2001b).

Other digital divide bodies include the United Nation's ICT Task Force (ECOSOC 2000a), the Global Business Dialogue on E-Commerce's Digital Bridges program (digitalbridges.gbde.org), UNDP, Andersen Consulting, and the Markle Foundation's "opportunITy initiative" (www.opt-init.org).

A wide number of individuals organizations have put out recommendations on the digital divide, ranging from numerous UN documents urging action among member nations such as UN Secretary-General Kofi Annan's letter to G8 countries on July 11, 2000 to non-profit organizations urging large-scale government universal access and subsidy programs (UNESCO 2000b). Such papers include UN Working Group on Informatics issues recommendations for creating IT opportunities (Hoffman), and APEC's pledge for Universal Internet access by 2010 (Creed). These policy papers run the gamut of perspectives on the digital divide, as are briefly outlined in Annex 1. In this category are also the vast number of think tanks, commentators, and reporters who have urged ground level and policy actions on the digital divide. A list of prototypical articles is available in Annex 9.

B. Other Recommendations

E-Commerce

Many E-Commerce recommendations include a component addressing digital divides. As with focused digital divide initiatives, e-commerce initiatives include international and national task forces, informational and consensus building conferences and workshops and policy papers. For example e-commerce conferences with digital divide elements have ranged from the OECD's "Emerging Market Economy Forum" on Electronic Commerce and BIAC's Business-Government Symposium on E-Commerce in Dubai in January 2001 (OECD 2001d, BIAC) to the Nepal IT Conference in Kathmandu entitled "IT Revolution: A Millennium Opportunity". National and international initiatives include the South African government's E-Commerce Green Paper process (Dept. of Communications), and APEC's E-Commerce Steering Group (APEC). Vast numbers of position papers have been published on e-commerce, ranging from the Alliance for Global Business's "Global Action Plan for Electronic Commerce"[56] to the Shane Ham and Robert D. Atkinson of the Progressive Policy Institute's "A Third Way Framework for Global E-Commerce" (AGB, Ham)

Information Society and Information Economy

Digital divide policies and projects are often included as part of wider action plans to harness ICT to benefit economies and societies. The archetypal example is the EU's "e-Europe" plan, which has the stated goals of:

- Bringing every citizen, home and school, every business and administration, into the digital age and online.
- Creating a digitally literate Europe, supported by an entrepreneurial culture ready to finance and develop new ideas.
- Ensuring the whole process is socially inclusive, builds consumer trust and strengthens social cohesion.

from the European Union's "eEurope: An Information Society for All" website.

[56] http://www.giic.org/focus/ecommerce/agbecplan.html. The action plan "sets out industry's views on the full range of e-commerce issues, including privacy, cryptography, consumer protection in the online environment, taxation of E-commerce, intellectual property protection, standards, competition, and Internet governance."

Other information society or economy initiatives include UNESCO's Universal Framework for Cyberspace (UNESCO 2001a), information technology requirements for EU ascension, and Croatia's Office for Development of Internet Infrastructure. The US Internet Council refers to the UK government's initiatives as "one of the most aggressive in Internet and e-commerce promotion" with its "two special cabinet posts...known as the “e-Minister” and “e-Envoy” (US Internet Council).

Other ICT Recommendations

Countless initiatives target specific issues of the digital divide. These range from the well-known Council of Europe Draft Cyber Crime Treaty, to World Custom Organization's "International Convention on the Simplification and Harmonization of Customs procedures", and the Civil Society Internet Forum's efforts for “democratization of Internet governance" (OECD 2001a, CSIF). Trade agreements and initiatives through international bodies such as the WTO and WIPO have significant relevant to digital divides, particularly in the areas of tariffs and taxation and intellectual property. The World Bank and International Monetary Fund have used also loan criteria to require "structural adjustments" which have an impact on national policies and programs, many of which have positive and negative ramifications on digital divides. These initiatives and their perspectives are so varied that no summary could suffice. Annex 5, "Relevant policies", lists some of the organizations working on policy issues, and Annex 9 lists position papers with other ground-level recommendations.

3.3 Directing Scarce Resources to Move Beyond Studies

Good background research is essential to a directed, coherent plan of action. Case studies especially are powerful tools to plan appropriate policies and applications of information technology to spread the benefits of ICTs. However, these are all useless without moving beyond studies to put information and ideas into practice. Too many organizations have announced their plan for bridging the digital divide but have failed to follow through with implementation. Additionally, too many research programs are replicating instead of building upon existing studies or moving on to implementation.

For example, bridges.org's survey of e-readiness assessments found that significant duplication of effort had occurred in some countries, while others were devoid of useful data:

- A total of **84** countries have been assessed by at least one tool.
- ***Sixteen*** countries have been assessed at least ***five*** times by different organizations;.
- Many of the poorest countries which have the most to gain from the information technology revolution have had no assessment activities to drive their planning toward e-readiness.

4 On the Ground Efforts to Bridge the Digital Divide

This chapter reviews ground-level programmes to bridge digital divides, and draws out best practices for providing real access to ICT. *We review major types of ground level programmes which seek to bridge the international or domestic digital divides, by building the ICT sector and overall ICT use in the country or by spreading information technology to underserved populations (respectively). For twelve categories of initiatives (ranging from telecentres and training to healthcare technology), general descriptions, sources of funding, stakeholders, audience, common experiences and a case study are given. An annex lists and describes dozens of current initiatives. General lessons are drawn from these initiatives. The chapter concludes with a list of 11 aspects (including: physical computers and connections, affordability, training and content) that must be addressed for groups to have "real access" to ICT.*

Summary of Findings

- **Numerous on-the-ground initiatives are working to provide technology access and help put technology to use in underserved populations.** There are an enormous number of efforts, ranging from telecentres to telemedicine to training to innovative business applications, and they are driven by the smallest NGO in Myanmar Burma to the largest multinational corporation, such as Hewlett Packard's US$1 billion "E-Inclusion" initiative.[57]

- **Many initiatives address specific aspects of the range of issues, but too often they neglect related factors that limit their success.** For example, too many telecentres providing computers and connections in rural locations do not become self-sustaining because local people do not use their services – often they have failed to address the role of the centre in the local economy or the need for locally relevant content. There is a need for a holistic approach to cover the range of issues to create effective and sustainable uses for technology that are integrated into local society.

- **Providing access to technology is critical, but it must be about more than just physical access**. Computers and connections are insufficient if the technology is not used effectively because it is not affordable; people do not understand how to put it to use, or they are discouraged from using it; or the local economy cannot sustain its use. *Real access* requires training, relevant content in local language, a supportive political environment, and a sustainable local economy.

- **Overall, a pooling of resources and experiences is needed.** Dealing with the digital divide is beyond the scope of any single initiative. While it is important for organizations doing community ICT projects to meet the needs of their clients as comprehensively as possible, the issues at stake in international and domestic digital divides are huge, and organizations should cooperate to tackle problems collaboratively.

- **Private sector programs are vital.** For-profit programs are successfully expanding access to technology to increasingly larger groups, but often fail to adequately address the needs of the poorest countries, and the poor citizens within countries. In isolation they can exacerbate divisions within countries since privileged groups are more able to afford and use the technology.

[57] Annex 4 includes descriptions and references for over 100 initiatives that were analysed for this report.

- **Donation and other philanthropic programs are necessary.** Donations and philanthropic programs have demonstrated the useful application of technology among underserved populations, but in many cases they have failed to produce sustainable, widely replicable models.

- **The digital divide is not a new problem.** We should learn from previous experience in fields such as economic development, technology transfer, and sustainable development. Many of these ongoing programs have an impact on digital divides, and coordination will benefit both sides.

4.1 Initiatives

How are organizations, individuals, governments, and businesses actually working to address international and domestic digital divides? The approaches taken are about as varied as the perspectives on the problem itself. There are literally tens of thousands of self-identified "digital divide initiatives" in existence, and many more that do not label themselves as such but work toward similar goals.[58] This section summarises a wide range of on-the-ground projects – both current and planned – aimed at applying technology to the specific needs of people, in areas ranging from the provision of infrastructure to improving health care[59]. Broad categories of projects are listed in general terms, noting common types of technology used, major actors, and the primary issues addressed. We describe the key factors that contribute to their successes and failures, and draw out assumptions about "best practices" that can inform future digital divide programmes.

The following common categories are applied to the numerous initiatives that address international or domestic digital divides:

1. Infrastructure providers
2. Physical access providers
3. Training programmes
4. Telecentres
5. School computer programmes and distance learning programmes
6. Online information resources – relevant content
7. E-government
8. E-commerce
9. Healthcare
10. Agriculture
11. Other applications of ICT
12. Technology development
13. Laissez faire

For each category, we provide a short "fact sheet" that includes:

1. a description of the type of initiative;
2. implementers, funders, and audience;
3. common experiences;
4. a brief case study example;
5. a list of other examples and sources of further information; and
6. sources of commentary.

[58] Many programmes in the long-standing development and technology transfer traditions do not identify themselves as digital divide programmes, though their work fits many definitions of the digital divide. This section draws heavily on self-identified "digital divide" initiatives, from sources including: the Digital Divide Network's database, the World Economic Forum's Digital Divide "project exchange" database, OneWorld.net's list of partners, messages by individual organizations to digital divide email lists (such as The Benton Foundation's DigitalDivide list, and the US, UK and Canadian DOT Force consultations).

[59] The next chapter of the report examines major policy initiatives which aim to provide larger scale and longer term solutions to these problems.

A. Infrastructure Providers

Description
ICT infrastructure projects involve the positioning of wires, mobile receivers, satellites, undersea cables, as well as the switching hardware required for telecommunications. They are large-scale projects that make international telecommunications possible. As a result, these projects are either undertaken by the private sector in response to competitive market forces or at the national level as part of a commitment to universal access.

Government telecommunications agencies have nearly always had universal service provisions and a written commitment to equity in infrastructure – but these commitments have not always been fulfilled. Projects driven by the private sector are conducted where a significantly large and lucrative market is believed to support such massive infrastructure projects.

Common implementers
Due to the tremendous cost of ICT infrastructure projects, these projects are almost exclusively undertaken by either national telecommunications companies (whether government owned or privatised), or multinational telecommunications companies.

There is a significant trend towards privatising national fixed-line telecommunications companies. The mobile networks, on the other hand, are generally privately owned, profit-driven companies with no social requirements (although national governments may institute some social targets as part of the awarded licence, as is the case in South Africa).

Generally, transnational submarine cable and satellite operators are privately owned, and often multinational, primarily connecting developed countries. However, in their search for new markets, and driven by market forces, these companies are slowly spreading their infrastructure to reach developing countries, thereby connecting them into the developed world.

However, within these developing countries, there are national government barriers to foreign ownership of their telecommunications infrastructure and companies[60]. As a result, most private infrastructure programmes are nationally based or supported by international organisations, such as the International Telecommunications Union (ITU).

Sources of Funding
State-owned infrastructure projects are funded through general taxes and user fees, while private projects are funded through normal revenue sources and stock issues, as well as special-purpose bonds. International organisations provide donor funding for infrastructure projects.

Target audience
Infrastructure projects are aimed primarily at the general public, although private programmes tend to focus almost exclusively on the middle class and upper income markets.

Common experiences
On the whole, national telecommunications infrastructure projects have explicit digital-divide bridging goals, but have lacked the entrepreneurship and speed needed to meet these goals. These attributes are well-established among the private telecommunications companies. However, these corporations have a lesser social intention and do not hold as one of their goals to provide universal access. Despite this, they have slowly dispersed their technology to the developing world by responding to competitive market forces.

[60] Though this is fading as countries are pushed to adopt WTO rules for increased foreign ownership.

Case study of an example initiative[61]

Africa ONE

The in-progress Africa ONE project is a 32 000 kilometre undersea fibre optic network that will link African nations directly to one another for the first time and further provide increased connectivity to the rest of the world. http://www.africaone.com

[61] For an extended list of initiatives with descriptions and references for more information, see Annex 4, "On the Ground Initiatives".

B. Physical Access Providers

Description
The primary goal of access providers is to connect people to the Internet once the necessary infrastructure is in place. Access projects provide the physical hardware such as computers, hardware, software and Internet access required to connect to the Internet, or alternatively provide access via television, mobile phones or radio. Access projects range from containers converted into portable access stations, to established telecentres, to using radio to disseminate Web content. Providers may approach Internet access for commercial, social or political reasons. The stated aims of these projects include improving quality of life and enabling entrance into the digital economy.

Common implementers
These include: international donor organisations such as Bellanet and the IDRC (International Development Research Centre); international organisations such as the National Association of Community Banks, multinational corporations (including Microsoft amongst others), and national governments.

Sources of Funding
Large projects are funded by international donor organisations, corporate ventures or general taxes. International organisations and corporate ventures tend to fund the smaller, private projects.

Target audience
People in the developing world without access – disadvantaged urban or rural communities, underprivileged schools, and under-resourced small businesses form the target audience.

Common experiences
The most tangible and dramatic results are seen in the physical provision of access. However, supplying access is not a guarantee of sustainability, or of reducing the digital divide. Most physical access projects prove successful when linked to a programme meeting a community's material and health needs with appropriate technology, and are not solely limited to the provision of physical access.

Case study of an example initiative[62]
OmniAccess
OnmiAccess combines Internet technologies and a sustainable access centre business model to provide affordable access for disadvantaged communities. The business model ensures the profitability of the ventures and is a long-term solution. OmniAccess centres are comprised of 10 computer stations housed in a shipping container and the solution is scalable for mass implementation. Networked to an Intranet, the centres sell virtual space to content providers therefore “rather than charging people to see information, we will charge information providers to be seen.” However, while OnmiAccess subsidises e-mail, news, bulletin boards, Intranet content and educational programmes (charged at US$ 0.05/hr), access to the Internet will be charged at commercial rates. A further revenue stream will come from the selling of the member user base to commercial parties (for example, employers, buyers of crafts and agricultural products, etc
http://www.weforum.org/digitaldivide.nsf/vwAllProjectsWeb/00432A40B1FB9FAEC1256A1F00372FCF?OpenDocument

Commentary
- Andrew Skuse, *Information communications technology, poverty, and empowerment.* [c.2000]. http://www.imfundo.org/knowledge/skuse.htm

[62] For an extended list of initiatives with descriptions and references for more information, see Annex 4.

- Uday Mohan, "Bridging the Digital Divide", International Food Policy Research Institute (IFPRI), 26 September 2000.
  http://www.iicd.org/base/show_article?article_id=414&subcat=41
- Liza Carver, "Digital Delusions: Issues in Broadband Access Pricing", January 1998.
  http://www.gtlaw.com.au/pubs/digitaldelusions.html
- Peter Benjamin and Mona Dahms, "Universal Service and Universal Access Issues", June 1999.
  http://www.sn.apc.org/community/paperuni.html.

C. Training Programmes

Description
A range of training programmes exist that address ICT skills development and capacity building for persons either entering or reskilling on return to the job market. The training programmes range from basic digital literacy courses, to more advanced IT certification courses through to computer programming and applied ICT skills.

Common implementers
Interest from the private sector comes in the form of business organisations reskilling their labour force with core IT skills, or commercial training institutions offering ICT training to the general population. Furthermore, government, international donor and NGO sector programmes offer ICT training as a means of community capacity building. Universities have further training programmes at tertiary level.

Sources of Funding
The large public training programmes are funded through donor grants and taxes.
Smaller programmes are usually funded through private or corporate sponsorships.

Target audience
Programmes ideally suited for workers needing to extend their skills. NGO and aid programmes are targeted at disadvantaged and/or rural communities that do not have access to school computer training programmes. Special needs persons also benefit from specialised computer applications.

Common experiences
Programmes address specific skills training needs aid in job creation or job migration. Many (largely corporate) programmes however supply training only on their products, without further consideration of its applicability external to the organisation.

Case study of an example initiative[63]
ITrain
This global project aims to develop free open content computer and Internet training materials by and for developing countries. The project draws together several international NGOs. It was initiated by the International Development Research Centre and is managed by Bellanet in conjunction with several partners.
http://www.bellanet.org/itrain.

Commentary
- Papers from US Conference on Educational Technology, 2000.
  http://www.ed.gov/Technology/techconf/2000/white_papers.html.
- "E-Rate and the Digital Divide: A Preliminary Analysis From the Integrated Studies of Educational Technology"
  http://www.ed.gov/offices/OUS/eval/elem.html#technology

[63] For an extended list of initiatives with descriptions and references for more information, see Annex 4.

D. Telecentres

Description
A telecentre is broadly defined as a shared facility usually providing public access to basic telephony and other information services to a disadvantaged community. They are often referred to as multi-purpose community centres (MPCCs), community access centres or public call offices (PCOs). Government and international donor commitments to the ideal of universal access to telephony and ICT drive telecentre projects, as well as commercial projects in the mobile phone market and smaller demand driven initiatives.

Telecentres aim to bridge the digital divide by creating a focal point for community use of ICT. Successful ventures are self-funded micro-enterprises providing needed and appropriate communication services to a local community.

Common implementers
International organisations have undertaken many telecentre initiatives, such as the ITU, UNESCO, and the World Bank. International donor organisations, and particularly the IDRC, the state, and private enterprises (telecoms, IT suppliers)

There are many telecentre programmes – from donor and NGO organisations, to governments and business. Businesses have focused on telecentres as the way to bundle varied business services including training, phone, fax, internet, copying and printing. Several digital divide issues have been overcome by addressing access issues and providing training.

Sources of Funding
Larger telecentre projects are funded by international donor organisations or through general taxes and state telecommunication company contributions to a universal service fund. Private projects are funded as corporate ventures or self-funded as small micro-enterprises.

Target audience
Telecentres are implemented to serve disadvantaged communities, especially in rural areas in the developing world or inner city areas.

Common experiences
Ironically, most large well-funded projects are not as successful as smaller and unsupported entrepreneurial initiatives. Most of the larger projects address the physical access issue, however this is not supported by a marketing campaign, and therefore there is a lack of awareness as to the benefits of the telecentre. Furthermore, these projects face the challenges of high telecommunication costs, dependency on donor funding, unfulfilled community expectations and poor management capacity. Many of the smaller projects face the problem of basic access in rural areas.

Case study of an example initiative
Peruvian Telecentre Franchises Project
In 1992, the Peruvian Scientific Network (RCP) established the Peruvian Telecentre Franchises project. It uses a three-tier franchise model (Mother Infocentres in cities, franchises in small towns, and "Monocabinas" in rural areas) to provide access to telephony, computers, the Internet and other information services to communities. This model aims to addresses universal access concerns and is to be rolled out in El Slavador.
http://www.rcp.net.pe;
http://www.idrc.ca/telecentre/evaluation/text/BIOS%5CHerreraY_11.HTML

Commentary
- Benjamin, Peter. 2000. *Telecentre 2000: Report 1: Literature Review*. Development Research Africa.

- Burton, Patrick. 2000. *Telecentre 2000: Report 3: Domestic Case Studies, Section 3.1: Domestic Case Study Synthesis Report*. Development Research Africa.
- Jeremy Grace, Charles Kenny and Christine Qiang, with Jia Liu and Taylor Reynolds, *Information and Communication Technologies and Broad-Based Development: A Partial Review of the Evidence*, 14 February 2001.
- Scott Robinson, *Rethinking telecentres: knowledge demands, marginal markets, microbanks, and remittance flows*, http://www.isoc.org/oti/articles/0401/robinson.html.

E. School Computer Programmes and Distance Learning Programmes

Description
School computer programmes and distance-learning programmes combine access and training programmes (for both teachers and students). Distance learning is primarily aimed at tertiary education levels. These programmes provide teacher training, technology skills development and dissemination of educational content. Computer labs, "virtual classrooms", resource centres, educational networks and curriculum development characterise these programmes.

The benefits of these programmes include: meeting community needs; equitable access to education between urban and rural areas; access to global resources; enhancing teacher training; capacity, and networking; dynamic student-teacher interaction in the learning process, and producing technically competent job-seekers.

Common implementers
Most organisations, be they international donor organisations or business, have an interest in education. Donor organisations include the World Bank, government programmes initiated by the national education departments, and private enterprises (such as Intel).

Sources of Funding
General taxes and grants from international donor organisations form the primary sources of funding for large and usually national projects. Privately funded projects are supplemented by donor funding.

Target audience
School computer programmes are directed at teachers and students in under-resourced developing world schooling systems requiring such access to training and skills.

Common experiences
Successful programmes are supported by government and the IT programme components are integrated into the school curriculum. Further criteria that contribute toward the programmes' success include networking with other school centres, teacher training, feedback and evaluation, and the establishment of well-resourced and funded computer labs.
Isolated computer labs do not benefit from the network effect of shared (and interactive) learning, Computer training not meeting the on the ground training needs of students are ineffective in transferring knowledge. Crucially, it is the bridging of the resourcing gap between rural and urban schools which ensures an even greater spread of the programme benefits.
The effectiveness of distance-learning lies in decreased cost and increased numbers irrespective of location, however, this is not always a reality on the ground. Distance-learning usually applies to tertiary education though audiovisual resources (e.g videos) are used in the schooling environment.

Case study of an example initiative
Proyecto de Informática Educativa (Centro de Recursos de Aprendizaje)
This project outlines a model for the introduction of ICTs into Panamanian schools. The Ministry of Education aims to establish 500 learning resources centres and a Web-based educational network for students and teachers. The content focuses on the natural sciences, Spanish language, mathematics, and social studies. Each centre has a number of educational resources (books, multi-media devices and computers). This model is different from the traditional, isolated computer labs. Research has shown that the CRA model to be more cost efficient and better suited to teaching. The project is supported by the Fundación Gabriel Lewis Galindo, which assists in gaining corporate sponsorship of schools or IT equipment.
http://www.educaion.gob.pa/p-inf-ed.html

Commentary

- Jeremy Grace, Charles Kenny and Christine Qiang, with Jia Liu and Taylor Reynolds, *Information and Communication Technologies and Broad-Based Development: A Partial Review of the Evidence*, 14 February 2001, pp. 30 –35.
- Papers from US Conference on Educational Technology, 2000. http://www.ed.gov/Technology/techconf/2000/white_papers.html.
- "E-Rate and the Digital Divide: A Preliminary Analysis From the Integrated Studies of Educational Technology" http://www.ed.gov/offices/OUS/eval/elem.html#technology
- "How the Internet is changing the fourth grade" http://europe.cnn.com/2000/TECH/computing/09/25/changing.4th.grade.idg/index.html

F. Online Information Resources – Relevant Content

Description
Online information sources address a wide range of development issues, including legal advice, advocacy of human rights, and resources for women. These Web sites are used to network NGOs and donor organisations, publicise and communicate project news and local development needs, and provide online resources for disadvantaged communities.

The Internet provides a cheaper and more efficient means to disseminate information but does in fact presuppose that communities must be able to access computers and the Internet in order to benefit from these online resources.

Common implementers
A range of organisations lead these initiatives, including locally-based NGOs (e.g. Soul City), government departments, international donor organisations (The Varsavsky Foundation), international organisations (e.g.World Bank), and business.
Further sources of online information include all organisations with a Web site, and those organisations, which only have a Web presence, as well as the full gambit of digital divide players (NGOs, NPOs, Government, business and international organisations).

Sources of Funding
Self-funded projects are usually sustainable through commercial endeavours, while public projects draw on international donor funding or government resources.

Target audience
Online information resources are useful resource tools targeted at NGOs, disadvantaged communities, donor organisations, and the wider Internet community.

Common experiences
The online publication of projects and resources creates awareness of development issues. This aids assessments of the digital divide and facilitates networking. However, the little content produced at community level does not always filter back to the community in an accessible form or appropriate media or language.

Case study of an example initiative
Soul City
Soul City publishes research online and produces a South African TV drama and daily radio drama addressing adult and youth issues, including HIV/AIDS information, job creation and money management. Soul City is a self-sustaining organisation.
www.soulcity.org.za.

Commentary
- Andrew Skuse, *Information communications technology, poverty, and empowerment.* [c.2000] http://www.imfundo.org/knowledge/skuse.htm.
- Education Department Centre (EDC), Global Knowledge for Development Forum on the Global Development Gateway, February 2001.
  http://www.edc.org/GLG/GDGreport/final.pdf

G. E-Government

Description
E-Government is the online provision of public services and information to the citizen, as well as the participation of civil society in governance through ICT. E-government initiatives focus on bringing government services online and strategically set out to demonstrate the economic advantages and beneficial use of ICTs. These include the internal information efficiencies assisting policy decision-makers; improving delivery of government services; and the empowering civil society to access, and respond to, government information.

Common implementers
These are government-driven programmes, with input and support from international organisations (e.g.UNCTAD) and civil society (e.g.IDASA in South Africa). E-government systems are outsourced to business or non-profit organisations.

Sources of Funding
Taxes and international donor funding fund these state initiatives.

Target audience
Initiatives focus on internal efficiencies within government departments and the provision of information and access to services to civil society and citizens.

Common experiences
E-government provides the impetus to transparency, reduces corruption, and provides citizens with direct access to officials and public information. However, the high costs of initial IT implementation, management buy-in and commitment to change, and the ability of citizens to access this resource have hampered several e-government initiatives.

Case study of an example initiative
Land Registry
Land registration offices in Andhra Pradesh (India) use computerized counters to increase efficiency in the land registration process. Originally, the registration process took several days. Citizens now complete the process within an hour. Furthermore, the system cuts out corrupt brokers and middlemen. ICT processing has replaced manual record keeping and illustrates how the use ICT improves citizen-government interfaces.
http://www1.worldbank.org/publicsector/egov/cardcs.htm.

Commentary

- Jeremy Grace, Charles Kenny and Christine Qiang, with Jia Liu and Taylor Reynolds, *Information and Communication Technologies and Broad-Based Development: A Partial Review of the Evidence*, 14 February 2001.
- Archana Ghosh. "Management of Urban Environment: A Study on Post-Plague Initiatives of Surat Municipal Corporation", *UMP-Asia Occasional Papers*. UMP-Asia (Urban Management ProgrammeProgrammemememe Regional Office for Asia-Pacific), Paper No. 39, December 1998).
- Bhavya, Lal. *Information and Communication Technologies for Improved Governance*, IICD (International Institute for Communication and Development, 21 October 1999.

H. E-Commerce

Description
Electronic commerce is the ability to reach a global market, access real-time market information, improve internal efficiencies, reduce costs, and complete business transactions electronically. E-commerce benefits economic growth in the developing world by providing a further channel to export goods and services. This is particularly true for business-to-business trading.

Many multinational organisations have initiated e-commerce initiatives in developing countries. Development agencies however have been slow in adopting e-commerce as a means of creating sustainable community-based projects.

Common implementers
Non-profit organisations (e.g.PeopLINK), international organisations (e.g.World Bank), government, non-profits as well as corporate organisations implement e-commerce initiatives. Multinational corporations (such as Hewlett-Packard) lead international developments in e-commerce, with international organisations and governments following.

Sources of Funding
Most e-commerce initiatives are private ventures which are self-funded by an e-commerce activity. Several programmes are supplemented by international donors or non-profit organisations.

Target audience
E-commerce initiatives in developing countries are targeted at getting artisans and small-medium-micro enterprises (SMMEs) in disadvantaged communities online to increase their earning potential. Initiatives are also targeted at NGOs partnering with these enterprises that assist in getting goods produced for trade online.

Common experiences
E-Commerce provides the developing world with access to the digital economy, improves banking services, and new export and domestic trade opportunities, but raises issues such as access, education and training and its potential for poverty alleviation. A wholesale reliance on e-commerce is not sustainable and has to be administered as part of a comprehensive solution.

Case study of an example initiative
Pura Vida Project
A Costa Rican Christian faith-based initiative to establish interactive centres for street children and addressing the social issues of prostitution, drugs and poverty in disadvantaged communities. The project is self-funded through the profits made from the online sales of gourmet coffee. http://www.puravidacoffee.com/.

Commentary
- ITU, *Challenges to the Network: Internet and Development*. October 1999.
- Jeremy Grace, Charles Kenny and Christine Qiang, with Jia Liu and Taylor Reynolds, *Information and Communication Technologies and Broad-Based Development: A Partial Review of the Evidence*, 14 February 2001, pp. 8-11.
- Jonothan Coppel, *E-Commerce: Impacts and Policy Challenges*. Economic Department Working Papers No. 252. OECD, June 2000. http://www.oecd.org/eco/eco/.

I. Healthcare

Description
The application of technology to health-care is a key to improving quality of life. These ICT – health programmes draw on the benefits of access, telecentres, training and other initiatives and implement a telemedicine solution. ICT is also used to capture and disseminate information, for example in the monitoring of diseases and their treatment, and the dissemination of disease prevention information. ICT in health-care brings medical knowledge to remote and poor areas through telemedicine initiatives.

Common implementers
Healthcare initiatives are driven by international organisations (such as the World Health Organisation), international donor organisations (such as Satellife), local NGOs, governments and multinational corporations.

Sources of Funding
Donor and public sector funding contribute to large health-care initiatives. Smaller telemedicine programmes are private sector or local NGO funded.

Target audience
Disadvantaged rural and urban communities with health-care needs, especially in remote areas stand to gain the most benefit from telemedicine initiatives. Medical research organisations benefit from being able to access and exchange medical research as well as being able to capture data about the organisations they service.

Common experiences
Telemedicine effectively bridges the rural/urban divide, providing patients or medical professionals in remote areas access to (real-time) medical knowledge. However, the issues of access, changing administrative culture, capacity building and addressing community needs with appropriate technology need to be addressed. Clarity in the policy environment in required as to where the liability and compensation lies in the event of a misdiagnosis after an "off-site" consultation.

Case study of an example initiative
SATELLIFE.
This initiative uses satellite, telephone, and Internet technology to meet the health communication and information needs of the developing world. It aims to improve health by connecting professionals, and facilitating an exchange of information on public health, medicine, and the environment. It partners with various medical institutions and organisations, as well as telecommunications service providers, to overcome the financial and technical barriers of providing medical professionals with relevant information.
http://www.healthnet.org/

Commentary
- Dr. Kashif Mirza, *Health goes digital: telemedicine. An overview of how telemedicine can work.* http://www.bytesforall.org/7th/lastbyte.htm
- Jeremy Grace, Charles Kenny and Christine Qiang, with Jia Liu and Taylor Reynolds, *Information and Communication Technologies and Broad-Based Development: A Partial Review of the Evidence*, 14 February 2001.
- BBC, "Digital Divide hits third world health", 29 September 2000. http://news6.thdo.bbc.co.uk/hi/english/health/newsid%5F947000/947030.stm.
- UNESCO, Connections thet save lives, 2000. http://www.unesco.org/webworld/news/000728_teleinvivo.shtml.

J. *Agriculture*

Description
The application of technology to areas of agriculture and the environment greatly improves development work in these areas. These programmes draw on access, telecentre, training, and other initiatives and then disseminate information on agriculture and land rights.

ICT enables vital information flows by linking rural agricultural communities to the Internet, both in terms of accessing information and providing local content. Other technology benefits include automating record-keeping and management functions to increase efficiency and reduce costs, communicating traditional forms of environmental knowledge to communities and facilitating the citizen monitoring of environmental issues.

Common implementers
International organisations, international donor organisations e.g. (IDRC), local NGOs, governments and agricultural research councils implement ICT in agriculture initiatives.

Sources of Funding
Larger projects source their finding from donors along with government spending. Smaller projects are funded primarily through corporate sponsorships.

Target audience
Agricultural initiatives are targeted mainly at disadvantaged rural communities with specific sustainable development needs, as well the community of small-scale farmers.

Common experiences
ICT which disseminates relevant information (techniques, weather, crop market prices) to small farmers in rural areas, assist rural development initiatives. Innovative use of community-based radio, for example, gives Internet content further reach into the communities, particularly those without Internet access or low-levels of literacy.

Large-scale projects (Government or international donor organisations) that do not assume a grassroots perspective to ICT projects, waste resources and pose the danger of applying a uniform model to communities with differing socio-cultural and geographic regions.

Case study of an example initiative
Village Info-Shops
Linked to the IDRC PAN project “Impact of IT in rural areas—India” and developed by the M.S. Swaminathan Research Foundation in the Pondicherry region, the project aims at assessing the impact of information and communication technologies in fostering transition to sustainable agricultural and rural development. The project documents the NGO's role in promoting the process of knowledge-empowerment of rural families. The project's objectives are: the establishment of six village information shops enabling rural families to access ICT; the training of youth and women in rural areas in the operation of information shops and maintenance of a system generating locally relevant information; the maintenance, updating and dissemination of information on entitlements to rural families using various channels of communication; and assess project so as to build a model of information dissemination and exchange in rural areas that uses ICT.
http://www.idrc.ca/pan/ICT%20and%20poverty_files/frame.htm.

Commentary
- Case study – Technology innovation in rural India. http://www.outlookindia.com/full.asp?fodname=20010409&fname=Cover%20Story%20(F)&sid=1

- Jeremy Grace, Charles Kenny and Christine Qiang, with Jia Liu and Taylor Reynolds, *Information and Communication Technologies and Broad-Based Development: A Partial Review of the Evidence*, 14 February 2001.

K. *Other Applications of ICT*

ICT is applied in numerous sectors other than those noted above, from water management to micro-lending. Prior implementers and sources of funding apply to these remaining initiatives. These include international organisations, international donor organisations, local NGOs, governments and commercial initiatives that source funding from international donor organisations, governments, and corporate sponsorships.

Case study of an example initiative

Grameen Telecomm
Perhaps the most often cited example of an information technology success story is Grameen Bank's mobile phone programme. Grameen Bank is a highly success full micro-enterprise bank in Bangladesh that combines small loans with face to face financial advice, personal support, and a heavy dose of work-ethic.

The mobile phone programme is Grameen Telecomm. Larry Press describes one example "One of their first subscribers, Mrs. Laili, borrowed $450 for a mobile phone and is repaying her loan at a rate of $3.50 a week. Calls cost her around 8 cents a minute, and she charges 10 cents. Service began in March 1997, and by October 1998, 150 village operators were averaging a profit of $2 per day, more than twice the country's annual per-capita income. By February 1999, the number of village phones was 240, and they plan to reach 2000 by the end of 1999." (Press)

Grameen is successfully engaging the digital divide on a number of fronts – by building resources in one business, then leveraging it to support new endeavours and partnerships. Grameen Telecom is a 35% shareholder of Grameen Phone, Grameen's nationwide mobile provider. Grameen has also working with the IDRC's Pan Asia Networking (PAN) programme in their telecentres to provide computers and connectivity to rural regions. In total, branches of Grameen are providing capital (loans), entrepreneurial support (through village representatives), Telecommunications infrastructure (Grameen Phone), rural connectivity and aid for cell phone businesses (Grameen Telecomm).

Grameen was initially dependant on grants and development loans, but is now a private, for profit business – with 90% of its stock is held by borrowers. Grameen's model has been replicated in at least 30 countries. One of 13 Grameen organisations, Grameen Telecom uses micro-credit to fund village mobile telephone operators.

L. Technology Development

Description
Development initiatives that develop technology solutions for disadvantaged communities fall into this category. The technologies are usually communications or access related. These solutions also meet the commercial goals of establishing a presence in a new market.

Common implementers
Multinational corporations (e.g. HP), international donor organisations (e.g. IFC), and international organisations (e.g. C@MP) are the common implementers of such developments, whether it be for developmental purposes or to access new commercial markets.

Sources of Funding
Private and corporate research and development funding form the bulk of the money spent on technology development, and may be further supported by donor grants.

Target audience
Initiatives are focused on developing world markets to spread market penetration of established products and disadvantaged communities where new technologies can be developed to suit these communities.

Common experiences
Commercially driven models do not necessarily adapt technology for local needs. In many instances, technology is shown as a way to enter an emerging market. Nevertheless, these initiatives are focused, well-resourced and have a profit model. While limited in their intentions to create specifically adapted technologies, capacity building can occur within SMMEs using commercial ICT applications. There needs to be greater communication between developmental organisations and the needs they perceive on the grass-roots and commercial organisations that could produce the relevant technologies and enter new markets where the demand for these technologies exists.

Case study of an example initiative
- *Centre for Advanced Media.* Introduces new-media concepts and solutions to independent news organisations by adapting new technologies, for example, Radio 68H in Indonesia. http://www.mdlf-camp.net/.
- *SOFTBANK Emerging Markets*. With IFC funding, supports growth of Internet ventures by providing funds and strategic resources to assist local entrepreneurs. http://www.softbank.com/scripts/MAIN.ASP.
- *World e-Inclusion initiative*. Several projects partnered between HP and development organisations to provide access to connectivity, content and access to new markets in the developing world. http://www.hp.com/e-inclusions

Commentary

Commentary on Africa Technology Forum
- http://www.technews.com/news/00/157468.html
- http://allafrica.com/stories/200011010014.html

M. Laissez Faire ("Do Nothing – Let the Market Solve It")

A number of authors argue that government should allow market and economic forces to close the digital divide (Crandall, Singleton). Primarily, this is because these authors see the digital divide as a problem of a lack of computers and access to the Internet. These problems are being solved as all technology problems have been – by a steady decrease in prices and diffusion of technology through society. Crandall adds another argument as well, that technologies are not desired by everyone (and sometimes this falls along racial or other lines) whilst other technologies naturally become obsolete, or fail outright. To jump at any new technology and demand immediate equity of consumption is foolish – a waste of time and energy (Crandall).

N. Other Approaches – A Long History of "Technology Transfer" and Sustainable Development

"Bridging the divide" is nothing new – technology transfer programmes have existed for many decades in order to address previous development disparities and use technology to address poverty. James for example, notes the similarities between current IT programmes and the "Green Revolution". These experiences, and the lessons drawn from them, are rarely mentioned in digital divide literature. The reason for this being that the digital divide is depicted as a new and gaping problem that we are just starting to grasp.

It is vital that we learn from past mistakes and draw on successes in related areas of development. The digital divide is a technology transfer problem. The same claims were made during the introduction of industrialised machineries, such as leapfrogging, the top-down methods of imposing technology and technology "dumping". These phrases are now re-occurring, but with a new guise and context. While information technology does have the unique potential to lift people out of poverty, and that it will radically exacerbate existing inequalities if the opportunities are not seized, it remains that we cannot turn our backs on the past and the lessons already learned in related development fields.

4.2 Understanding the Initiatives[64]

A. Sustainability

Digital divide programmes range from unsustainable donation-funded initiatives to innovative business models. Non-profit programmes use donations and grants from organisations such as Microsoft, the World Bank, or IDRC. New businesses that help bridge the digital divide include micro-loan systems and rural cell phone programmes from Grameen, Busy Internet's multiuse "Internet Labs" and the Simputer Trust's inexpensive Linux-based Simputer. Traditional businesses are also launching programmes that aid the "digital divide" such as HP's E-Inclusion programme, OnmiGlobal's OmniAccess programme, AOL Peace Packs, and AfricaONE. A number of "transition" projects use short-term donations to build long-term revenue and sustainability, such as the Softbank Emerging Markets project. Finally, Jonathan Peizer of the Open Society Institute describes ".corgs" as companies who explicitly combine social goals with business revenue such as Viatru which works "with NGOs supporting artisans in the developing world to bring their products to retail and wholesale outlets." Other examples of ".corgs" are the Pura Vida project and PeopLINK.

Generally speaking, larger projects in fields such as physical access, education, telecentres, and e-government are less sustainable than smaller projects applying technology to existing services, such as healthcare and agriculture. Projects that make use of existing infrastructure are also more likely to be sustainable (or simply recoup costs) than those that provide physical access as well as added services.

Donation schemes to help bridge the digital divide run the gamut of money and equipment programmes. Below we briefly highlight the unique challenges and opportunities of digital divide donation programmes, and how some of traditional models have been innovatively applied.

- Large IT Corporate Donors – usually of the products they develop and sell (see below)
- Foundations – In this very traditional source, some donors have specialized themselves as IT or digital divide funders, such as Markle and Benton, while many others fund on a project by project basis, such as Ford.
- Aggregators of individual contributors – such as the "Apples for the Schools" programmes which successfully donated computers to schools.
- Companies using portions of proceeds of particular product to go to a charity or non-profit..
- Donated labour with costs covered – such as GeekCorps – this brings in highly skilled individuals who want to give something back to their community in a hands-on-way, without giving up their existing careers.

However, **corporate donation programmes also are a double-edged sword**. They bring valuable resources to communities. Microsoft Giving for example provides million of dollars worth of computers, software, and training to students, ranging from the "Computers for Every Child" project in Israel (10,000 computers donated and growing) to their Dalian Labor Bureau project which will provide training to 1,200 laid-off workers per year in China. However, these programmes are naturally contingent on their use of the given company's products. On the one hand, students are trained in exactly the products that are in demand in today's market – such as Microsoft networks. However, both the student and the training centres (if applicable) are often tied to that product – which is usually proprietary and expensive. This can limit student's ability to transfer their skills and can make the project unsustainable after the corporate donor leaves.

[64] Unless otherwise indicated, more information about all initiatives cited here can be found in Annex 4, "On the Ground Initiatives".

B. Top Down versus Bottom Up Initiatives – The Role of Local Champions

Top-down approaches cause local communities to remain outside of the information feedback loop, especially in education and health-care. Local communities become the receivers of information, or at most a source of community data and knowledge into a far away research report; no local network for disseminating wisdom between communities such as traditional health-care practices is created. On the other hand, initiatives following a more bottom-up and holistic approach to community development can facilitate content generation and capacity building, create resources in local languages, providing powerful resources to encourage cultural preservation, and potentially enhance cultural and eco-tourism.

Initiatives can better empower and engage local community members if they are supported by a "local champion" – a person or organization rooted in the community who spearheads put of the project and coordinates with other communities members. The champion can foster community buy-in and thus improve the project's longevity. For government projects, key members of management play this "champion" role. Programmes need the targeted support of management members towards ICT in e-government and education, otherwise institutional support wanes.

Bottom up approaches, or approaches with significant local direction and a local champion, are vital in adapting technology for local needs. Top-down approaches face the serious potential of pushing currently popular technologies (or the chosen technologies of a particular donor company – see "corporate donation programmes" above) that simply do not fit local needs. As Andrew Skuse of the United Kingdom's Department for International Development notes, “understanding the information needs and socio-cultural constraints to both access and use of ICT is essential. Interventions should be demand driven and gender sensitive" (Skuse).

C. Technologies Used

Personal Computers
The vast majority of self-identified digital divide initiatives involve PCs[65]. Corporate donation programmes often use the Microsoft platform on an Intel machine, either because the company donating them develops products for that platform (Microsoft is itself a major source of donations worldwide), or because the computers are obsolete machines from corporate offices, which are disproportionately Windows & Intel based.

However, Linux based machines are also increasingly being used – both in donation programmes, non-profits, and governments. Anecdotal evidence points to Linux's wide reaching acceptance as a more cost-effective platform, especially in developing country and not-for-profit initiatives. One often noted example is the Linux Simputer. Currently, Linux may not be as appropriate for job training programmes, since most corporate jobs still require Windows-based experience.[66]

Use of Radio to Spread Information
As the Farm Radio project of the IDRC notes, computers are simply not an option for many rural areas. Even if people have electricity, access to computers, telephones lines, and the money to afford a connection, and "even when available in local languages, they do not help the farmers who are illiterate — in some countries, that is more than 70 percent of the population (FarmRadio.org website)." However, according to the World Bank, in 1997 there were 4 radios for every 10 people in the world, with Sub-Saharan Africa having 2 radios for every 10 people (World Bank 2001a). As a medium, radios are far more prevalent than computers globally. This medium is also far more cost-effective (the listening devices are cheap and often already in place) and transmission is also relatively

[65] However, this is likely not an accurate reflection of the total number of socially-geared technology programmes.
[66] To date, the numbers of Windows versus Linux machines in digital divide programmes are not available.

inexpensive. Therefore, organizations like Farm Radio, UN Radio, the Kothmale Community Radio Project, Radio 68H, and Ashaninka.net use radio broadcasts to spread information, the latter projects use the radio to provide alternative access to the online information accessible on the Internet[67].

Internet Radio
Internet-based radio is increasingly being used to circumvent the overhead cost and limited reach of radio broadcasting and limitations on the number of allocated radio licenses. "This [internet radio and television] revolution has produced more than 3,700 radio and television stations around the world streaming audio and video on the Internet and has created a $1 billion industry...according to RealNetworks"(US Internet Council, 2000 Data).

These programmes will only actually reach developing world audiences if they already have the computers and sufficiently fast Internet access connections. Nonetheless, Internet Radio provides a great deal of promise for both information dissemination and original, relevant content development among the information "have-nots". Several developing countries have commercial and community stations with live (or recorded) Internet radio providing news and music content, for example, Costa Rico (Radio Monumental), Ghana (Joy FM), and Philippines (DZMM)[68].

Use of Television
Television, while less common than the radio, still has far more density than the computer. In 1998, there were 247 TVs in the world for every 1000 people, but 70.6 personal computers per 1000. Television is also more evenly spread – South Asia and Sub-Saharan Africa had 61 and 52 TVs per 1000 people respectively, while only 2.6 and 7.5 PCs per 1000 (World Bank 2001a and 2001b, 1998 data). WETV, for example, a partnership between the public and private sector, brings together TV, the programming of local content (educational, sport, culture) and the production of online information. The WETV signals are to be transmitted by satellite to set-top boxes. Television is also used in telemedicine, the dissemination of educational material via videos, and a communal focal point in telecentres.

Handheld Devices and Mobile Internet
Handheld and mobile devices are increasingly being used to circumvent insufficient fixed-line infrastructure. They are well suited for data capture tasks, especially in rural and remote areas, and for telemedicine. Mobile phone based Internet, though more expensive, leverages existing GSM networks in remote areas to provide information retrieval and input over wide territories. Mobile phones are also the basis of generating revenue within communities, as with the Grameen micro-lending and telephony programmes – see Annex 4 for more information.

D. Major Actors

Digital divide programmes are operated by organizations ranging from the smallest NGO to the largest multinational corporation. Countless small NGOs such as Starfish and the Geekcorps, are matched by comparatively large NGOs such as the Association for Progressive Communications and Helping.org. International institutions such as the World Bank, UN, and UNDP often have a whole slew of digital divide programmes – including the WoRLD Links programme, African Virtual University, UNITeS, and the opportunITy initiative. Faith-based programmes also exist, such as the Chapel of Peace's computer training programme, and Pura Vida Coffee.

National and international governments mainly direct programmes toward education, capacity building and providing universal services and Internet access. ICT adoption is usually driven by education and technology departments in national governments (South America and Asia), or by

[67] For more information on initiatives cited in this section, see Annex 4, "On the Ground Initiatives".
[68] For more information on initiatives cited in this section, see Annex 4, "On the Ground Initiatives".

communications and commerce departments (southern Africa). International governments direct their attention more towards the policy implications than the on-the-ground programmes, although the United Nations does involve itself in both policy and developmental initiatives.

Businesses programmes focus on finding accessible new markets in the developing world for their products and services, albeit that these programmes and projects are motivated by social responsibility. Programmes are operated by multinational corporations with either an IT core business focus (such as Microsoft, Hewlett-Packard[69]) or without an ICT focus (such as Ford). Further programmes are operated by smaller enterprises servicing local community needs (PeopLINK, Vodacom Phone shops) or providing Internet services to the community (the Te Tomokanga portal). There is no accurate way to determine which organisations are the most active is addressing the digital divide. While many self-identified digital divide programmes operated by large multinational companies, institutions and foundations receive considerable press coverage, many of the smaller programmes do not receive press coverage or listings on "digital divide databases", despite their positive and substantial results on the grassroots level.

E. Goal / Function

The goals of digital divide programmes are universal in providing some form of access to ICT. The justifications behind this goal include anticipated economic growth and improved quality of life, building capacity in businesses, introducing ICT to non-IT businesses, training entrepreneurs and workforce and educators in technology use, supporting civil society initiatives, encouraging the dissemination of public information by governments, and lastly, informing policy makers in their decision-making processes.

F. What's actually happening, and what's planned?

There is a lot of hype around the digital divide, and many programmes that announce grandiose plans only to never be heard from again. A number of foundations and companies pronounced new digital divide efforts surrounding the July 2000 G8 summit, many have not come into being. Bridges.org is currently surveying organizations' expressed commitment to their efforts. This forthcoming in-depth research will provide clearer answers to what is actually happening with digital divide programmes. It is probably true to say that while numerous programmes are in progress, they are either in the planning or pilot phases. Many programmes initially implemented are no longer active because they proved to be unsustainable, not because the programme's goals were attained. Those pilot programmes which can be said to be successful are being implemented elsewhere, or have been converted into sustainable community initiatives.

G. Relative number of Projects of each type

Given that it is almost impossible to quantify the number of programmes which define themselves as addressing the "digital divide", and given the even wider range of programmes claiming to address the digital divide (depending, of course, on the current popularity of the term), there is no way to honestly assess the number of projects by type.

The generalisation could be made that telecentres and access providers form the largest group of programmes, followed by infrastructure providers, educational programmes, online information sources, training programmes, applied technology programmes, e-government, and with e-commerce and technology development providers forming the smaller set of programmes. Based on this assessment, the relative number of projects of each type probably reflect a 60:30:10 ratio.

[69] For more information on initiatives cited in this section, see Annex 4, "On the Ground Initiatives".

H. Private Sector versus Explicitly Social Programmes

Private sector programmes have made impressive strides into bridging the digital divide internationally. In Senegal, thousands of small private phone shops are providing access to their customers. Countrywide teledensity and access statistics have risen because of these programmes. However, private sector programmes generally serve to *widen*, and not lessen, the digital divide within countries. They tend to replicate the pattern of inequality at internal-country level – since they provide access to the middle and upper classes with lower classes being ill equipped to take up the same opportunities. While benefiting some, the relative gap between the middle class and the majority of the population widens – and threatens to further entrench existing inequalities as the more advantaged classes take advantage of ICT for better jobs, and information. Moreover, they generally do not address the wider issues of the divide including the provision of local content and, to a lesser extent, training.

Public sector programmes have not provided a clear alternative though. Large, top down projects have been plagued by high cost and insufficient interest and participation among those they are meant to 'serve'. Some (though certainly not all) have succeeded in reaching a wider swath of the population than private programmes, and are often more geared towards useful applications of the technology to improve people's lives.

However, as ITU Secretary-General Pekka Tarjanne, quoted by Peter Benjamin, states: "The truth is that most Africans will not gain access to telecommunications without African initiatives, taken by individuals. The individual who sublets his or her phone line or sets up a phone shop or telecentre does more to close the development gap than the great corporations and businesses of the world".

I. A Closer Look At Telecentres

The telecentre initiative is perhaps the most widely implemented, often cited, and often criticised application of information technology to bridge the digital divide. Tens of thousands of telecentres – locations that provide telephony plus other additional services to a large and dispersed clientele – have been initiated by governments, international donors, NGOs and cottage-industry entrepreneurs. In October 2000, Peter Benjamin reported that there were 9,000 telecentres in Senegal alone. These statistics deserve a further discussion.

At the outset, Peters Benjamin draws an important distinction between types of "telecentres", namely, between the small private telecentres, and the larger often multi-service donor-funded projects.

1. Private Telecentres

Benjamin states that "the past few years have seen a proliferation of small phone shops", primarily in urban areas. These centres are profitable[70], and provide telephone access for a fee. They have successfully expanded access beyond the very wealthy, but there services are still priced out of reach of the majority of the population. Since the demand has not been high enough to cover costs, most are only slowly adding fax, email, and Internet services. Additionally, few address wider issues of the digital divide such as training and local content development.

2. Donor Funded Telecentres

Donor Funded telecentres include such projects as the Nakaseke Multipurpose Community Telecentre in Uganda, which has 8 computers, 2 printers, a scanner, photocopier, television,

[70] Or at least the ones still in existence – Benjamin notes the normal market conditions has led some projects to close for lack of demand.

video cassette recorder, video camera, and projector. It combines these physical resources with computer training, a library, and a growing resource on local indigenous health and agricultural knowledge. It is subsidized by a community tax, but is unable to pay for replacement equipment or recoup set-up costs. As Benjamin states, "The centre has proved that ICT can be useful for development in a rural area", however, due to initial set-up costs and the fact that it is not self-sustaining, it “is unlikely to be a model that can become widespread".

Often training programmes are targeted to specific audiences, such as rural areas (most common), or for unemployed persons in particular cities, or disabled persons.

Figure 5: Telecentre Case Studies

Senegal's micro-enterprise Phone Shops
In Senegal, individual entrepreneurs have reshaped public telephone access in Dakar. With over 6,000 telecentres, they have taken the place of traditional pay phones and received the support of Sonatel, the national telephone operate. There is strong competition, especially in Dakar with a telecentre nearly on every corner, and they are slowly adding Internet Services.

Africa Online
A different model can be seen with Africa Online's "E-Touch" centres in Kenya. The 261 centres (as of Oct 2000), provide email, fax, Internet, photocopying, and telephony, all for a fee. With 10,000 active users, they have been successful, but still too expensive for most people.

Vodacom
Other models exist as well for providing small scale, widely replicated service – Vodacom had 1176 franchise operators at the end of July 2000 where metal shipping containers are equipped with 5-10 phone lines, and sometimes Internet and fax services, to provide access. As of Oct 2000, 1,800 of these shops, which cost R24,000 to set up, have been established.

Source: Peter Benjamin, "African Experiences with the Internet", *OnTheInternet*, Oct 2000

While both types are promising, current private sector and donor-funded models have yet to find a long term, wide scale solution for Africa's digital divide. The private sector shops are impressive in their scope, and certainly replicable with a supportive legal and business environment, but only extend services to a middle tier, and still leave out the majority of citizens. Donor funded projects show that information technology can aid development, including rural development, but have failed to provide any sustainable model – they are simply too expensive to set-up and operate for it to be rolled out en-masse. Most fail to even cover operating costs – let alone the cost of the equipment. "None of them have shown a model that is sustainable (Benjamin)". These projects also suffer from unplanned problems – computer crashes, theft, power shortages, and insufficient community support and participation.

The many problems that have plagued telecentres can be addressed, and indeed local solutions have often been found. Ways to prevent theft, stabilize power supplies, provide comprehensive and prerequisite services (training, immediate needs) and embed programmes that better the lives and interests of the community have been found. This insight and knowledge needs to be shared amongst all the telecentre initiatives.

Scott Robinson proposes a new form of telecentre, geared towards what he believes is the most needed application for rural developing country peoples – communication and money transfers between migrant workers and their families at home. He envisions "telecentres using satellite or local Internet service provider (ISP) Internet connections linked with microbanks providing digital remittance services while offering a set of generic financial, communication, education, informational,

and even e-commerce resources". His approach is based on a needs analysis of rural people (frequent international communication, money remittances costing up an estimated 20% of the funds) and provides a concrete application to make people's lives better – and less expensive. The telecentres would incorporate these immediate-needs services with ICT training and skills, which are useful in the migrant job markets.

Drawing from Benjamin and Robinson's reviews of telecentres:

- "Centres are better managed when the owners have a stake in them...The entrepreneurial instinct is a strong force in making a centre effective (Benjamin)."
- "There is a great demand for telephony. ICT use can be built, but it takes time, training, and local adaptation (Benjamin)."
- "Simple business models are more likely to be successful than complicated ones. The idea of a multipurpose telecentre is ambitious (Benjamin)"
- "Computers by themselves are not an information service. Few centres use information technology systems to provide information for local use (Benjamin)."
- One major " complicating issue is the lack of a clear and public commitment on the part of ...national telecommunications regulatory bodies" to create universal access and competitive pricing, with accountability and public input (Robinson).

J. Further observations

Before drawing any conclusions, further observations can be made on the role of donor organisations, the need for sustainability, and areas where further research is needed.

First, solutions to the digital divide must fundamentally address issues of poverty and inequality. The use of technology is to be viewed as one approach to increasing the quality of life. As such, the digital divide represents the latest manifestation of long-standing problems in a history of "development". The digital divide is merely symptomatic of living in the information age.

Second, international aid should not continue cycles of dependency due to structural debt at a national level in developing countries, especially in Africa, or re-direct funding away from existing development programmes. Rather, aid organizations should encourage sustainability from below as a means toward economic growth and a lack of dependence on donor funding. Private sector and government partnership should be encouraged to foster sustainable and community-based development models. Programmes need to take into account the appropriate use of technologies, local knowledge and the development of pro-poor content.

Third, there should be a practical result to the development of information and the accumulation of knowledge at community level. The use of information online as a means to create awareness by development agencies should not come before human development and social equity, but should complement work in these areas. Donor funding or technology programmes should not make value judgements about the use of technology and what solutions they would like to see implemented. Rather, they should support innovation and the appropriation of technology by disadvantaged communities that would best support human development and social equity initiatives. Furthermore, these are local region-specific strategies and possibly inappropriate in other locations.

After assessing all the current initiatives, the **need becomes apparent for further research to assess the impact of ICTs on poverty reduction and the use and extent of online services**. This research will need to take into account the role of women, the poor, marginalized and the historically disadvantaged due to the potential policy implications that this may hold.

4.3 Drawing Out Lessons and Best Practices

Access Is More than Physical

When it comes to addressing the digital divide, providing access to technology is critical. However, too often "access" is defined only in terms of physical access to a computer or network connection. But computers and connections are not sufficient if the technology is not used effectively because it is not affordable to use, people do not understand how to put it to use, or they are discouraged from using it. Access must be considered in a much broader context to ensure that technology is integrated into people's lives. Specifically, true access is affected by the following factors: Computers and Connections, Capacity, Trust, Appropriate Technology, Content, Affordability, Local Economics, Legal and Policy Framework, Demographics, and Political Environment (see Table 6).

Table 6. What is *Real* Access?

Physical Access	**Is there physical access to technology?** People will only use technology if it is available within a reasonable distance from their home or work. A computer that lacks adequate power supply, connection (internet capabilities), and software will not be effective in helping people see the relevance of technology to their lives.
Capacity	**Do people understand how to use technology and its potential use?** People must be able to effectively use the technology. Further, it is essential that people understand the broader potential for technology applications, so users can be empowered to creatively apply the technology to other parts of their life.
Affordability	**Is technology affordable enough for people to use?** The cost of hardware, phone lines, electricity, internet connection, software, and maintenance must not be so expensive it excludes many people and organizations from using technology.
Trust	**Do people have confidence in and understand the implications of the technology they use**, for instance in terms of privacy, security, or cybercrime?
Relevant Content	**Is there locally relevant content in the local languages?** Content is only relevant when its substance is interesting to users given their culture background, and accessible given their reading, writing, and language skills.
Integration	**Does the technology further burden people's lives or does it integrate into daily routines?**
Socio-cultural Factors	**Are people limited in their use of technology based on gender, race, or other socio-cultural factors?** People are often excluded from using technology based on ethnic, gender, or other socio-culturally-based inequalities. These factors must be considered and addressed.
Appropriate Technology	**What is the appropriate technology that meets the needs and desires of people?** A wide variety of technologies are available. Policy makers and users must be able to critically assess which kind of technology is appropriate for the intended use.
Local Economic Environment	**Is there a local economy that can sustain its use?** The local economic situation will determine the level and frequency of technology use. Technology that can be used to foster economic growth will foster use in the community.
Legal and Regulatory Framework	**Do laws and policies foster technology use?** What changes are needed to create an environment that does?
Macro-economic environment	**Is national economic policy conducive to widespread technology use**, for example in terms of transparency, deregulation, investment, and labour issues?
Political Will	**Is there political will in the government to do what is needed to enable the integration of technology throughout society?**

Which aspects of access do current initiatives address?

	Physical Access	Capacity	Affordable	Trust	Relevant Content	Integration	Socio-cultural Factors	Appropriate Technology	Local Economic Environment	Legal and Regulatory Framework	Macro-economic environment	Political Will
Infrastructure	✓				✓		✓			✓		✓
Physical Access	✓				✓		✓			✓		✓
Training Programmes		✓			✓		✓			✓		✓
Telecentres	✓	✓	✓		✓	✓	✓		✓			✓
School Computer and Distance Learning	✓	✓	✓		✓	✓	✓			✓		✓
Online Information Resources			✓	✓	✓		✓					✓
E-Government	✓		✓	✓			✓			✓	✓	✓
E-Commerce				✓			✓		✓	✓	✓	✓
Health Care	✓			✓	✓	✓	✓	✓				✓
Agriculture	✓				✓	✓	✓	✓				
Other Applied ICTs	✓					✓	✓	✓				
Technology Development	✓						✓		✓		✓	

Table 7: Ground Level Initiatives versus Elements in *Real Access* To ICTs

It is especially important to find comprehensive solutions to disparities in ICTs because the effects of ICT exclusions are cumulative – the sum is greater than the parts. Professor James, drawing from Myrdal, states that the advantages of information technology are subject to "Cumulative Causation" – ie IT usage and growth builds in momentum over time, and the cumulative positive or negative factors listed above are greater than the sum of the parts. And countries like those in Sub-Saharan Africa are "locked in a cumulatively downward movement...in relationship to the global economy"(Juries).

The Digital Divide is Beyond the Scope of Any Single Initiative

While it is important for organisations doing community ICT projects to strive to meet their needs of their clients as comprehensively as possible, the issues in international and domestic digital divides are huge. It is simply not realistic for most individual projects to encompass all of the elements needed for people to make effective use of information technology. For example, a small NGO trying to use two-way pagers to help deliver remote diagnoses, should not spend their time learning the intricacies of trade laws that are blocking the import of the pagers. Likewise, a large powerful policy think tank may not have the immediate grassroots experience to understand the needs of local communities or the means to put their recommendations into place. A pooling of resources and established methods for information exchange and dissemination of information is needed.

Appropriate Technology, Appropriate Policy

Professor James emphasises the vital necessity of developing countries to develop and adapt technology to their own environments and local contexts. He states that ICTs (like any other technology) is developed "against a backdrop of ...a particular set of factor inputs, infrastructure, culture, legal and administrative systems, incomes, and so on"(James). The set of policy circumstances needed for effective application of the technology are its "technological package". In developing countries "major elements of the package...are sorely lacking", and thus are bound to be less effective at using developed world technology.

As a result, organisations working on the ground have to come up with innovative methods to route around current policies, such as was seen in the Manguzi Wireless Access project in South. The Information and Communications Unit of the CSIR (Centre for Scientific and Industrial Research) did just that in a project in Manguzi, a rural community in South Africa's KwaZulu Natal province.

The initial part of the project consisted of the establishment of a Telecentre in the centre of town. The community's desire was that the facilities offered at the Telecentre should be available to the largest possible audience, including school students. However, walking (cars are an extreme luxury, there is no public transport such as buses and trains, most people don't even own a bicycle) the 5km to the Telecentre on a regular basis was not practical. It was found that for various reasons the "normal" solutions (telephone, cellular telephone, VSAT, ISDN, Leased Lines, spread spectrum technologies) were not appropriate in this situation. An additional requirement was that the solution implemented should be cheap, suited to the specific regulatory and geographic environment, robust and suitable for a particular application, namely web browsing and e-mail. The solution implemented consisted of a combination of radio communication and satellite broadcast technology.

It must be noted that the South African policy and regulatory framework does not allow wireless data transmission across a public network. As a result, they partnered with an empowerment company that had been awarded a wireless licence as part of the National Lottery rollout, and were therefore able to operate under their licence, thereby adhering to regulations whilst circumventing the obstacles posed.[71]

A further South African example shows how handheld devices might be the most appropriate technology to be implemented whilst conducting fieldwork, due to the vast areas that need to be covered. Furthermore, touch screen technology for fieldworkers with low literacy levels would be most applicable. The Cyber Tracker field guide allows for efficient data capturing at a level not possible before.[72]

The Working for Water Programme are further exploring the possibilities of utilising this appropriate technology and type of software application in their fieldwork programmes that involve the eradication of alien vegetation from water catchment areas. These devices would be used to identify the tree before chopping in, as well as to record the catchment areas that have been cleared.[73]

While a few exemplar projects have succeeded, **there are too few examples of initiatives truly combining policy and physical projects**. Further development and experimentation is needed to discover how to empower local citizens, who are involved in ground level programmes, to bring their perspectives to the government and effect long term change.

[71] http://www1.challenge.stockholm.se/winners_index.html
[72] http://www.cybertracker.co.za
[73] http://www-dwaf.pwv.gov.za/Projects/Working for Water/

Healthcare Technology, not Healthcare or Technology

What must be the higher priority, treating malaria, or buying computers? We must get beyond this dichotomy and seek a more nuanced, honest solution, accounting the real trade-offs, and real opportunities of using technology to enhance existing services. If computers are not *used*, they are a waste of money; no amount of funds should be diverted from healthcare, environmental programs, and other vital sectors to them. However, if a particular application of information technology allows services to be delivered more cheaply, or enable better services, then they should be more closely examined. Some will still be too expensive to justify. However, programs such as Satellife provide a vital communications network between doctors, and a vehicle for information gathering and dissemination to improve healthcare. Nonetheless, Satellife and other such initiatives should not be valued because of the services *can* provide – they should be judged on whether they are used in practice and improve people's lives; and indeed they do.

When computers are pushed on a government, organization, or business for their own sake, everyone losses – we must strive to find appropriate applications of technology, and avoid panaceas on both sides. Computers alone are pointless; a real application of the technology that fits the needs and desires of a community, along with the training and sustainability to make it used for the immediate and long term, are essential.

These deeper issues are lost in the numbers. The most effective way to bridge the "digital divide", however you choose to define it, is to *use* the computers and not solely to count them.

Successful, Sustainable Initiatives

Unfortunately, providing access to ICT is necessary but not sufficient provision to ensuring the success of the initiative. The initiatives need to be sustainable for the benefits to be felt. The successful, sustainable initiatives that employ technology to improve people's lives meet a number of critical success factors in order to keep the project going:

1. funding
2. personalities and strength of implementers, champions
3. buy-in of public
4. ongoing technical support
5. good management
6. legal and regulatory environment
7. isolation – are they really learning from others
8. isolation – in partnerships
9. basic infrastructure (electricity, roads),
10. basic needs – literacy
11. appropriate technology to meet community needs
12. affordable, reasonably priced solutions
13. solving a real problem with technology
14. fit immediate needs of people (*food* before other long-term prospects)
15. replicability
16. sustainability
17. scalability
18. content and training
19. marketing strategy – awareness in community

5 Policy and Digital Divides

Economic growth and social equity are both needed to bridge international and domestic digital divides. However, no consensus exists on exactly what policies are needed for either of these goals. Governments face constituencies with radically different perspectives on how to bridge the divides, ranging from labour unions to international businesses to government regulatory agencies. Numerous governments, private businesses, civil society members, and international organizations have turned their collective attentions to bridging these divides, and have launched a variety of initiatives to shape policy. This chapter examines what policies are considered relevant to digital divides, summarize what policies are currently in place, and analyse current policy initiatives.

Summary of Findings

National governments can play a fundamental role in creating an environment that will foster technology use and encourage national and international investment in ICT infrastructure, development, and a skilled workforce. Government action is also important in spreading the benefits of technology throughout society, and governments have the power and mandate to balance the needs of their citizens for long-term economic growth and social prosperity. These goals are too often seen as contradictory and mutually exclusive

Real access **to ICT is affected by nearly all aspects of policy, ranging from digital signatures to collective bargaining and general macro-economic policies, which places "the digital divide" debate in a wider context.** Relevant fields of policy include:

- **ICT Infrastructure and Supporting Systems.** Policies that affect basic ICT infrastructure and its productive use in society, notably: Telecommunications Licensing and Regulation, Telecommunications Privatisation, Spectrum Allocation, Internet Domain Management, Banking and Financial Sector, Standards Setting, Customs Standardization.
- **Trust.** Policies that effect business, government, and consumer trust towards ICT and each other online, including: Electronic Signatures, Data Security, Cybercrime, Privacy, Intellectual Property, Regulation of Content, Consumer Protection.
- **Capacity Building.** Policies that build the necessary capacity to use ICT effectively, including Curriculum and Materials, Technical Education.
- **Taxation and Trade.** Taxation, tariffs and trade barriers, foreign direct investment.
- **Employment and Labour.** Collective Bargaining and Other Labour Policies, Brain Drain Counter-Measures.
- **Technology Diffusion.** Universal Service, E-Government, Private Sector and Civil Society ICT Use.
- **General Government.** Government Structure (e.g. democracy, transparency, independence of judiciary and regulatory authorities), Discrimination Policy.

Other major stakeholders and actors in the policy-making process include: a wide range of organizations and companies, including, international organizations (e.g. UN, UNCITRAL, ITU, World Bank, WTO, ICANN, W3C), consumer rights organizations (e.g. Consumers International, TransAtlantic Consumer Dialogue), regional Internet registries (RIPE, ARIN, APNIC), private businesses *(*e.g. Telecom companies, Internet service providers, Financial sector companies, Certification Companies), business forums (e.g. Alliance for Global Business, International Chamber of Commerce), and online rights organizations (e.g. Electronic Frontier Foundation, Privacy International, Global Internet Liberty Campaign).

The G8's DOT Force initiative is by far the largest, most clearly and comprehensively targeted at the digital divide, and most likely to impact on government policy.

Policy directions must be adapted to the local context. Often basic policy principles are agreed at the international level, or policies are transferred from highly industrialized countries to developing and emerging countries. The local context – in terms of local needs and skills and local political issues – has a significant impact on whether generally accepted policy reforms are actually adopted and put into practice. Even national governments that have the political will to drive change, often struggle with the process of putting policies into effect. Policies and processes that are grounded in real life experience, in local circumstances, based on real user needs, and addressing the multiple issues of *real access* to ICT have been more effective than those that have not.

5.1 Policy Goals (Perspectives)

Summarizes six common policy positions that influence government decision-making on digital divides.

Around the world, government policies on issues effecting digital divides are far from homogenous. In a single country, a web of interconnected and at times conflicting policies occurs because of the divergent needs of constituents inside and outside of government. The range of goals particular constituents have is beyond the scope of this paper; nonetheless, a quick look at common goals can help provide a foundation for understanding. The current debate surrounding ICT policy and digital divides involves as least six basic goals: **ICT sector growth** and policies specifically targeted for **e-commerce, online rights, worker's rights, ICT equity,** and a perspective focusing on **basic needs**[74]**.**

Note: while these stereotypical positions fundamentally disagree on a number of aspects described below (especially on privacy, cybercrime, and worker's rights), a few elements are common to all policy perspectives – including general governance issues such as transparency and democracy.

A. ICT Sector Growth

A commonly and often voiced perspective advocates that governments should woo businesses (especially foreign) to locate and remain in their country. This wooing entails lower tariff and non-trade barriers to encourage Foreign Direct Investment, weak labour unions to lower wages and encourage the recruitment and retention of businesses, rigorously enforced international Intellectual Property rules, a restructured banking sector to eliminate government support and other market distortions, deregulation and privatisation of state industries, raised government expenditure on technical education in schools, and lowered taxes[75]. Multinational businesses, business organizations such as the World Economic Forum (WEF), Global Business Dialogue (GBD) on E-commerce, international financial and trade institutions such as the World Trade Organisation (WTO), International Monetary Fund (IMF) and the World Bank, and many developed world governments espouse this view[76].

[74] These are gross generalizations, and individual stakeholders likely hold elements of each perspective.

[75] A country's "success" along this path is reported day-by-day according the amorphous concept of "investor sentiment", the capitalization of the country's stock market, the value of its currency, etc.

[76] A second perspective for ICT sector growth focuses on protection and encouragement of local ICT industries. Government is expected to use tariff and non-trade barriers to hinder importation of foreign ICT products, block significant foreign control of ICT companies, offer incentives to local ICT companies, allow reverse engineering and ignore international patents on technological processes, (and at times) disallow short term speculative investment and institute currency export controls. For example, Korea encouraged the creation of massive business conglomerates with the resources to compete internationally.

These two perspectives address the economic divide between countries but do not target the digital divide within the country. They may be combined with social-equity programs, but its proponents often portray ICT sector growth alone as the most important element in bridging the digital divide.

Example Proponents: WTO, World Bank, Business Forums (AGB), Regional Trade Bodies (APEC, FTAA)

B. Policies for E-Commerce

In addition to policies that encourage general ICT sector growth, a range of policies is geared specifically at developing e-commerce. Its proponents state that developing countries should embrace e-commerce to 1.) remain competitive and 2.) leapfrog over "existing development constraints" such as middlemen and extreme distance from "major markets". E-commerce proponents generally advocate the general policies for economic growth listed above, standardized customs procedures, minimal or no taxation on e-commerce, recognition of digital signatures as legally binding, and minimal restrictions on encryption.

Example Proponents: Asian-Pacific Economic Cooperation (APEC)'s E-commerce Steering Group

C. Online Rights

Online rights advocates focus on the consumer or end user of the technology and policies that protect their interests. They generally advocate comprehensive and strictly enforced privacy and consumer protection laws, strong encryption, independent regulatory authority and judiciary. Online rights advocates include those focused on civil liberties and on consumer rights.

Example Proponents: GILC, a coalition of online rights organizations. See their statement of principles at http://www.gilc.org/about/principles.html

D. Workers' Rights

Workers' rights advocates focus on the interest of workers, often on the workers in telecommunications industries. They generally resist telecommunications deregulization and privatisation in order to protect existing jobs, support collective bargaining and strong unions, and favour import controls such as tariffs for their industries.

Example Proponents: COSATU, South African trade union confederation. See their statement on e-commerce at http://www.cosatu.org.za/docs/2001/ecommgp.htm.

E. ICT Equity

Advocates of equitable access and use of technology across race, gender, geography, (etc) lines believe strongly in government policies for spreading technology such as universal service requirements, incentives to NGOs for ICT use and providing ICT services to underserved populations, strictly enforced and broadly defined anti-discrimination policies. Some also propose reserving sections of the spectrum for non-profit uses and provisions for public access TV broadcasting. Advocates of ICT equity often also advocate online users rights and worker's rights.

Example Proponents: Tele-centros, a network of Latin American access centres. See their "manifesto" at http://www.tele-centros.org/english/manifiesto/manif_en.html.

F. Basic Needs

A number of organizations are calling for governments to stop focusing on ICT and instead provide for the basic, more immediate, needs of their citizens. Organizations such as Jubilee 2000 state that some developing countries are faced with crushing debt burdens and other crises that make ICT a low priority. For example, a Jubilee 2000 press release reads, "An internet connection will not help them [the poorest people] survive malaria or TB. Of course information technology is important. But until they drop the debt, these G8 [digital divide] gestures are empty" (Jubilee).

5.2 Summary of Relevant Policies

International and domestic divides touch on many aspects of government policy – from digital signatures to collective bargaining and general macro-economic policies such as foreign direct investment controls.

This section will provide a brief list of how key policies can impact on the digital divide. This list is certainly not comprehensive, but aims to provide an introduction to the issues and indicate the vast complexity of the issues at the same time. More information on the policies, their potential effects on digital divides, and key stakeholders can be found in Annex 5.

List of Policies

1. Physical Access: Telecommunications licensing and regulation, telecommunications privatisation, spectrum allocation, standards setting, electronic signatures, collective bargaining and other labour policies, universal services, e-government, private sector and civil society use of ICT, discrimination policy.

2. Capacity: Technical education, curriculum materials, brain drain counter-measures, discrimination policy.

3. Trust: Electronic signatures, data security, cyber crime, privacy, content regulation, consumer protection, discrimination policy.

4. Affordability: Telecommunications licensing and regulation, telecommunications privatisation, Internet domain management, intellectual property, tariffs and trade barriers, foreign direct investment, collective bargaining and other labour policies, universal services, discrimination policy.

5. Relevant Content: Internet domain management, intellectual property, e-government, private sector and civil society ICT use, policy discrimination.

6. Socio-cultural Factors: Collective bargaining and other labour policies, e-government, private sector and civil society ICT use, discrimination policy.

7. Local Economic Framework: Telecommunications licensing and regulation, telecommunications privatisation, spectrum allocation, banking and financial services sector, customs standardization, electronic signatures, data security, cyber crime, privacy, intellectual property, content regulation, consumer protection, technical education, curriculum and materials, taxation, tariffs and trade barriers, foreign direct investment, collective bargaining and other labour policies, brain drain counter measures, private sector and civil society ICT use, government structure, discrimination policy.

8. Macro-economic Environment: Customs standardization, taxation, tariffs and trade barriers, foreign direct investment, collective bargaining and other labour policies, discrimination policy.

9. Political Will: Government structure, discrimination policy.

5.3 Current and Planned Policies

Most countries have a web of interconnected and at times contradictory policies relating to ICT. Chapter 3 reviewed surveys of current policies and a few conclusions that are common among most policy surveys are described below.

First, a real divide exists for policies that encourage ICT use, but that divide differs depending on the survey's goal (ie ICT growth and e-commerce, workers' rights, online rights, ICT equity). Each policy survey inevitably concludes that some of a government's ICT policies are lacking, but urge the governments towards different actions, depending on the author's policy perspective. Secondly, each country has a unique set of ICT policies, some of which are rating "poorly" while others are rated "highly".

North American, Western European, Central and Eastern European countries, and a number of Pacific, Asian and Latin American countries receive mixed reviews. African and Middle Eastern countries are considered to be far behind in policies needed to bridge international and domestic digital divides. There are numerous exceptions, and 'strength' in one policy arena is often accompanied by lower ratings in many others.

More often than not, policies written many years ago for different purposes are being applied to ICTs out of necessity. As the Internet Law Policy Forum (ILPF) states, "The majority of countries with laws on electronic authentication have not yet developed detailed standards, although a number are working on them." Similarly, in Dec 2000, McConnell International found that 33 of 52 countries surveyed had not updated their crime laws to cover cyber crime and only 9 had substantially updated their laws. Often legacy laws have not been tested in court for electronic circumstantiates, and thus their effects are unknown (McConnell 2000a). McConnell and the ILPF also note that when new policies are adopted, there is little global consensus and interoperability (McConnell 2000a), which could "could lead to a Babel that imperils international legal interoperability (ILPF)."

Therefore, what truly matters is not what policy is currently on the books, but how existing policies are interpreted, and how informed implementers are about ICT issues. This process can lead to radically different results – the stereotypical example is taxation, and whether e-commerce should be taxed and what jurisdiction receives the revenue. The result is often a jumble of conflicting actions by different regulatory agencies, departments and courts. Current ICT policy initiatives are an attempt by government to set a coherent agenda and provide its various departments with a clear mandate.

While current policies can be used for some aspects of ICT policy, others that are required but lacking are causing an increased international or domestic digital divide. One example is Internet Domain Management – according to AfriDNS, there are a number of countries with no registrar for their top-level country codes (http://www.afridns.org/). Similarly, a number of policies for e-commerce, that many believe are necessary for significant growth, are lacking throughout the world (eg ILPF).

In the face of the complicated landscape of current policies and policy goals, detailed case studies provide the most valuable tools to critically analyse what policies should be reformed. More importantly perhaps, a good case study details the needs of stakeholders and clients governments seek to balance as they plot their course. USAID's case study method can provide this necessary information (see the Annexes below for links to their current survey's). As a further example, see bridges.org's brief study of the South African telecommunications sector, attached at Annex 8.

5.4 Analysis

Impetus of New Initiatives

New digital divide policies are being adopted because of pressures from within and outside of government. Sample impetuses of policy change are trade agreements (such as the TRIPS agreement), EU ascension requirements, high-publicity incidents (such as the inability to prosecute the "Love Bug" virus author in the Philippines[77]), loan or other aid criteria (eg by IMF, World Bank), and various internal constituencies within governments and countries (eg telecommunications departments and unions).

These new initiatives are drawing from existing resources on digital divide policy which include:

- **e-assessments**, such as APEC's e-commerce assessment, and USAID's case studies. See the Annex 3 for information on e-assessments; more information is also available at www.bridges.org/ereadiness/
- **model laws**, such as UNCITRAL's Model Law on Electronic Commerce, available at http://www.uncitral.org/en-index.htm
- **position papers and reports** on specific issues, which encompass considerable diversity of perspectives and topics. Examples are tele-centros.org's call for government support of Non-profit organizations working on the digital divide[78], to Telkom (South Africa)'s request for a continued VANs[79] monopoly to support universal service provisions. See the "Resources" Annex below for sample position papers;
- **private sector consultations**, such as the correspondence between President Obasanjo of Nigeria and Microsoft Chairman Bill Gates over Nigerian IT development. Microsoft will provide further advice to Nigeria in the future (Famakinwa).

The legal and regulatory environment surrounding the use of ICT is complex. Many developed countries are struggling with drafting and implementing laws governing their use, and there are conflicting views on the merits – or otherwise – of some of these laws. Developing countries need a source of unbiased guidance on the way ahead, which is technology neutral and does not subscribe to a course which is biased towards any nation or group of nations.

Policy and International versus Domestic Digital Divides

Do policies aimed at bridging the divide between countries exacerbate domestic digital divides? Unfortunately, no one knows. Adoption of ICT in developing countries may expose and increase existing inequality, as was described above. If these ICT sector and e-commerce policies are pursued alone, then yes. If they are coupled with policies for consumer trust and protection, and spreading ICT to underserved areas, then no.

What effect will these policy initiatives actually have?

Some policy initiatives are likely to have a much greater effect than others. The DOT Force's recommendations are expected to have wide-ranging impact on G8 policy. The IMF and World Bank have had significant impact on policy throughout the developing world by making continued loan aid contingent on the country adopting desired policy changes. The WTO has also had wide ranging effects on policy, by directly overruling national government policies and governments rewriting policies to be in line with GATT treaties.

Smaller, policy advocacy drives are likely to have far less success. Scott Robinson notes the difficultly of impressing change on regulatory bodies. In Latin America, he says, "national regulatory commissions are beholden to their clients: the carriers and their associated portal players", and ignore

[77] See McConnell International, "Cybercrime and Punishment".
[78] http://www.tele-centros.org/english/manifiesto/manif_en.html
[79] Value added network services. See www.telkom.co.za

NGO and public calls for equitable reforms. "One option to counteract the closed-shop script now in effect involves using existing international organizations, such as the Internet Society, to create countervailing pressures and credible policy proposals difficult to ignore by all of the institutional and corporate actors involved"(Robinson).

The policy initiatives most likely to succeed advocate ICT growth[80] and e-commerce. Domestic digital divide programs, especially significant government intervention to spread ICT equity, online rights, and workers' rights seem less likely, unless the DOT Force takes a strong stance on domestic digital divides or social movements such as the anti-corporate globalisation movement force policy changes. We must then ask - what effect will these economically oriented policies have on the domestic digital divide?

[80] Often through a wider package of globalisation

5.5 What is Missing?

Detailed and comprehensive information on ICT policies around the world is lacking, as the Internet Law and Policy Forum plainly states for the (relatively) narrow issue of electronic signatures: "Information about them is often difficult to come by" (ILPF).

A balanced approach: practical use of technology, taking user needs into account.
In addition to the generalized categories above, there are a vast number of policy perspectives in between which attempt to balance the needs of each community. Some proponents of this pragmatic approach argue for slow deregulation and privatisation with reassignments or retraining of lay-off workers, universal service provisions, overall phasing-out of trade barriers with slower removal on key industries, etc.

While there are a large number of ground-level "digital divide" initiatives, their are far fewer organizations and initiatives devoted to the long term policy issues of digital divides. There is a significant push for e-commerce policy, but that is only one aspect of digital divides – economic growth in the ICT sector and ICT-enabled companies. As the "ground level efforts" section shows, e-commerce is an important component, but it is inappropriate for many small businesses other potential users of technology. Similarly, there are a number of narrow programs focussed on cryptography policy, security law, etc. A broader approach is needed in developing countries.

Country specific assessments are needed, together with a detailed understanding of the local political, economic and social environment. And, governments should be very clear on their goals. Bridging digital divides should not be a government's only priority, there are other, more critical issues to address in the developing world.

Ground level and policy level are inexorably linked. Policy has ultimate control over the digital divides; including the success and failure of ground level projects. Governments can also learn from the needs of ground level initiatives, and ground-level initiatives can provide the necessary feedback on how policies are actually occurring in practice, and how they affect real people.

What is the role of the international organisations? What mandate do these organisations really have, and how can their *recommendations* be implemented? The developing world already views some of these initiatives with suspicion, perceiving a hidden agenda to promote particular technologies or regulatory regimes. And do they really represent the views and interests of the developing nations? In many cases the developing nations are underrepresented, or not represented at all, and they dislike being told what to do by their more affluent neighbours. If they are to develop effective policies for ICT integration they need a forum where they can consult, exchange views and be given practical, neutral advice.

6 Conclusions

Recognizing the Divides

There are real disparities between countries and socio-economic groups that are benefiting from information technologies, and those that aren't. While information technology use is growing around the world, and some indications show that divides within highly developed countries are shrinking, the disparities between countries and many domestic disparities, especially in the developing world, are growing. Whether or not one chooses to label these disparities as a "digital divide" is immaterial; the disparities remain and as societies and countries we have the availability to address them, if we choose.

The full extent of this growing exclusion is lost when one looks only at the number of people using PCs or the Internet. Computers sit in classrooms and closets around the world, unused because teachers don't have the training and support to use them. Knowledge of English is virtually required, and most content on the Internet is both in English and US-Centric. Most current information technologies are simply not relevant to people's lives; even in the US 25% of the population has no intention of getting access to the Internet (Pew). Information technology must be made *relevant* and *appropriate* to truly give people the ability and choice to use it.

These disparities are not simply developing world – developed world divides, nor is any country completely unprepared to use technology. E-readiness assessments depict a far more complicated picture, where all countries have some pieces in place, and others are lacking. The cumulative effect of many "missing pieces" for effective ICT use builds to form the "digital divide".

ICT Growth and Equity

The stark reality is that ICT usually benefits privileged communities first – those that have the education and resources to afford the technology and the skills to use it. Since ICT skills can lead to higher paying jobs and opportunities, ICT is exacerbating existing inequalities. Likewise, companies with the resources to take advantage of ICT are often larger companies or branches of foreign multinationals. These companies are increasingly enabled to reduce internal costs and coordinate dispersed offices and operations, and thus beat or buy out their smaller, domestic competitors.

None of this is necessary, however. ICT exacerbates inequality only when the privileged gain effective access to them and others do not, or receive only minimal access. If no other lesson comes out of this report, it should be clear that ground level efforts and government policy are fundamental to changing the status quo and spread the benefits of ICT. Only with a concerted effort will the potential of ICT impacts on and improve people's quality of life, whether they are underprivileged or not.

A Confluence of Factors

Three factors interweave throughout our understanding of the digital divides, each of which are necessary to an eventual solution, but fundamental to its causes. Ineffective or insufficient government policy, development initiatives, and market expansion have led to the well-known divide

between the information “haves” and “have-nots”. Development initiatives[81] have been essential to providing basic access to underserved populations, but have failed to provide sustainable, replicable models for community ICT use, and often err with top-down approaches that are not grounded on the needs, interests, and active direction (or even participation) of local residents. Government policy has often tried to meet the short term demands of their constituencies, but failed to provide a coherent long term plan for prosperity, or hindered the efforts of development initiatives and private sector markets to address ICT disparities. The private sector has slowly spread the technology to middle income groups, but on the whole has, failed to see the developing world and underserved populations as valuable markets which require targeted products, thus exacerbating existing inequalities. Together, the three have provided pieces of the puzzle including valuable practical experience in ICT usage, but failed to provide *real access* in society, and the *economic growth* needed to fuel further access.

At the same time, each factor offers hope for bridging the divides with effective, practical applications of technology. Government policy can enable and foster ICT growth in existing industries with prerequisite laws on electronic signatures and customs standardization. At the same time, governments have the power and responsibility to balance the needs of their constituents, and spread effective ICT use with universal service provisions, training programs, and incentives for local content preservation and development. Development oriented telecenters such as LINCOS and online advocacy resources such as Banglarights.net have made a real impact in the lives of many poor citizens. Market based initiatives such as Grameen's micro-lending and Vodacom's Pay-as-you-go phone services have shown that targeted programs can provide infrastructure and access to reach increasingly wide audiences, if companies are willing to think creatively.

However, without all three threads, the tapestry will unravel. Without the entrepreneurship of individual operators of Senegal telecenters spreading technology to middle income groups, and government policy encouraging and supporting equity, development initiatives face insurmountable tasks and no funding to finance them. Without basic electrical and telecommunications infrastructure programs and universal service initiatives by government, ICT companies will have little incentive to develop new products to meet the needs of people who cannot use nor afford their products. And, government policies are useless without ground-level programs to take advantage of them.

Looking into the future

Forecasting international and domestic digital divides is impossible without looking to the interplay of government policy, ground-level development efforts, and market driven growth. While reports and studies abound about the future of the digital divide, and their projections are as varied as the authors, no one really knows what will happen. Current projections are based on the status quo, and they paint a dismal picture – disparities between the information “haves” and “have-nots” will grow, between countries and especially within countries. Unless policy makers, development initiatives, and corporate executives choose to find more creative ways to apply information technology cheaply and usefully, then the gap will continue to grow.

[81] Whether by "development agencies" such as USAID, national governments, or private sector donation / corporate responsibility programs

Annexes

1. Perspectives on the Digital Divide

The 'digital divide' is a hotly debated topic, laden with proponents' divergent goals and perspectives. Definitions range from the very narrow "the digital divide is the lack of access to computers between racial groups" to a wide definition including training, meaningful content, and cultural norms that facilitate effective use between regions, age groups or genders. This report does not claim to have the definitive definition, any more that it has the definitive solution. Instead, we present current digital divide perspectives, statistics and initiatives, so readers can draw out the information that they find relevant. Nonetheless, understanding how another person views the digital divide is a key to understanding and critiquing their argument. Therefore, this section will briefly review how the digital divide is defined, and why people believe it came into being.

Defining the Digital Divide

There are five basic perspectives on what the digital divide is and how to solve it, which focus on various elements of ICTs and ICT use:

1. *the digital divide is a lack of physical connections and training* – computer hardware, network access and (in some arguments), training, is required to bridge the digital divide - government, NGO and private initiatives should supply them;

2. *the digital divide is a lack of computers, access and training, but the problem will solve itself in time* – computer hardware and network access are required, but the market and selective development projects will solve this problem on its own by steadily lowering prices, fostering an IT training sector, and extending infrastructure to outlying regions (for example, see Singleton and Mast);

3. *the digital divide is a lack of computers, access and training, exacerbated by ineffective government policy* - government actions (or inaction) hinder the development and use of computers and until these policies are changed, the digital divide cannot be solved;

4. *the digital divide is a lost opportunity, with disadvantaged groups being unable to effectively take advantage of ICTs to improve their lives* - what really matters is how the technology is used, and its incredible potential to improve quality of life for disadvantaged groups; effective use requires computers, connections, training, locally relevant content, and real applications of the technology to fit immediate needs.

5. *the digital divide is a reflection of the lack of basic literacy, poverty, health and other social issues* – computers are useful, but nothing will enable a society to bridge the digital divide until basic literacy, poverty, and healthcare issues are addressed.

Additionally, any particular author may focus on international (between country) or domestic (within country) digital divides.

Why does the digital divide exist?

Another way to understand the perspectives on the digital divide is to look at why people believe it exists and how they believe it can be addressed[82]:

- *The digital divide comes from the normally slow diffusion of new technologies* The digital divide is the natural and expected result of wealthier people and countries experimenting with and adopting technologies because they have disposable income. Such "divides" have occurred with every major technology including car, radio, television, and telephone. Over time, the divide closes as the technology becomes less expensive and more tested. To quote the US Internet Council's 'State of the Internet 2000', "But like any new technology, this rapid global dissemination has been far from uniform. A map of Internet users and innovators quickly reveals a stark global North-South divide. The Internet has planted deep roots in the regions that encouraged and fostered its early growth. Not surprisingly, these regions are also the world's wealthiest (chapter 1, p1)."

- *The digital divide occurs because people don't know how to use the technology, or it is not made relevant to their lives* - Even when people have access to information technologies such as the Internet, they often do not have the training to use them, do not have relevant and interesting content or they are blocked by cultural and political mores against using it.

- *The divide mirrors the existing landscape of technology infrastructure and wealth distribution* - Countries that do not have literacy and electricity are simply unable to effectively adopt information technology. Moreover, countries in extreme debt are unable to finance technology investments. Countries that are slow to adopt precursors and prerequisites for information technology face a playing field sloped against them, such as African countries not adopting electronic switching networks[83] (James) [84].

- *The digital divide results from the real difficulties in "rolling out" the technology around the world* - The rural-urban divide especially (which occurs around the world) is caused in part by the inherent difficulty of providing network access, let alone electricity, in extremely rural regions.

- *Government policies have failed to support, or even discouraged information technology growth, exacerbating the digital divid*e - Many also point to weak or poor government policies and a woefully inadequate response to the opportunities and demands of information technology (eg: James, 1999, p91). However, there is considerable debate over what "the right policies" are - as we examine later in the report.

- *The digital divide is a matter of personal choice* - Some people simply don't want to use information technology and thus the "digital divide" is partly an illusion. Robert Crandall of the Brookings Economic Studies programmme states that while income levels are a major factor currently in the divide, these issues will fade over time as the market continues to push down computer and access prices. Yet, a divide may remain - because of individual family choices. There are natural, cultural gaps in consumption, according

[82] For another approach to understanding how organizations view the digital divide, see Wilson, "Closing the Digital Divide: An Initial review" at http://www.internetpolicy.org/briefing/ErnestWilson0700.html

[83] Note the "necessity" of such technologies is, of course, in hindsight. There are still some debates on the value of current technologies such as broadband (Cunningham), which may be considered "prerequisites" in the future.

[84] There is at least one notable exception to this technological determinism though - the belief that countries can "leapfrog" other countries by jumping to a new technology while "more advanced" countries have to spend valuable time and energy revamping their existing systems. Some believe that this occurred with the rapid adoption of electronic switching technology among the newly industrializing countries of East Asia (James 17), but leapfrogging has been an often anticipated, but rarely materializing spectre.

to Crandall (p40). This is backed up by a recent Pew study stating that roughly 50% of Americans are not online and half of them do not want to be. 25% of the population does not see the utility of computers or finds them too expensive to warrant the purchase. Those who hold this view are on average disproportional older - creating the 'age divide'.[85]

[85] While they may be short-sighted, Crandall states "households can choose for themselves" (Crandall p40). Similarly, while telephone prices are well within poor families' means, a higher portion of Hispanic families choose not to have a fixed-line telephone than white families of the same income.

2. Statistics Used to Measure the Digital Divide

Below is an overview of the statistics that are commonly used and what they measure:

Measure	Description
Teledensity	The number of telephone lines per square mile (or km) or per person. Can be used for fixed-line or mobile phones. Used to measure overall technological sophistication, and as a prerequisite for ICT use.
Number of PCs	Statistically sampled or estimated by sales figures. Used to gauge the digital divide of "access" to ICTs.
Number of Web Sites (by country only)	The number of unique DNS (Domain Name Service) entries. Used to gauge local IT sector growth, and "amount of local content ". There is no accurate way to tell where a host is located in the world. So researchers use mainly two methods to guess where the computers are[86]: • The domain of the website according to their country-specific domain (.za, .fr, .us), and estimates on where websites with "generic domains" (.edu, .com) originate. • The address of the owner of the website in international registries, and the country-by-country allocation of large blocks of IP addressees.
Number of Internet Hosts (by country only)	The number of computers connected to the Internet with static addresses. This count misses computers in large organizations behind firewalls, and individual users dialling up to ISPs (Internet Service Providers); some researchers try to estimate these numbers. It is impossible to know where hosts are in the world, so this is estimated. Used to gauge the "access" to ICTs and the number of actual users of ICTs.
Number of Internet Users	Estimated via statistical sampling and aggregating various smaller, country specific surveys, or by guessing the number of users by the number of ISP accounts, Internet hosts, PCs, overall literacy, etc. Used to gauge how many people are actively using ICTs.
Bandwidth	The quantity of information that can travel from one location to another on the network (per second). Technologies such as modem dialup, ISDN (Integrated Services Digital Network), DSL (Digital Subscriber Line), Cable Modems, Fibre Optics offer increasing levels of bandwidth. Because of the structure of the Internet, more bandwidth often means higher access speeds. Used to gauge "speed" and "quality of access" to ICTs.
Language of Users	Estimated by the number of users per country[87] and the distribution of languages in the country. This assumes there is a relationship between the languages in a country and who is online (a circular problem).
Language of Websites	Estimated via sampling of websites and direct counting. Also used to gauge "language of users", relevance of content and usefulness of ICTs.
Size of ICT Sector	Judged by % of GDP generated in ICT sector, number of jobs, % of exports that are ICT products.

Most of these statistics are gathered on a country or regional basis, or along demographic lines such as race, gender, age, disability status, and income. Whenever a "digital divide" statistic is cited, consider whether it is meant to measure the divide between countries or within countries. Unfortunately, detailed demographic information is extremely difficult to gather, and often does not exist for countries in the developing world.

[86] For more information on Network metrics and their difficulties, see Telegeography's "Hubs And Spokes", pg 96.
[87] which has many difficulties of its own

3. Reports Measuring the Digital Divide

Below is a partial list of sources for statistics, policy surveys, and e-assessments. Additional resources, including position papers, can be found in Annex 7.9

A. Statistics

General Economic Statistics

- International Labor Organization, World Employment Report
  http://www.ilo.org/public/english/employment/strat/stwer/
- International Telecommunication Union, World Telecommunication Indicators 2000/2001
  http://www.itu.int/ti/publications/wti2000-01/index.htm
- International Telecommunication Union, Yearbook of Statistics 2001
  http://www.itu.int/ti/publications/YB2001/index.htm
- OECD Communications Outlook 2001
  http://electrade.gfi.fr/cgi-bin/OECDBookShop.storefront/EN/product/932001021E1
- World Bank "World Development Indicators"
  http://www.worldbank.org/data/wdi2001/index.htm
- World Bank online statistical database,
  http://devdata.worldbank.org/data-query/
- World Bank "World Bank Development Report 2000/1"
  http://www.worldbank.org/poverty/wdrpoverty/
- World Bank "Knowledge Assessment Matrix" (aggregation of 61 statistics),
  http://www1.worldbank.org/gdln/kam.htm

Internet Specific Statistics

- Connectivity in Africa
  http://www3.sn.apc.org/africa/
- Internet Software Consortium, Distribution of Top-Level Domain Names by Host Count
  http://www.isc.org/ds/WWW-200101/dist-bynum.html
- ISP World's ISP Statistics
  http://www.ispworld.com/src/ISP_Statistics.htm
- Global Diffusion of the Internet Project
  http://mosaic.unomaha.edu/gdi.html
- Netcraft, SSL Server Survey
- http://www.netcraft.com/surveys/analysis/https/2001/Jan/CMatch/index.html
- NetSizer - Number of Hosts and Users
  http://www.netsizer.com/
  http://www.netsizer.com/daily/TopCountry.html - "Table of Hosts by Country"
- Nua Internet Survey - Number of Users
  www.nua.ie/surveys/how_many_online/index.html

ICT and Digital Divide Reports

- Center for Democracy and Technology's "Bridging the Digital Divide: Internet Access in Central & Eastern Europe"
  http://www.cdt.org/international/ceeaccess/
- Crenshaw and Robinson of Ohio State University's Digital Divide Research
  http://www.acs.ohio-state.edu/units/research/archive/interdev.htm

- International Telecommunication Union, "Challenges to the Network: Internet For Development". Oct 1999. http://www.itu.int/ti/publications/INET_99/ExeSum.htm
- Jeremy Grace, Charles Kenny and Christine Qiang with Jia Liu and Taylor Reynolds. "Information and Communication Technologies and Broad-Based Development: A Partial Review of the Evidence." February 2001 http://www.worldbank.org/ict
- OECD, Access Costs in OECD Countries: http://www.oecd.org/dsti/sti/it/cm/prod/localaccess.htm
- OECD "Measuring the ICT Sector" 2000, http://www.oecd.org/dsti/sti/it/prod/measuring_ict.htm
- OECD "Understanding the Digital Divide", http://www.oecd.org/dsti/sti/prod/Digital_divide.pdf
- Rodríguez, Francisco and Ernest J. Wilson, III. "Are Poor Countries Losing the Information Revolution?". http://www.infodev.org/library/working.htm
- Pew Internet and American Life Project "Who's Not Online" by http://www.pewinternet.org/reports/toc.asp?Report=21
- US Department of Commerce, National Telecommunications and Information Administration, "Falling Through the Net" series, http://www.ntia.doc.gov/ntiahome/digitaldivide/index.html
- US Internet Council, "State of the Internet Report 2000", www.usic.org.
- World Bank, Global Information and Communication Technologies Department, , "The Networking Revolution, Opportunities and Challenges for Developing Countries", June 2000. http://www.infodev.org/library/working.htm

B. Policy Surveys

Digital Signatures

- "Analysis of International Electronic and Digital Signature Implementation Initiatives" http://www.ilpf.org/digsig/analysis_IEDSII.htm
- "Digital Signature Law Survey" http://rechten.kub.nl/simone/ds-lawsu.htm

Cryptography

- "Cypto Law Survey" http://cwis.kub.nl/~frw/people/koops/lawsurvy.htm

Anonymity

- "Anonymity Law Survey" http://rechten.kub.nl/anonymity/index2.htm

Privacy

- EPIC and Privacy International's Survey of 50 Countries' Privacy laws http://www.privacyinternational.org/survey/
- Privacy Dossier (in Dutch) http://www.privacydossier.nl/
- Consumers International's Privacy@Net http://www.consumersinternational.org/news/pressreleases/fprivreport.pdf

Data Security and Cybercrime

- Security Law Project http://www.mcconnellinternational.com/services/securitylawproject.cfm

Competition Law

- "The APEC Competition Policy and Law Database" http://www.apeccp.org.tw/

Intellectual Property and Copyright Law

- "International Copyright Law" http://www.lawresearch.com/V3/ctcopy2.htm

General Online Rights

- Association for Progressive Communications' "Internet Rights Policy Monitor" http://www.apc.org/english/rights/monitor.htm

Consumer Rights

- "Consumer Protection in the Electronic Marketplace" http://www.giic.org/focus/ecommerce/consumer.html

Freedom of Speech

- "Enemies of the Internet: Obstacles to the free flow of information on the Internet" http://www.rsf.fr/uk/homennemis.html

Private Sector Policies

- The Privacy Practices of Web Browser Extensions (by the Privacy Foundation) http://www.privacyfoundation.org/advisories/advbrowserext.htm

General Policy Resources

- Links to Policy Information http://www.internetpolicy.org/research/directory.html

C. E-Assessments

E-assessments often measure both policies and ground level use of ICTs to gauge how prepared an economy or society is to benefit from information technologies. The information below is drawn from bridges.org's survey of e-assessments, available at www.bridges.org/ereadiness/.

Statistical or Questionnaire Based

- **Allen**
  - **Author:** Allen E-Commerce Preparedness Index
  - **Source:** http://www.noie.gov.au/projects/information_economy/ecommerce_analysis/eCommAust/executive.htm.
  - **Description:** Detailed study of (Australia's) preparedness for e-commerce.
- **APEC**
  - **Author:** Asian Pacific Economic Cooperation (APEC) Electronic Commerce Steering Group
  - **Source:** The assessment tool can be found at http://www.ecommerce.gov/apec. There is no central listing of assessments conducted using the tool, and likely many more assessments have been conducted than are listed here. The Hong Kong report can be found at http://www.info.gov.hk/digital21/eng/ecommerce/ec_assessment.html.
  - **Description:** These assessments gauge a country's readiness for e-commerce through a detailed questionnaire, focusing especially on import-exports and policy.
- **CID**
  - **Author:** The Center for International Development at Harvard and IBM.
  - **Source:** The assessment tool can be found at www.readinessguide.org. The reports themselves are not currently available online. People can email with questions regarding these assessments to eDevelop@ksg.harvard.edu.
  - **Description:** Assessments categorize countries along four stages of development for each of 19 categories, focusing on technology infrastructure, pervasiveness of technology, and the regulatory and business environment.
- **CIDIF**
  - **Author:** Centre International pour le Dévelopement de l'Inforoute en Français
  - **Source:** http://www.cidif.org/diffusion/.
  - **Description:** A French organization's adaptation of Mosaic's Questionnaire (see "MQ")
- **CSPP**
  - **Author:** Computer Systems Policy Project (CSPP)
  - **Source:** The assessment tool and a short list of US communities using it are available at http://206.183.2.91/projects/readiness/. The international assessments are not available online.
  - **Description:** Assessments rate communities along four progressive stages of development for each of the five categories, focusing on existing infrastructure and the pervasiveness of technology in society. Based on a 23 question questionnaire.

- **EIU**
  - **Author:** The Economist Intelligence Unit - E-Business Readiness
  - **Source:** http://www.ebusinessforum.com/index.asp?layout=rich_story&doc_id=367&country_id=VN&channelid=6&categoryid=20&title=Introducing+the+EIU%27s+e%2Dbusiness%2Dreadiness+rankings+World
  - **Description:** Gauges countries "e-business environment" and network "connectivity" with two 1-10 statistics, based on "70 different indicators such as the strength of the economy, the outlook for political stability, the regulatory climate, taxation policies and openness to trade and investment."
- **Knowledge Assessment Matrix**
  - **Author:** World Bank, Knowledge Assessment Matrix
  - **Source:** http://www1.worldbank.org/gdln/kam.htm
  - **Description:** A very detailed statistical assessment of country's preparedness for information economy and society using 61 metrics on the "economic and institutional regime", "educated and skilled population", 'dynamic information infrastructure", and an "efficient innovation system of firms, research centers, universities, consultants".
- **McConnell International**
  - **Author:** McConnell International and the World Information Technology and Services Alliance (WITSA)
  - **Source:** The assessments can be found at http://www.mcconnellinternational.com/ereadiness/default.cfm.
  - **Description:** Countries are rated in the five categories including infrastructure and access, government policies, ICT education, and business climate, on a scale of one to three ('blue,' 'amber,' 'red'), and extensive analysis and recommendations are given.
- **Metric-Net**
  - **Author:** Metric-Net E-Economy Index
  - **Source:** http://www.metricnet.com/specials/GNEImain.html
  - **Description:** Statistics on country's technological sophistication and strength using metrics of "Knowledge Jobs", "Globalization", "Economic Dynamism and Competition", "Transformation to a Digital Economy" and "Technological Innovation Capacity"
- **Mosaic Group, Questionnaire**
  - **Author:** The Mosaic Group
  - **Source:** http://som.csudh.edu/fac/lpress/gdiff.
  - **Description:** A questionnaire based assessment by Mosaic, much less detailed than their case studies but covering the same issues (pervasiveness, geographic dispersion, usage within the economy, technology infrastructure, the Internet service market, and sophistication of use).

Case Study E-Assessments

- **Mosaic**
  - **Author:** The Mosaic Group
  - **Source:** http://mosaic.unomaha.edu/gdi.html
  - **Description:** Detailed case studies of the state of the Internet within a country at a particular point in time, measuring pervasiveness, geographic dispersion, usage within the economy, technology infrastructure, the Internet service market, and sophistication of use.
- **IED**
  - **Author:** USAID's Presidential Internet for Economic Development Initiative (IED)
  - **Source:** http://www.usaid.gov/info_technology/ied/
  - **Description:** Case studies of countries using a framework of "Pipes (Access), Public Sector (Government Policies, E-Government), Private Sector (Usage), People (Training), and existing development Programs".

- **USAID**
  - **Author:** U.S. Agency for International Development
  - **Source:** Central and Eastern Europe reports are easily available at: http://www.usaid.gov/regions/europe_eurasia/eeresources.html#IT
  - Other reports can be found through: http://www.usaid.gov/regions/
  - **Description:** Detailed case studies of countries using a framework of "Pipes (Access), Public Sector (Government Policies, E-Government), Private Sector (Usage), People (Training), and existing development Programs", with detailed action plans for countries to pursue in the future.

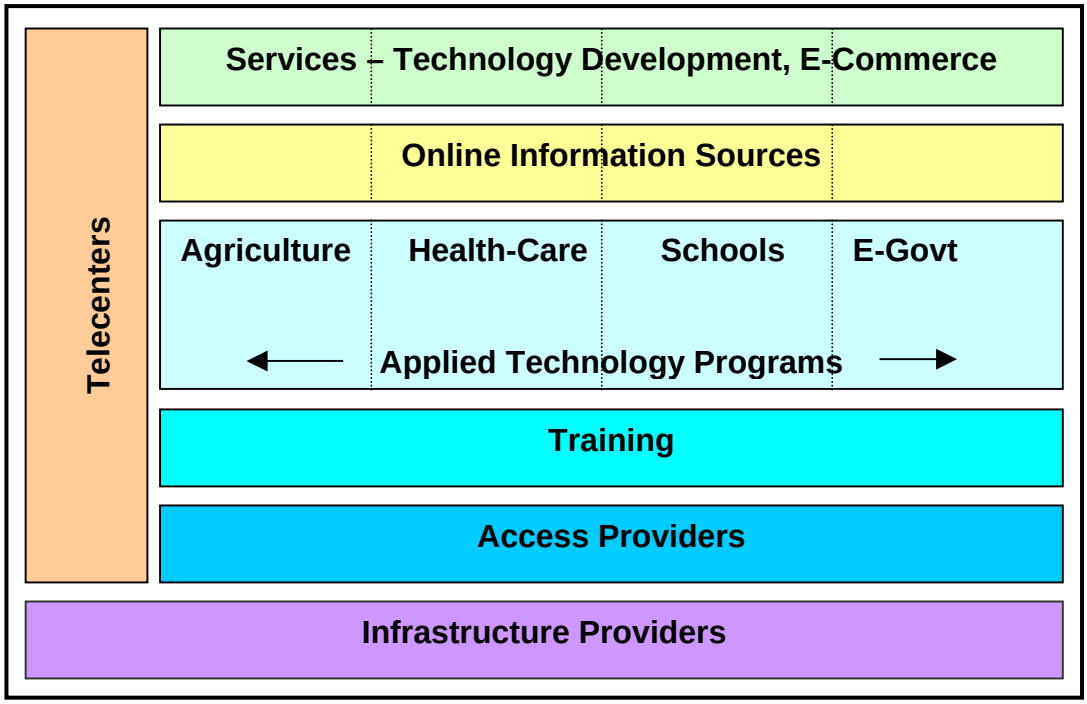
4. On the Ground Initiatives in the Developing World

The following common categories are applied to the numerous initiatives that address international or domestic digital divides. The sections below list initiatives of each type.

1. Infrastructure providers
2. Physical access providers
3. Training programmes
4. Telecentres
5. School computer programmes and distance learning programmes
6. Online information resources – relevant content
7. E-government
8. E-commerce
9. Healthcare
10. Agriculture
11. Other applications of ICT
12. Technology development

The on-the-ground initiatives relate to each other in the following manner, where programs at the top of the diagram require or build upon programs lower on the diagram:

How Digital Divide programs relate to each other



A. Infrastructure

- **Africa ONE.**
  Private sector. Africa.
  Connectivity via undersea fibre optic network for Africa.
  http://www.africaone.com.
- **Telkom.**
  Parastatal. Africa.
  South African fixed-line carrier, undergoing deregulation.
  http://www.telkom.co.za.
- **Warsun4Africa.**
  Private sector. Africa.
  Satellite and wireless technologies to provide cheaper access to Internet infrastructure for schools, business, ISPs.
  http://www.warsun.com.
- **Averroes.**
  Government. Europe.
  Program has set up a telematic network in Andalucia (Spain) for schools to source teacher training, access online educational material, and student participation.
  http://averroes.cec.junta-andalucia.es.
- **Satellife.**
  NGO. Global.
  Provides satellite, telephony and Internet for health-care partners information and communications needs.
  http://www.healthnet.org.
- **Celcom.**
  Private sector. Asia.
  Malaysian fixed and mobile carrier, providing multi-media services.
  http://www.celcom.com.my.
- **Vodacom**
  Private sector. Africa.
  Mobile carrier in South Africa. Promotes Vodacom Phone Shops.
  http://www.vodacom.co.za
- **MTN**
  Private sector. Africa.
  Mobile carrier in South Africa.
  http://www.mtn.co.za

B. Access Providers

- **OmniAccess**.
  NGO. Global.
  OnmiAccess combines Internet technologies and a sustainable access center business model to provide affordable access for disadvantaged communities.
  http://www.omniaccess.net.
- **The Virtual Souk.**
  NGO/Gov. Middle East/North Africa.
  Internet access and e-business resources (the elsouk market) for SMEs – especially artisans - and NGOs.
  http://www.elsouk.com/.

- **Non-profit Empowerment Program.**
  NGO. Asia.
  Provides PCs, servers, software and Internet access to Taiwanese NGOs.
  http://www.microsoft.com/giving.
- **World Computer Exchange.**
  NGO. Global.
  Ships surplus computers from USA to disadvantaged schools, and has cultural/technology training exchange.
  http://www.worldcomputerexchange.org.
- **Web Access by E-Mail.**
  NGO. Global.
  A free Bellanet service providing access to information by delivering Web pages by e-mail.
  http://www.bellanet.org/email.htm.
- **Leland Initiative.**
  NGO. Africa.
  USAID program establishes bilateral policy agreements for liberalised markets and provides. African connectivity scheme using the very small aperture terminal (VSAT) system.
  http://www.rti.org/leland/home.cfm.
- **Asháninka.Net.**
  NGO. South America.
  Provides Internet access for sharing language and culture between remote villages in Amazonian Peru, via high-powered radio.
  http://www.idrc.ca/reports/read_article_english.cfm?article_num=837.
- **Computer for Every Child.**
  Private sector. Middle East.
  Donates computers to children from disadvantaged backgrounds.
  http://www.microsoft.com/giving/.
- **AOL Peace Packs**.
  Private sector. Global.
  Pilot project to equip Peace Corps volunteers with "AOL Peace Packs" - includes computers and two-years Internet access, and ICT resources for local projects.
  http://www.aoltwfoundation.org/expand/aol_peace.html.
- **Radio 68H.**
  NGO, Asia.
  A virtual radio network and news agency, connecting two hundred radio stations across Indonesia.
  http://www.radio68h.com/.
- **Kothmale Community Radio Project**.
  Govt/NGO/Private sector. Use of radio to link rural Sri Lankans to the Internet, building a database of frequently requested public information. http://www.kothmale.net.
- **Educ.ar**.
  Govt. South America.
  Argentina's national student portal provides the students with Internet access.
  http://www.educ.ar.
- **Burma Internet Initiative**.
  NPO. Asia.
  Connectivity for Burmese democracy groups (NGOs) working in Thailand and India.
  http://www.soros.org/internet/regional-asia/burma_internet.html.
- **Cyber Cafe Project.**
  Private sector. Africa.
  e-World CyberSolutions (ISP) plans to provide Internet services to Lagos communities via cyber cafes.
  http://allafrica.com/stories/200102150324.html

- **American Assistance for Cambodia, Inc**.
  NGO. Central America.
  Provides access to ICTs for education by building rural schools, which use solar panels to generate power.
  http://cambodiaadopt.11net.com/cambodia5.htm.
- **Mobile Internet Unit (MIU).**
  NGO/Govt. Asia.
  Basic ICT literacy training programs for school communities in rural and urban Malaysia.
  http://www.miu.nitc.org.my.
- **The Simputer Project.** .
  NPO. Asia.
  The Simputer Trust produces a Linux-based, low-cost mass access device that will bring local-language IT to the masses.
  http://www.simputer.org.

C. Training Programs

- **Itrain.**
  NGO. Global.
  Aims to develop free open content computer and Internet training materials.
  http://www.bellanet.org/itrain.
- **Dalian Labor Bureau IT Training Project**.
  Private sector. Asia.
  IT training program in China assisting laid-off workers improve their prospects for re-employment.
  http://www.microsoft.com/china/.
- **The Disabled Students Programme**.
  Private sector/University. Africa.
  Program at the University of Witwatersand addressing the academic needs of special needs students.
  http://www.microsoft.com/giving/.
- **International Human Development Corporation**. Private sector.
  Central America.
  Learning centers in Panama to train students in technology skills for employment.
  http://www.microsoft.com/giving/.
- **Learntele.com.**
  NGO. Global.
  Web-based telecommunications education for teachers, students, professional and users.
  http://www.learntele.com.
- **Smart Learning Environment.**
  NGO. Asia.
  Program aims to facilitate learning through the use of the ICTs.
  http://www.jaring.my/learning/sle/index.html.
- **Geek Corps.**
  NPO. Global.
  Assists organizations with voluntary technical training and on site expertise.
  http://www.geekcorps.org.
- **Houwteq IT and Telecommunications Software Training and Development Centre.**
  Govt/Private sector. Africa.
  South African Department of Communications initiative for historically disadvantaged B.Sc graduates.
  No website reference.

D. Telecenters

- **Peruvian Telecentre Franchises Project**
  NGO. South America.
  A three-tier franchise model (city, town, remote area) providing access to ICTs.
  http://www.rcp.net.pe.
- **Grameen Phone's Village Programme**.
  Private sector. Asia.
  Bangladesh initiative empowers women with cellular phones to start village pay phone micro-enterprises.
  http://www.cisp.org/imp/december_99/12_99camp.htm
- **Mamelodi Area Community Information Service**.
  CBO/Govt. Africa.
  MPCC with support from the Universal Service Agency.
  http://mweb.co.za/mamelodi/main1.html
- **Microsoft Digital Villages.**
  Private sector/NGO. Africa.
  Centers for teaching IT and business skills to unemployed and previously disadvantaged persons.
  http://www.microsoft.com/southafrica/community/digital.htm.
- **Africare.**
  NGO/Private sector. Africa.
  Provided training to Microsoft Digital Village volunteers.
  http://www.africare.org/at_work/index.html.
- **Vodacom Phone Shops.**
  Private sector. Africa.
  Profitable SME franchises selling Vodacom services in South Africa.
  http://www.vodacom.co.za.
- **Nakaseke Telecenter**.
  NGO. Africa.
  Ugandan telecenter focused on ICT training and community and rural development via information resources.
  http://www.nakaseke.or.ug.
- **The Acacia Initiative**.
  NGO. Africa.
  IDRC project for sub-Saharan Africa enabling the application of ICT by communities to social and economic development needs.
  http://www.idrc.ca/acacia/acacia_e.htm.
- **The PAN Initiative**.
  NGO. Asia/Latin America/Caribbean.
  IDRC telecenter projects.
  http://www.idrc.ca/pan/telecentres.html.
- **Committee for Democracy in Information Technology (CDI).**
  NGO. Global.
  Funds social and educational projects through Technology and Citizenship Schools in Brazil.
  http://www.cdi.org.br/.
- **TeltecGlobal Telecenters**.
  Private sector. Africa.
  Providing technical education content, links to LINCOS initiatives.
  http://www.hp.com/e-inclusion.
- **All India Society for Electronics and Computer Technology**.
  Govt. Asia.
  Community based computer and Internet centers providing a wide range of ICT services.
  No website.

- **Busy Internet**.
  Private sector. Africa.
  Launching Internet centers in West Africa to stimulate growth among SMEs.
  http://www.busyinternet.com
- **Little Intelligent Communities (LINCOS)**
  NGO. Central America.
  Costa Rican community access centers giving villagers access to telemedicine, the Internet and e-commerce.
  http://www.lincos.net.
- *CommUnity SA list of telecenter programs, including 25 in the Western Cape*
  http://www.communitysa.org.za. (select telecenter link, select region on map).
- 20 Case Studies cited in Peter Benjamin and Aki Stravrou. *Telecenter Report 2000*.
  http://www.communitysa.org.za.

E. School Computer Programs and Distance Learning Programs

- **Proyecto de Informática Educativa (Centro de Recursos de Aprendizaje).**
  NGO/Govt. Central America.
  Project has a model for the introduction of ICTs into Panamanian schools.
  http://www.educaion.gob.pa/p-inf-ed.html
- **World Links for Development (WorLD).**
  NGO. Global.
  Trains teachers and students in the use of ICTs.
  http://www.world-links.org/.
- **TareaWeb**.
  NGO. Central America.
  Assisting Mexican K12 students with ICT and learning.
  http://www.tareaweb.com/.
- **EduNet**.
  NGO. Asia.
  A computer network connecting many rural and urban schools in Thailand.
  http://edu.au.ac.th
- **ESScare.**
  NGO. Asia.
  Supports education in rural China by providing students with access and learning materials.
  http://www.esscare.org.
- **Programa de Informática Educativa.**
  Govt. Caribbean.
  Dominican Republic IT education program introducing ICTs to facilitate access to science and technology resources.
  http://www.see.gov.do.
- **Red Telematica Educativa**.
  Educational organisations. Central America.
  Networking of schools in Costa Rica, assists in this training.
  http://www.fod.cr/programas/index.html.
- **Nuevo Milenio**.
  Educational organisations. Caribbean.
  Included on the Red Telematica Educativa network is the educational e-zine, Nuevo Milenio.
  www.fod.ac.cr/revista.
- **Fundacion Omar Dengo**.
  Govt. Central America.
  Builds computer labs and provides IT education to schools.

http://www.fod.ac.cr.

- **Educar Chile**.
  NGO/Government. South America.
  An educational Internet portal serving Chilean students and teachers.
  http://www.educar.org.
- **Educ.ar**.
  Government. South America.
  Argentine Ministry of Education initiative to create a national educational Internet portal.
  http://www.educ.ar.
- **Teach to the Future**.
  Private sector. Global.
  Intel program enabling teachers in the application of ICTs to improve student learning.
  http://www.intel.com/education/teachfuture.
- **CyberSchoolBus.**
  NPO. Global.
  United Nations teacher training modules.
  http://www.un.org/pubs/CyberSchoolBus.
- **The Shuttleworth Foundation.**
  NPO. Africa.
  Aims to promote innovation in education in South Africa through education and technology.
  http://www.tsf.org.za/projects.html.
- **Cikgu.net.**
  NGO. Asia. Malaysian-based education portal.
  http://www.cikgu.net.my.
- **The Enlaces Project.**
  Government. South America.
  Project provides schools with computers, technical support, training and curriculum development of collaborative projects across different schools.
  http://www.enlaces.ufro.cl.
- **Mobile Internet Unit (MIU)**
  NGO/Government.
  Facilitates basic ICT literacy training programs for school communities in rural and urban Malaysia.
  http://www.miu.nitc.org.my.
- **Khanya Project**
  Govt. Africa.
  Western. Cape Education Department. To equip schools with educational and administrative IT system, A/V system, curriculum and content development, and provide training.
  http://www.wcape.school.za/wcer/CM/Home/0101/n010106mhg.htm.
- **Distance Education Network**.
  Govt/Private sector.
  Incorporates World Bank's knowledge management system, EducationNet.
  http://www1.worldbank.org/disted/about.html.
- **Telkom Foundation.**
  Parastastal. Africa.
  The Telkom Supercenters Project is an access and training program for 1000 Schools.
  http://www.telkom.co.za/company/social/index.shtml. (cf. Link from SchoolNet Sa site).
- **SchoolNet SA**.
  NGO. Africa.
  Uses provincial school networks for Internet access and training, linked to IDRC's Acacia project and secured private sector funding.
  http://www.schoolnet.org.za.

- **Red Escolar**.
  NGO. Central America.
  A distance learning project using TV and the Internet to provide Mexican schools with access to and development of local educational content.
  http://www.redescolar.ilce.edu.mx.
- **Sony Education Support Project**
  Private sector. Africa/Asia.
  Donates A/V hardware and educational videotapes to enable teachers and students to profit from distance learning.
  http://www.weforum.org/digitaldivide.nsf/vwAllProjectsWeb/1289C4662F3319B7C1256A24004019E4?OpenDocument.
- **African Virtual University**
  NPO. Africa. Via Internet connections and satellite, and A/V media, program provides courses on computer technology, economics, language, and remedial coursework to sub-Saharan students. http://www.avu.org.
- **Virtual University of the Technological Institute of Monterrey**.
  University, Central America.
  Offers 15 distance degree programs at postgraduate level in administration, education and engineering. Also offers technical training and skills development programs.
  http://www.sistema.itesm.mx/english/uv.htm.
- **Umfundo.org**.
  NGO. Africa.
  With a focus on Rwanda and Gambia, Umfundo.org partners with government to assist distance learning programs via training, content development and telecenter initiatives. Umfundo model ensures commercial sustainability of program.
  http://www.umfundo.org.

F. Online Information Resources

- **Soul City.**
  NGO. Africa.
  Soul City publishes research online and produces a South African TV drama and daily radio drama addressing adult and youth issues, for example, HIV/AIDS, job creation, money management, etc.
  www.soulcity.org.za.
- **Chapter 2 Network**
  NGO. Africa.
  An IDASA project which provides information and communications to South African civil society organizations involved in advocacy.
  http://www.advocacy.org.za.
- **Africare.**
  NGO. Africa.
  Facilitates the flow of funding to wide range of projects in Africa.
  http://www.africare.org.
- **3BillionBooks**
  Private sector. Global. Online reading or converts multilingual digital content into locally produced print books though Internet-based on-demand dissemination.
  http://www.3billionbooks.com.
- **The African Virtual Library Initiative**
  NGO. Africa.
  Facilitates access to online information services and meets the needs of educational, research and development work in Africa.
  http://www.avli.org/.

- **TakeITGlobal**
  NGO. Global.
  A youth-led initiative to connect young people to relevant, real-world opportunities though the use of technology.
  http://www.takingitglobal.org/aboutus/.
- **International Channel – for the Digital Divide Network**
  NGO. Global.
  Project extension for sourcing information on grants, funding opportunities, best practices and toolkits for bridging the digital divide.
  http://www.digitaldividenetwork.org.
- **Info.Com 2025**
  Govt. Africa.
  Program aiming to bring together information and communications actors, promoting ICT development, and attracting foreign investment.
  http://www.ecomm-debate.co.z/docs/discuss07.html.
- **EcoNews**
  NGO. Africa.
  Uses Web site to communicate local issues and network with international NGOs, for example, successfully advocating the case of Masai farmers threatened with eviction from land due to government land management practices.
  http://www.apc.org/english/ngos/strategy/examples/index.htm.
- **Sakshi**
  NGO. Asia.
  Womens' rights group in India lobbying for sexual harassment legislation.
  http://www.apc.org/english/ngos/strategy/examples/index.htm.
- **Egyptian Antiquities Information**
  Govt/NGO. Africa.
  Web site of the Egyptian Ministry of Tourism hosting museum and cultural information.
  http://wwwtouregypt.net/antiq.htm.
- **National Library of Bosnia**.
  NGO. E.Europe.
  UNESCO project, collaborating with network of libraries, sourcing copies of books and manuscripts destroyed during the shelling of the National Library of Bosnia.
  http://www.applicom.com/manu/ingather.htm.
- **Te Tomokanga Portal**
  CBO. Oceania.
  Internet portal preserves marginalized cultural artifacts, traditions, identifies aboriginal rights issues, supports community initiatives, and online sale of Maori products.
  http://maori.culture.co.nz.
- **E-Law**
  NGO. Global.
  A network facilitating development and practice of public interest environmental law.
  http://www.elaw.org.
- **Tarahaat.com**.
  NGO. Asia.
  The Development Alternatives Group designed and developed this Internet portal in conjunction with rural villagers in India.
  http://www.tarahaat.com
- **Banglarights.net**.
  NGO. Asia.
  Bangladesh human rights portal.
  http://www.banglarights.net.

- **Altermedios.**
  NGO. South America.
  Alternative multimedia organisations in Ecuador collaborated to an association supporting the national democratisation of communications.
  http://altermedios.ecuanex.net.ec.
- **Movement for Democratic Change**.
  NPO. Africa.
  During Zimbabwean June 2000 elections MDC used the Internet and e-mail to campaign in the face of ruling party intimidation and control of traditional media.
  http://www.cddc.vt.edu/knownet/articles/zimbabwe.html.
- **Cultural Survival Project**.
  NGO. Asia.
  Supports and markets the Ersari peoples' vegetable dye rug weaving among refugees from Afghanistan in Pakistan.
  http://www.cs.org/specialprojects/afghan/afghan.htm.
- **Microfinance Gateway**.
  NGO. Global.
  An interactive information hub and resource for information on microfinance.
  http://nt1.ids.ac.uk/cgap/index.htm.
- **Tanzania Online**.
  NGO. Africa.
  Portal on development issues in Tanzania.
  http://www.tzonline.org.
- **WETV**
  Private sector. Global.
  Produces Internet content from local content based TV programs, and uses satellite to distribute content.
  http://www.wetv.com/what.html.
- **SANGONet.**
  An online resource for South African NGOs.
  http://www.sn.apc.org.
- **CommUnity SA**.
  NGO. Africa.
  A portal for NGO action, support, and telecenter research and policy issues.
  http://www.communitysa.org.za
- **Women's Net**.
  NGO. Africa.
  Online network support and resources program for women.
  http://www.womensnet.org.za.
- **Cape IT Initiative**.
  NPO. Africa.
  Fosters development of IT clusters, community networking, and incubation of entrepreneurial companies. Compiling database of ICT organisations.
  http://www.citi.org.za.
- **First Tuesday**.
  NPO. Africa.
  Aids Internet industry networking between entrepreneurs, service providers and venture capital.
  http://www.firsttuesday.co.za.
- **Khanya**.
  Private. Africa.
  Focused on change management and rural development in southern Africa, provide online resources.
  http://www.khanya-mrc.co.za.

G. E-Government

- **Land Registry**.
  Govt. Asia.
  Land registration offices in Andhra Pradesh (India) use computerized counters to increase efficiencies. ICT processing has replaced manual record-keeping. And improves citizen-government interfaces.
  http://www1.worldbank.org/publicsector/egov/cardcs.htm.
- **Surat Municipal Services**
  Govt. Asia.
  E-Government services, particularly in the delivery of health and sanitation services and information, via wireless and mobile phones.
  No website reference.
- **The Automated Systems for Customs Data (Asycuda).**
  NGO. Global.
  Developed by UNCTAD, the system is used by developing countries to manage tariff collection and reduce frontier corruption.
  No website reference.
- **Singapore Department of Transportation**.
  Govt. Asia.
  Uses ICTs to manage the network of urban roads and highways, supplies real-time traffic information over the Internet.
  No website reference.
- **South African Constitutional Assembly**.
  Govt. Africa.
  Citizen input in the drafting the new democratic (post-apartheid) Constitution via a Web site.
  http://www.iicd.org/search/show-entry.ap?entryid=3956.
- **India Image Web Site**.
  Govt. Asia.
  Indian Government Ministry of Information Technology initiative facilitating government to citizen information flows.
  http://indiaimage.nic.in.
- **Twin Cities Network Services (TWINS) Initiative**.
  Govt. Asia.
  Andhra Pradesh state in India established a citizen service centre – access to a range of government services, including payment of utility bills and taxes, registration of births, etc.
  http://www.andhrapradesh.com.
- **Chilean Government Procurement E-System**.
  Govt. South America.
  Through the Communications and Information Technology Unit, Chilean e-procurement services has helped business-government transactions reduce transaction costs and corruption.
  http://www1.worldbank.org/publicsector/egov/eprocurement_chile.htm
- **Costa Rican Government Online Services**
  Government/Private/NGO. Central America.
  Municipal telecentre service providing citizens and civil society organizations free access to email, a Web page and other e-government resources.
  http://www.costarricense.com/ing/servgob.html.
- **Tiruvaru Online**
  Govt. Asia.
  A district government in India annual audit of village accounts (Jamabanthi) conducted online in April 2000. This pilot e-district resulted in first online data warehouse of all land records and Taluk records.
  http://www.tiruvaruronline.com/whatsnew.html.

- **Orissa High Court, India**.
  Govt. Asia.
  Provides Internet access to case records, detailing the court a case is appearing in and its listing.
  http://www.cddc.vt.edu/digitalgov/news-orissa.htm.
- **Political Information and Monitoring Service (PIMS).**
  NGO. Africa
  IDASA program supporting democracy and the promotion of ethical governance in South Africa. A resource for South African parliamentary documents.
  http://www.pims.org.za/monitor.
- **Cape Online**.
  Govt. Africa.
  Western Cape Provincial Government initiative promoting and planning ICT strategy and implementing e-government services in province.
  No website reference.
- **Department of Trade and Industry Website**.
  Govt. Africa.
  South African public service resource for IT companies.
  http://www.dti.gov.za.
- **Info.com 2025**.
  Govt. Africa.
  South Africa's Department of Communications framework driving various Public Internet (PITs), MPCCs and Universal Service Agency telecenters in country, and other e-government and ICT infrastructure and services projects.
  http://docweb.pwv.gov.za.
- **IBM Institute for Electronic Government**.
  Private sector. Global.
  Showcase for e-government solutions.
  http://www.ibm.com.

H. E-Commerce

- **Pura Vida Project**
  Faith-based. Latin America.
  A Costa Rican Christian faith-based initiative to establish interactive centers for street children and addressing the social issues. The project is self-funded through the profits made from the online sales of gourmet coffee.
  http://www.puravidacoffee.com/.
- **MyBiz**
  Private sector. Asia.
  Service provider to SMEs enabling e-business and use of ICTs to streamline business operations, lower costs and secure markets in the digital economy.
  http://www.mybiz.net/mybiz/.
- **The Virtual Souk**
  Govt/NGO. Middle East/North Africa.
  Provides Internet access and e-business resources (the elsouk market) to increase the capacity and revenues of SMEs (especially artisans) and NGOs.
  http://www.elsouk.com/.
- **World e-Inclusion Web Site**
  Private sector. Global.
  A multi-language Hewlett Packard Web site providing users with virtual tours of villages, e-commerce sales of handcrafts, and links to sponsorships.
  www.hp.com/e-inclusion.

- **PeopLINK**.
  NPO. Global.
  Provides artisans and handicraft manufacturers with digital cameras and displays their products on its Web site, ensures order fulfilment.
  http://www.peoplink.org.
- **The E-Commerce Project**.
  NGO. Africa.
  Program in Ghana to equip local non-traditional export producers with e-commerce facilities to enhance their ability to target new export markets.
  http://www.iicd.org./countries.
- **Little Intelligent Communities (LINCOS)**
  NGO. Central America.
  Costa Rican community access centers giving villagers access to telemedicine, the Internet and e-commerce.
  http://www.lincos.net.
- **Viatru.**
  Private sector. Global.
  Using ICTs, Viatru links artisans to global markets. In the process they are preserving endangered cultures and creating online sources of income.
  http://www.viatru.com.
- **Busy Internet**
  Private sector. Africa.
  The US-based technology company is launching Internet centers in West Africa, to help stimulate growth among SMEs.
  http://www.busyinternet.com.
- **Te Tomokanga Portal**
  CBO. Oceania.
  Internet portal preserves marginalized cultural artifacts, traditions, identifies aboriginal rights issues, supports community initiatives, and online sale of Maori products.
  http://maori.culture.co.nz.
- **AutoBank E**
  Private sector. Africa.
  Bank developed automated savings system with range of electronic banking services aimed at the poorest depositors. Uses ATM technologies.
  No website reference.
- **Villageleap.com.**
  NGO. Asia.
  An American assistance program for Robib village, with e-commerce for locally produced hand-made goods.
  http://www.villageleap.com

I. Health-Care

- **Satellife.**
  NGO. Global.
  Provides satellite, telephony and Internet for health-care information and communications needs.
  http://www.healthnet.org.
- **Starfish**
  NGO. Africa/Asia.
  Provides technology training and literacy and health education to young girls and women in Malawi and India. Program specifically addresses prostitution and HIV/AIDS.
  http://www.secondnature.org/resource_center/resource_center.html

- **Gambia Telemedicine Initative**.
  Private sector. Africa.
  Using a digital camera and a laptop to photograph visible symptoms that are not identified/treated by nurses in remote areas. Images are transferred to a physician in Banjul who prescribes a treatment or e-mails the image to a UK company, to access specialists and feedback findings.
  http://www.itu.int/ti/publications/INET_99.
- **WHO Meningitis Monitoring System**.
  NGO. Africa.
  In the sub-Saharan "meningitis belt," the WHO has an electronic system capturing the daily reports of diseases outbreak, relayed by health professionals involved in mass vaccination programs.
  http://www.who.int/emc/diseases/meningitis.
- **MARA – Mapping Malaria Risk**.
  NGO. South Africa.
  Collects data on malaria risk and resistance patterns. Produces outputs that allow health-care practitioners and researchers to better treat and study the disease.
  http://www.mara.org.za.
- **Alvi Dental Hospital**
  Hospital. Asia.
  Providing teledentistry facilities via Internet. Patients send a scanned photograph with detailed history, a panel of dentists analyzes them and give free advice on dental needs. Appointments booked via the Internet.
  http://www.bytesforall.org/7th/lastbyte.htm
- **Pharmaco-genomics.**
  Private sector. Global].
  Network of scientific education sites focusing on the use of technology in molecular biology/human pharmaco-genomics.
  http://stoutventures.com/wsnB94E.html.
- **Little Intelligent Communities (LINCOS)**
  NGO, Central America. Costa Rican community access centers giving villagers access to telemedicine, the Internet and e-commerce.
  http://www.lincos.net.
- **Project Ulwazi**
  NGO. Africa.
  Project in Khayelitsha, part of Treatment Action Campaign (TAC) addressing HIV/AIDS awareness, resources and support for HIV+ persons in South Africa.
  http://www.tac.org.za/.

J. Agriculture

- **Village Info-Shops**
  NGO. Asia.
  Linked to the IDRC PAN project, and developed by the M.S. Swaminathan Research Foundation in the Pondicherry region, the project aims at assessing the impact of information and communication technologies in fostering transition to sustainable agricultural and rural development.
  http://www.idrc.ca/pan/ICT%20and%20poverty_files/frame.htm.
- **Biovillage Project**
  NGO. Asia.
  Project aims at sustainable agricultural development in India.
  http://www.idrc.ca/pan/ICT%20and%20poverty_files/frame.htm.

- **Tarahaat.com**.
  NGO. Asia.
  The Development Alternatives Group designed and developed this Internet portal in conjunction with rural villagers in India.
  http://www.tarahaat.com.
- **Project Radio**
  NGO. Asia.
  Project aims to empower Antandroy communities in Malaysia to develop new farming methods and resource management.
  http://www.andrewleestrust.org.uk/radio.htm.
- **Pura Vida Project**
  Faith-based. Latin America.
  A Costa Rican Christian faith-based initiative to establish interactive centers for street children and addressing the social issues The project is self-funded through the profits made from the online sales of gourmet coffee.
  http://www.puravidacoffee.com/.
- **Argentine Farmers Network**.
  Private sector. South America.
  Connects farmers, creating a network and online marketplace with information services.
  No website reference.
- **National Agricultural Extension Service**.
  NGO. South America.
  An Internet-based rural information service for farmers, governments, and NGOs.
  http://www.idrc.ca/books/focus/783/haravu.html.
- **Grameen Phone**
  Private sector. Asia.
  Bangladesh initiative where rural women rent out mobile phones in their villages. It enables farmers to check the latest crop prices and wives to maintain contact with their husbands working overseas.
  http://www.grameenphone.com.
- **PRAIS – Program for Agricultural Information Sources**
  University. Africa.
  Project for a regional agricultural information service for southern Africa based at the University of the Free State in South Africa.
  http://www.uovs.ac.za/lib/agric/assa.asp.

K. Other Applications of ICTs

- **Centre for Advanced Media (C@MP)**.
  NGO. Global.
  Introduces new-media concepts and solutions to independent news organizations by adapting new technologies, for example, Radio 68H in Indonesia.
  http://www.mdlf-camp.net/.
- **Pride Africa.**
  Private sector. Africa.
  Operates micro-finance programs in east African countries.
  http://www.prideafrica.com.
- **Developing Countries Farm Radio Network**
  NGO. Global.
  Support broadcasts to strengthen small-scale farmers and rural life.
  http://www.farmradio.org/english/indexen.html

L. Technology Development

- **Centre for Advanced Media (C@MP)**.
  NGO. Global.
  Introduces new-media concepts and solutions to independent news organizations by adapting new technologies, for example, Radio 68H in Indonesia.
  http://www.mdlf-camp.net/.
- **Softbank Emerging Markets**.
  Private sector. Global.
  With IFC funding, supports growth of Internet ventures by providing funds and strategic resources to assist local entrepreneurs.
  http://www.softbank.com/scripts/MAIN.ASP.
- **World e-Inclusion Initiative**.
  Private sector. Global.
  Several projects partnered between HP and development organisations to provide access to connectivity, content and access to new markets in the developing world.
  http://www.hp.com/e-inclusions
- **Telkom Centres of Excellence**.
  Private sector/University. Africa.
  Located at South African universities with MNO support. Aims at promotion of ICT at national level.
  No website reference.

5. Relevant Policies

This section provides brief descriptions of 25 key policies, how they affect the digital divide and the stakeholders in these policies. These policies range from telecom deregulation to brain-drain counter measures. The policies are broken down into 7 categories - ICT Infrastructure and Supporting Systems, Trust, Capacity Building, Taxation and Trade, Employment and Labour, Technology Diffusion, General Government Environment.

International and domestic divides are affected by many aspects of government policy - from digital signatures to collective bargaining and general macro-economic policies such as foreign direct investment controls. This section will provide a brief overview of how these key policies can impact on the digital divide. This list is certainly not exhaustive, but aims to provide an introduction to the issues, and indicate the complexity of the issues at the same time. These policies are broken down as follows:

1. **ICT Infrastructure and Supporting Systems** - policies that affect basic ICT infrastructure and its productive use in society, notably: *Telecommunications Licensing and Regulation, Telecommunications Privatisation, Spectrum Allocation, Internet Domain Management, Banking and Financial Sector, Standards Setting, Customs Standardization.*
2. **Trust** - policies that affect business, government, and consumer trust in ICTs, and of each other online, including: *Electronic Signatures, Data Security, Cybercrime, Privacy, Intellectual Property, Regulation of Content, Consumer Protection.*
3. **Capacity Building** - policies that build the necessary capacity to use ICTs effectively, including *Curriculum and Materials, Technical Education*
4. **Taxation and Trade -** including *taxation, tariffs and trade barriers and foreign direct investment*
5. **Employment and Labour -** *Collective Bargaining and Other Labour Policies, Brain Drain Counter-Measures.*
6. **Technology Diffusion -** *Universal Service, E-Government, Private Sector and Civil Society ICT Use.*
7. **General Government Environment** - including Government Structure (e.g. *democracy, transparency, independence of judiciary and regulatory authorities), Discrimination Policy.*

For each policy, we will list:

- **Key policy issues** that decision makers should be aware of.
- **Potential impact** the policy can have on digital divides (positive or negative effects), with a brief narrative description and shorter list of the aspect of the digital divide that it addresses, i.e.[88]:
  - **Physical access.** Is technology available and physically accessible?
  - **Appropriate technology.** What is the appropriate technology according to local conditions, and how people need and want to put technology to use?
  - **Affordability.** Is technology access affordable for people to use?
  - **Capacity.** Do people understand how to use technology and its potential uses?
  - **Relevant content.** Is there locally relevant content, especially in terms of language?
  - **Socio-cultural factors.** Are people limited in their use of technology based on gender, race, or other socio-cultural factors?
  - **Trust.** Do people have confidence in and understand the implications of the technology they use, for instance in terms of privacy, security, or cybercrime?

[88] These are the same aspects of ICT access described in the "ground-level efforts" chapter.

- **Legal and regulatory framework.** How do laws and regulations affect technology use and what changes are needed to create an environment that fosters its use.
- **Local economic environment.** Is there a local economy that can and will sustain technology use?
- **Macro-economic environment.** Is national economic policy conducive to widespread technology use, for example, in terms of transparency, deregulation, investment, and labour issues?
- **Political will.** Is there political will in government to do what is needed to enable the integration of technology throughout society?

- **Major actors** in the policies. A key to the abbreviations used and links for more information on the actors can be found in Annex 6, *Policy Organizations.* Initiatives related to these policies are covered in the Chapter 4 "Ground Level Efforts"; for example, the World Bank's support of e-commerce *programmes.*

1. Infrastructure and Supporting Systems

This section gives brief descriptions of policies that effect information technology infrastructure and other supporting infrastructure in the financial sector, customs and standards.

A. Telecommunications Licensing and Regulation

***Key Issues**:*

- Number of fixed line and mobile telephone licenses allowed, and how they are allotted.
- Unbundling of local loop (including whether licensees are required to deploy their own infrastructure or can draw on existing infrastructure).
- Interconnection agreements.
- Number portability.
- Usage charges versus flat rates.

Potential impact on digital divide:

- Licensing is the key to telecommunications competition - an increased number of licences can lead to greater competition and lower access prices.
- Monopolies (government owned or private) historically are slow to adopt and tightly limit new uses of telecommunications such as Voice Over IP and virtual private networks.
- Fair and open allotment of licenses tends to increase quality of service and accountability.

***Actors**:*

- International Bodies (ITU, World Bank, WTO)
- Business forums (e.g. AGB)
- Users forums (e.g. INTUG)
- Internet service providers
- Communications departments
- Telecom, regulatory agencies
- Unions
- Companies

B. Telecommunications Privatisation

***Key Issues**:*

- Whether government telecom companies are privatised, and when.
- Percent of ownership retained by government
- Means of privatisation (public IPO or closed private investment).
- Management of new company.

Potential impact on digital divide:

- Government telecom agencies are often required to pursue universal access requirements ("universal service provisions"), which are more relaxed in privatised companies.
- Privatisation often leads to increased quality of service, but may reduce efforts to reach rural and low-income citizens.
- Important in access, pricing, and local ICT sector.

***Actors**:*

- International Bodies (World Bank)
- Trade departments
- Communications departments

- Telecom agencies
- Unions[89]
- Companies

C. Spectrum Allocation

Key Issues:
- The allocation of communications spectrums can foster or hinder competition in existing markets, which affects prices to consumers.
- The spectrum must be re-allocated to allow new mobile technologies including broadband wireless.
- Portions of the spectrum can be reserved for not-for-profit organizations and initiatives.

Potential impact on digital divide:
- Out-of-date spectrum allocations leave no room for new technologies, making local development and access to these ICTs impossible, or block the entrance of new companies and competition.
- Important in access and local ICT sector.

Actors:
- ITU
- Communications departments
- Telecom agencies
- Unions
- Companies

D. Internet Governance and Domain Management[90]

Key Issues:
- Functional country-code Top Level Domain (ccTLD; ie ".za", ".fr")
- Speedy and inexpensive domain registration process.
- Active participation in international Internet governance (ICANN, et al).

Potential impact on digital divide:
- Countries have the ability to control their own country-specific top-level domain.
- Using the domain properly keeps registration monies within the country and builds national IT momentum.

Actors:
- ICANN
- IANA
- Regional Internet registries (RIPE, ARIN, APNIC)[91]
- Registrars (e.g. Network Solutions)[92]

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[89] As with many policy issues, the real effect of privatisation on workers is contested. Unions often resist privatisation and integrating ITC into existing industries because they believe it results in a loss of jobs. However, according to James (p.146) there is no good guide for policy makers of the real net effect of IT on total jobs and turnover. Similarly, the final effect of IT on a country's skill levels is not known. There are conflicting theories – de-skilling versus professionalization - but insufficient real data to settle the issue (James 142)

[90] Note, many policy issues exist on the international level; this section focuses on national policy.

[91] See hwww.ripe.net/ripencc/about/regional/index.html.

[92] See www.networksolutions.com

- International organizations (WIPO, ITU)
- Internet service providers
- Internet user's forums (e.g. CSIF, INTUG)
- Online rights organizations (e.g. EPIC, CDT)
- Consumer protection organizations (CPT, TACD)
- Trade and Industry, Commerce Departments.

E. Banking and Financial Sector

***Key Issues**:*

- Electronic Payments and Settlements
- Financial standards
- General transparency and solvency
- International and automated funds transfers, credit verification, encryption.

***Potential impact on digital divide**:*

- Fiscally sound banking and finance sectors, capable of handling electronic payments securely and across national boundaries, are necessary for e-commerce and for user trust of e-commerce.

***Actors*:**

- International Bodies (UNCITRAL, BIS, WTO (financial services trade)
- Business forums (e.g. ICC)
- Finance departments
- Banks
- Financial sector companies

F. Standards Setting

***Key Issues**:*

- Existence and coherent adoption of ICT-related standards (Internet standards, product identification, software interoperability)
- Source and control over standards.

***Potential impact on digital divide**:*

- Without certain key standards such as Internet protocols, communications and business between countries is costly or impossible.
- However, implementation may be prohibitively expensive and tightly controlled by developed world countries, or the standard may exclude the needs of developing countries[93].

***Actors**:*

- International Bodies (ITU, World Bank)
- Commercial software and hardware companies (e.g. Microsoft)
- Users forums (INTUG)
- Business forums (e.g. AGB)
- Trade and Industry, Commerce, Communications Departments

[93] As some state the "shortage" of Internet addresses currently does (Telegeography).

G. Customs Standardization

Key Issues:
- International coordination (e.g. in WCO)
- Handling of disputes and sanctions
- Transparency and standardization of tariffs, automation, transparency of regulation and administration, cargo processing, workforce and security, passenger processing.

Potential impact on digital divide*:*
- Local Economic Environment, Macro-Economic Environment.

Actors**:**
- International bodies (WCO, WTO)
- Business forums (ICC)
- Trade and Customs departments, Treasury

2. Trust

This section gives brief descriptions of policies that affect how well businesses, governments and consumers trust ICTs and are willing to interact with each other online; a short case study of issues in intellectual property is also provided.

A. Electronic signatures

Key Issues*:*
- Legality and scope of electronic signatures, potential for forged signatures and other authentication issues.

Potential impact on digital divide*:*
- Electronic signatures (of one form or another) are required to lessen paperwork (e-government, e-commerce) and make businesses and online services more efficient and less expensive.
- However, the move towards online "paperwork" may phase out physical methods, completely excluding the "have-nots".

Actors:
- International Bodies (ISO, IEC, UNCITRAL, EU, W3C)
- Online rights organizations (e.g. EFF, EPIC, CDT)
- Business forums (e.g. GIIC, AGB, ICC)
- Private companies (e.g. Thawte)
- Trade and Industry and Commerce departments

B. Data security

Key Issues*:*
- Means and regulation of authentication and certification.
- Interoperability of "trust" services, encryption and cryptography export controls.
- Availability of secure networks, secure settlement procedures.
- Liability of network operators.

Potential impact on digital divide*:*
- Trust and local economics, lack of either of which will lead to the continued exclusion of "have nots".

Actors:

- International Bodies (ITU, ISO, UNCITRAL, UPU, OECD)
- Online rights organizations (e.g. EFF, EPIC, CDT, PI, GILC)
- Business forums (e.g. GIIC, AGB, ICC)
- Numerous private companies
- Departments of Justice, Trade and Industry and Commerce
- Banking and Finance section

C. Cybercrime

Key Issues:

- Legal jurisdiction and international cooperation.
- Harmful content definitions.
- Training of courts and enforcement agencies.
- Enforced online record keeping.
- Jurisdiction over service providers.

Potential impact on digital divide*:*

- Reduce up-take of local commerce due to consumer fears of abuse of information.
- Lack of trust

Actors*:*

- International Bodies (CoE, EU)
- Online rights organizations (GILC, CDT, EPIC)
- General policy institutes
- Departments of Justice, Trade and Industry, Treasury and Commerce, Home Affairs.
- Banking and Finance
- Consumer Groups

D. Privacy

Key Issues*:*

- Legality of online information collectors giving personal information to third parties.
- Requirements for users' to "opt-in" to online data collection and ability to "opt-out".
- Ownership of personal information when a company goes bankrupt.
- Dispute resolution.

Potential impact on digital divide:

- If personal information is not secure, users will not trust data networks - for electronic commerce, for medical services, or even basic Net surfing - and will not benefit from its positive aspects.

Actors:

- International Bodies (ILO, ITU, UNESCO, UPU, WTO, CoE, EU)
- Online rights organizations (e.g. EFF, EPIC, CDT, PI, GILC)
- Consumer rights organizations (e.g. CPT, CI)
- Business forums (e.g. AGB, ICC, OPA)
- Other civil rights organizations (e.g. ACLU)
- Department of Home Affairs, Trade and Industry, Commerce, Telecommunications.

E. Intellectual Property

Key Issues:
- Duration of trademarks and patents.
- Recognition of foreign trademarks and patents and ability to produce generic products.
- Scope of patents on derivative products.
- Enforcement power of intellectual property agencies
- Type of patents allowed (especially in technological and software processes).
- Penalties for posting and distributing information online illegally.
- Protection of indigenous knowledge.

Potential impact on digital divide:
- Strict intellectual property laws are strongly desired by foreign investors and companies, which impacts the capitalization of the ICT sector.[94]
- However, weak intellectual property laws have fostered the growth of ICT sectors in East Asian newly industrialized countries, and can lower (effective) prices for local consumers.
- Patenting of processes makes it far more difficult to transfer technology to the developing world, than only the patenting of end products.

Actors:
- International Bodies (WIPO, WTO, ILO, UNESCO, World Bank, WCO, CoE, EU).
- Online rights organizations (e.g. EFF, CDT, PI, GILC).
- Consumer rights organizations (e.g. CPT, TACD).
- Business forums (e.g. AGB, ICC).
- Other civil rights organizations (e.g. ACLU).
- Department of Commerce, Trade and Industry, Home Affairs.

F. Regulation of Content

Key Issues:
- Definition of illegal and harmful content (child pornography, racism).
- Anonymity and pseudo-anonymity.
- Content rating.
- Cross-rating with other media (TV, computer games).

Potential impact on digital divide:
- Importing of technologies moderating Web content could have unforeseen censorship results in another country.

Actors:
- International Bodies (EU, CoE)
- Online rights organizations (e.g. CDT, EFF, EPIC, GILC)
- Consumer rights organizations (e.g. TACD)
- Departments of Justice, Home Affairs, Commerce, Trade and Industry.

[94] For example, the long duration of trademarks and patents, effective enforcement agencies, complete recognition of foreign patents.

Case Study: Intellectual Property

Policy for the digital divide is rarely clear-cut. As this study shows, often completely different policy perspectives can both claim to "bridge the digital divide".

Most authors and policy makers working on the "digital divide" state that strict intellectual property regulations are needed both to attract investors generally and specifically grow the IT sector; however there is continued controversy over this issue and good arguments on both sides.

There is strong evidence of investors being concerned over Intellectual Property rules. If a large foreign company believes its research and development will be stolen with impunity, it will certainly think twice before locating to such a country, as with highly publicized cases of infringement in South Africa. For example, APEC's measure of "readiness" for e-commerce specifically states that full adoption of the TRIPS agreement is necessary for e-commerce.

However, the historical effect of strict intellectual property is not at clear as many of its proponents state. In the 1960s through 1990s East Asian "newly industrializing countries" such as Taiwan and Korea were notorious for not following the IP rules of the developed world. Historians state that industrial IP violations were vital in their growth. Through extensive reverse engineering and outright replication of copyrighted technologies, these countries built their local IT sectors and remain powerhouses of IT - especially in the microelectronics sector. Crackdowns on industrial IP violations in these countries have only been (successfully) pursued well after the economic benefits had been gained.

IP violations of end-user products such as software, while a much clearer case, still have complicating issues. In South Africa, strict IP rules for pharmaceutical products have exacerbated the country's AIDS crisis - since the overwhelming majority of the population cannot afford brand-name AIDS drugs. Brazil and India, who have produced generic versions of brand-name products, were widely condemned by the international economic community, but have had a major impact on prolonging their citizen's lives. South Africa has only recently succeeded in approving generic products with the concession of pharmaceutical giants - a violation of international IP rules - under the threat of outright breaking of IP rules.

Overall, the total effect of strict intellectual property rules is difficult to determine. Among other issues, it should be considered in the wider context of the overall investment climate, and the necessity of foreign direct investment over internal development projects.

G. Consumer Protection

***Key Issues**:*

- Ability for consumers to seek redress for faulty or misleading products sold online, especially across international boundaries (legal jurisdiction).
- Limits on penalties.
- Means of dispute resolution
- Advertising and marketing practices
- Handling of customer complaints.

Potential impact on digital divide:

- If local consumers don't feel protected, they will be unwilling to buy online (halting B2C e-commerce).
- If businesses feel they will be unduly or unjustly punished, they won't sell online (halting all e-commerce).

Actors:

- International Bodies (ILO, WCO, EU)
- Business forums (GIIC, OPA, AGB GBDe)
- Consumer rights organizations (e.g. CI, TACD, CPT)
- Departments of Justice, Home Affairs, Commerce, Trade and Industry
- Countless businesses.

3. Capacity Building

This section gives brief descriptions of policies that can help build people's skills with ICTs.

A. Technical education[95]

Key Issues:

- Funding for equipment, training, and connections in schools, libraries, and government.
- Role of private sector sponsorship, teacher training; vocational education support, IT literacy and training programs within government; IT entrepreneurial training.
- Equality of training across country (by race, gender, class, geography, etc).

Potential impact on digital divide:

- Critical means to re-skill trainers, teachers and retrenched workers and prepare new job seekers in ICT for the new economy.
- Equitable, quality technology education is vital to bridging the divide.

Actors:

- International Bodies (ILO, EU - eLearning)
- Departments of Education, Trade and Industry.

B. Curriculum and Materials

Key Issues:

- Quality and quantity of education.
- Equality of materials across country (by race, gender, class, geography, etc).

[95] Note, technical education policy issues, not technical education *programmes*

- Teaching policy and social issues to help students engage the information society.

***Potential impact on digital divide**:*
- Equitable, quality education is vital to bridging the divide.
- Technology education builds on basic education, and both are required.
- Important in training and development of locally relevant content.

***Actors**:*
- Education departments

4. Taxation and Trade

This section gives brief descriptions of a few of the wider issues in tax and trade on ICTs.

A. Taxation

Key Issues:
- Whether and how much to tax products sold online.
- Where tax is assessed (especially internationally).
- How it is collected.
- What products are taxed.
- International coordination and cooperation.
- Tracking of e-commerce.
- General taxation levels.

***Potential impact on digital divide**:*
- Many businesses believe high or overly complicated taxes will halt e-commerce.
- Important in ICT sector growth - e-commerce.

***Actors**:*
- International bodies (World Bank, IMF, ITC, WTO, UNCTAD)
- Business forums (e.g. AGB, GBDe, GIIC, ICC).
- Departments of Home Affairs, Foreign Affairs, Commerce, Trade and Industry, Treasury
- Consumer Groups

B. Tariffs and Trade Barriers

***Key Issues**:*
- Tariffs on ICTs and components.
- Existence of equivalent local product and industry.
- Labelling of products as goods or services (and thus the relevant trade agreement).
- Anti-globalisation debate.

Potential impact on digital divide:
- Can raise the price of ICT goods, making them too expensive for parts of the population.
- But can protect local industries for long-term growth.
- Important in pricing, ICT sector.

Actors:
- International bodies (WTO, World Bank, IMF, ITC, UNCTAD).

- Private sector forums (e.g. AGB, GBDe, ICC).
- Department of Home Affairs, Foreign Affairs, Treasury.
- Internet users forums (e.g. INTUG).
- Consumer organizations (CI, TACD).
- Numerous other policy organizations.

C. Foreign Direct Investment (FDI)

Key Issues:
- Percentage of foreign investment allowed in IT sectors.
- Types of investments allowed (speculative, stock, fixed-capital only).
- Ease of de-investment in country.
- Anti-globalisation debate.

Potential impact on digital divide
- Long-term investment can help grow the local ICT sector and overall prosperity of the country, easing the domestic and international digital divide.
- Short-term speculative investments make countries highly susceptible to shocks and can devastate economy, but it is strongly desired by foreign investors.

Actors:
- International bodies (WTO, World Bank, IMF).
- Departments of Trade and Industry, Commerce, Foreign Affairs and Treasury.

5. Employment and Labour[96]

This section gives brief descriptions of some related workforce issues.

A. Collective Bargaining and Other Labour Policies

Key Issues:
- Government position on unions - facilitating or allowing collective bargaining, or attempting to hinder it; the strength of unions politically, wages, flexibility of companies to adopt new technologies and markets.

Potential impact on digital divide:
- Unions and labour policy can play an extremely complicated role, since strong communications unions may resist deregulation and privatisation of telecom (which can help lower access prices and strengthen telecom sector)
- However, unions historically are strong voices for equity in access to technology, and can push the government and private sector towards easing the digital divide.

Actors:
- International bodies (ILO).
- Labour unions.
- Human rights organizations.
- Department of Commerce, Trade and Industry.

[96] For job training and other worker-oriented programs, see "approaches" above.

B. Brain Drain Counter-Measures

***Key Issues**:*

- How local skilled workers are encouraged to stay in the country and foreign workers are encouraged to immigrate.
- Skills targeted and length of stay.

Potential impact on digital divide:

- Skilled workers are necessary to run the economy, start new businesses and creatively adapt technology for local needs, especially in the IT sector.
- The government can encourage the recruitment and retention of skilled workers with marketing and monetary incentives.
- Foreign workers can help build the economy, but may remit their earnings overseas (thus hurting the economy overall), especially if they are not allowed to settle.

Actors:

- Trade and Industry, Commerce, Science and Technology, Education and the Treasury.
- ICT Companies

6. Technology Diffusion

This section gives brief descriptions of policies that can help spread ICTs through a society.

A. Universal Service

***Key Issues**:*

- Requirements for telecommunications companies to pursue universal access.
- Requirements for public access radio and television stations, telecenters.

Potential impact on digital divide:

- Governments can mandate the extension of access to regions which are not served by the market, which equalizes access.
- Public access broadcasting fosters local, culturally relevant content.

***Actors*:**

- International Bodies (UNESCO, World Bank, CoE, EU)
- Internet users forums (e.g. INTUG)
- Departments of Telecommunication, Education and Information

B. E-Government Policy[97]

***Key Issues**:*

- Type of services offered (e.g. information dissemination, public feedback, online form completion).
- Commitment to open source.
- Public access points
- Use of ICTs in government departments and institutions (e.g. hospitals).

[97] E-government programs are discussed under above under "ground-level initiatives". This entry discusses e-government *policy.*

***Potential impact on digital divide**:*

- Online public information makes government more transparent and can reduce corruption.
- The high cost of IT infrastructure roll-out to cater for e-government services and lack of managerial support and awareness within departments could slow processes.

***Actors**:*

- International bodies (EU).
- Most government departments, especially dealing with taxation, social security, motor vehicles.
- IT consultants and e-government software and service providers.

C. Private Sector and Civil Society ICT Incentives

***Key Issues**:*

- Incentives to businesses to integrate ICT in their offices and industries.
- Incentives to NGOs adopting ICTs or providing ICT services to the public.
- Support and encouragement of local content development.

Potential impact on digital divide:

- Increases awareness, interaction, usage.
- Builds trust.

Actors:

- International bodies (UNESCO, EU).
- Departments of Commerce, Trade and Industry, Education.
- ICC, Local Chambers of Commerce.

7. General Government Environment

This section looks at a few of the wider policy issues that impact on ICT use and ICT investment.

A. Government Structure

***Key Issues**:*

- Democracy and open participation in decision-making
- Transparency (i.e. in decision making and procurement)
- Corruption
- Independent judiciary
- Independent regulatory authorities

***Potential impact on digital divide**:*

- Empowered and resourced regulatory authority needed to enable policy decisions
- Frameworks in place to encourage SME growth

***Actors**:*

- Most international bodies (e.g. UN, World Bank, IMF, WTO)
- Numerous government departments
- Online rights organizations
- Consumer rights organizations

B. Discrimination Policy

***Key Issues**:*

- Legality of preferential treatment towards groups of particular ethnicity, religion, gender, age, disability status, sexual orientation, etc in hiring and trade.
- Ability of subject of discrimination to seek redress.
- Affirmative action programs for underprivileged groups.

***Potential impact on digital divide**:*

- Discrimination (current or historical) is a fundamental cause of the digital divide, and continued discrimination and the inability to seek redress among underprivileged groups will only perpetuate it.
- Government instituted preferential treatment toward the underprivileged may alleviate the divide, but has considerable social and political implications.

***Actors**:*

- International bodies (ILO).
- Numerous consumer and civil rights organizations.
- Departments of Home Affairs, Justice.

6. Policy Organizations – Key to Abbreviations

Drawn from "International and Regional Bodies: Activities and Initiatives in Electronic Commerce", (OECD 2001a). *See their websites or the OECD report for more detail on their activities.*

- ACLU - American Civil Liberties Union
  - www.aclu.org
- AGB - Alliance for Global Business
  - www.giic.org/agb
- APC - Association For Progressive Communications
  - www.apc.org
- APEC - Asian-Pacific Economic Cooperation
  - www.apecsec.org.sg
- BIAC - Business and Industry Advisory Committee to the OECD
  - www.biac.org
- BIS - Bank for International Settlements
  - www.bis.org/about/index.htm
- Bits of Freedom
  - www.bof.nl
- CDT - Center for Democracy and Technology
  - www.cdt.org
- CI - Consumers International
  - www.consumersinternational.org
- CSIF - Civil Society Internet Forum
  - www.civilsocietyinternetforum.org
- CoE - Council of Europe
  - www.coe.int
- CPT - Consumer Project on Technology
  - www.cptech.org
- EFF - Electronic Frontier Foundation
  - www.eff.org
- EPIC - Electronic Privacy Information Center
  - www.epic.org
- GBDe - Global Business Dialogue on E-Commerce
  - www.gbde.org
  - digitalbridges.gbde.org
- GIIC - Global Information Infrastructure Commission
  - www.giic.org
- GILC - Global Internet Liberty Campaign
  - www.gilc.org
- ICANN - Internet Corporation for Assigned Names and Numbers
  - www.icann.org
- ICC - International Chamber of Commerce
  - www.iccwbo.org
- IEC - International Electrotechnical Commission
  - www.iec.ch
- ILO - International Labour Organization
  - www.ilo.org
- IMF - International Monetary Fund
  - www.imf.org
- INTUG - International Telecommunications Users Group
  - www.intug.net

- ISO - International Organization for Standardization
  - www.iso.ch
- ITU - International Telecommunication Union
  - www.itu.int
- ITC - International Trade Centre
  - www.intracen.org
- EFTA - European Free Trade Association
  - www.efta.int
- EU - European Union
  - europa.eu.int
- FTAA - Free Trade Area of the Americas
  - www.ftaa-alca.org
- OPA - Online Privacy Alliance
  - www.privacyalliance.org
- PI - Privacy International
  - www.privacy.org/pi
- TACD - Transatlantic Consumer Dialogue
  - www.tacd.org
- UN/CEFACT - United Nations Centre for Trade Facilitation and Electronic Business
  - www.unece.org/cefact
- UNCITRAL - United Nations Commission on International Trade Law
  - www.uncitral.org
- UNCTAD
  - United Nations Conference on Trade and Development
  - www.unctad.org
- UNESCO - United Nations Educational, Scientific and Cultural Organization
  - www.unesco.org
- UPU - Universal Postal Union
  - www.upu.int
- World Bank
  - www.worldbank.org,
  - www.worldbank.org/ict
- WCO - World Customs Organization
  - www.wcoomd.org
- WIPO - World Intellectual Property Organization
  - www.wipo.org
- WTO - World Trade Organization
  - www.wto.org

7. Measuring Policy: Aggregated Data from the World Bank

Measuring policies is a complicated, controversial task. Naturally, what constitutes a "good" policy depends on the author's perspective. Below is data aggregated by the World Bank which "rates" country's policies. The statistics are derived from a wide variety of sources, with different rating systems and methodologies. The chart and descriptions below are meant as a starting point for discussion and further research, and not because they should be taken as definitive.

Composite Statistics from the World Bank's "Knowledge Assessment Matrix"

		Africa	East Asia	Europe	G7	Latin America	Middle East	North Africa	South Asia	Transitioning Economies	US
ICT Sector Growth	Intellectual Property is well protected	4.26	4.10	5.61	5.85	3.80	3.97	n/a	3.42	3.34	6.24
	Investment in telecom	0.64	0.85	0.49	0.44	0.78	0.26	n/a	0.69	1.03	0.38
	Regulatory Framework	0.10	0.41	1.02	0.83	0.51	0.01	-0.18	-0.03	-0.02	1.14
	Tariff & nontariff barriers	4.50	6.20	8.00	8.00	6.75	4.00	3.33	3.00	6.73	8.00
Civil Liberties	Press freedom 1999	48.64	47.70	13.29	18.57	34.33	69.40	68.67	61.83	42.92	13.00
	Government Effectiveness	-0.31	0.46	1.66	1.34	0.02	-0.29	-0.06	-0.55	-0.26	1.37
General Government Environment	Control of Corruption	-0.27	0.25	1.83	1.37	-0.11	-0.37	-0.24	-0.37	-0.24	1.41
	Political stability	-0.16	0.43	1.30	1.05	-0.09	-0.15	-0.56	-0.50	0.27	1.10
	Rule of Law	-0.15	0.45	1.56	1.33	-0.08	0.21	0.07	-0.47	-0.11	1.25
	Soundness of Banks	5.16	3.76	5.91	5.19	3.95	4.58	n/a	3.78	3.27	5.92

Source: http://www1.worldbank.org/gdln/Programs/kam/technical.htm
Descriptions below are quoted from the World Bank, except the text in italics which is drawn from the original source of each statistic.

Intellectual Property is Well Protected: This is based on the statistical score of a large sample group in a particular country responding to the question of whether "intellectual property is well protected" in their country. *Units from 1 to 7; 1= strongly disagree, 7 = strongly agree with the statement.*

Investment in Telecom: *This indicator measures investment in telecommunication as a percentage of Gross Domestic Profit.*

Regulatory Framework: This indicator measures the incidence of market-unfriendly policies such as price controls or inadequate bank supervision, as well as perceptions of the burdens imposed by excessive regulation in areas such as foreign trade and business development. *Units range from -2.5 to 2.5, with higher values corresponding to "better governance".*

Tariff and non-tariff Barriers: This involves a cumulative score assigned to each country based on the analysis of its tariff and non-tariff barriers to trade, such as import bans and quotas as well as strict

labeling and licensing requirements. This score is part of the larger group of indices comprising the Index of Economic Freedom by the Heritage Foundation. *Scores are between 1 and 5, with 5 being the highest tariff and non-tariff barriers.*

Press Freedom: This provides a cumulative score for the degree of press freedom in a country *Countries scoring 0 to 30 are regarded as having a free press; 31 to 60 a partly-free press; 61 to 100 a not-free press.*

Government Effectiveness: This indicator combines into one grouping perceptions of the quality of public service provision, the quality of the bureaucracy, the competence of civil servants, the independence of the civil service from political pressures, and the credibility of the government's commitment to policies. *Units range from -2.5 to 2.5, with higher values corresponding to "better governance".*

Control of Corruption: This indicator corresponds to "graft" measures of corruption. Notably, corruption measured by the frequency of "additional payments to get things done" and the effects of corruption on the business environment. *Units range from -2.5 to 2.5, with higher values corresponding to "better governance".*

Political stability: This index combines several indicators which measure perceptions of the likelihood that the government in power will be destabilized or overthrown by possibly unconstitutional means and/or violent means. This index captures the idea that the quality of governance in a country is compromised by the likelihood of wrenching changes in government, which not only has a direct effect on the continuity of policies, but also at a deeper level undermines the ability of the citizens to peacefully select and replace those in power. *Units range from -2.5 to 2.5, with higher values corresponding to "better governance".*

Rule of Law: This indicator includes several indicators which measure the extent to which agents have confidence in and abide by the rules of society. These include perceptions of the incidence of both violent and non-violent crime, the effectiveness and predictability of the judiciary, and the enforceability of contracts. *Units range from -2.5 to 2.5, with higher values corresponding to "better governance".*

Soundness of Banks: This is based on the statistical score of a large sample group in a particular country responding to the question of whether "banks are generally healthy with sound balance sheets" in their country. *Units from 1 to 7; 1= strongly disagree, 7 = strongly agree with the statement.*

8. Case Study: South African Telecommunications Policy

South African telecommunications policy provides a useful case study of the disconnect between policy reform and on the ground initiatives in the country. Different political agendas play a large role in this policy process.[98]

Introduction

South African telecommunications policy-making is at a crossroads. The path towards national economic growth and equitable development within the information, communication and technology (ICT) sector has been tortuous, given the difficult and sometimes conflicting tasks of liberalization. The critical question is how the government should approach changes in the telecommunications sector to foster the emergence of a globally competitive information economy in South Africa that will encourage the use of ICTs to improve people's lives.

This case study looks at the current telecommunications sector of South Africa, focusing on existing and proposed government policy, and describing the interests of telecom businesses and other constituencies that influence government decision-making. It also provides analysis and recommendations for balancing the needs of ICT users and the concerns of the public and private sectors, while fostering competition and bringing down telecommunications costs.

The current telecommunications policy-making environment in South Africa

There is one fixed line operator in South Africa – the 67% government-owned Telkom – and two mobile operators – Vodacom (50% Telkom owned) and MTN (partially government owned). The Government has licensed a third mobile operator – Cell C – that will begin operations at the end of 2001. Telkom has absolute monopoly over basic telephony (local, national, and international), as well as value added network services (VANS) such as voice over Internet protocol (VoIP, which is currently banned by Telkom). The current debate focuses on two issues:

1. The South African Government's plan to license a second fixed line operator (SNO) in May 2002, where the second national operator (SNO) would be at least 35% owned by state agencies Eskom (electricity) and Transtel (transportation); and
2. The plan to make the current monopoly over telephony, pay-phones, and VANS a duopoly, with the SNO using Telkom infrastructure for three years, after which it would be required to develop and use its own infrastructure.

The Government's long-standing plans to privatise Telkom also complicate the picture, as government departments vie for the revenue from the sale. The plan would allow minimal VoIP only in areas with less than 1% teledensity.

The licensing of a third network operator will be reviewed at the end of 2005. The two fixed line operators will eventually be licensed to compete in the mobile phone market as well, but it is not clear whether the current mobile operators will then be licensed to compete in the fixed line market. All licenses require a minimum 30% black empowerment, and maximum 49% foreign ownership. The partially state owned satellite company, Sentech, will be licensed to compete in the international phone market. A small portion of telco revenue would be used to support Universal Service Provisions.

The Government held hearings around the country on the proposed changes, including a conference in early February 2001. The plan was officially published on March 23, and was open to comment until

[98] This account including bridges.org's recommendation can be found at: http://www.bridges.org/africa/satelcom/report.html.

May 2, 2001. The South African Government is torn by conflicting interests within the bureaucracy and within society. Internally, the Department of Trade advocates early and open deregulation to encourage foreign investment, while the Department of Communications is pushing for extending the monopoly to raise Telkom's IPO value and foster more equitable development. Externally, Telkom and the Congress of South African Trade Unions (COSATU, a labour confederation, and one of three alliance members in the current government) are advocating slow deregulation and job security, through maintenance of Telkom's monopoly for years to come. The business community, many individual Telkom users, and South Africa's nascent regulatory authority, the Independent Communications Authority of South Africa (ICASA), are pushing for rapid deregulation of telecommunications and value added services. ICASA's powers are effectively limited by its position relative to the Department of Communications and a lack of resources.

Analysis

Telecommunication policy has been inconsistent as the Government pursues ICT enabled economic growth, but is unwilling to take the path that this requires. The Government must put forward a coherent high-level national policy framework that all departments work within and towards. This policy should include the rapid licensing of at least one additional fixed-line operator, and the de-bundling and licensing of VANs from basic telephony. Even rudimentary competition would improve the current low quality of service and reduce high costs. Universal Service Provisions should be retained for all licenses to promote equitable development. The current spider's web of conflicting state interests in the various telecommunications companies must be disentangled. Additionally, telecommunications infrastructure should be de-bundled from telephone service to prevent the needless duplication and fracturing of infrastructure. Moreover, the independence of South Africa's regulatory authority, ICASA, must be established to avoid conflicts of interest in the future.

Background

Telecommunications deregulation can be a critical component of a government's plan to promote a low-cost telecom environment, encourage the widespread diffusion of the ICT sector, and enable broader economic and societal benefits from technology integration. In numerous countries, deregulating telecommunications has successfully brought down communication prices and made Internet connections more affordable, encouraging people to use technology and foster economic growth. Naturally, telecommunications is only one piece of the puzzle and policy reform is often required in other sectors as well.

The South African Government has stated its commitment to promote the technology sector in order to stimulate economic growth.[99] As part of that strategy the Government has been engaged in limited telecommunications deregulation activities for a number of years since granting wireless operator licenses in 1993 and implementing the provisions of the Telecommunications Act of 1996. Currently, there is one fixed line operator in South Africa – the 67% government-owned Telkom[100] – and two mobile operators – Vodacom (50% Telkom owned) and MTN (partially government owned). In 1997, Telkom was given a five-year monopoly in providing non-wireless telecommunications infrastructure in South Africa through its public switched telecommunication service license issued under the Telecommunications Act 103 of 1996 on 7 May 1997. This license expires in May 2002. During the monopoly period Telkom is tasked to meet detailed license targets on issues such as quality of service and rural access, of which it is has achieved most. Telkom has absolute monopoly

[99] The Government's commitment has been demonstrated through both the telecommunications and e-commerce policy processes, and most notably by President Thabo Mbeki in his 9 February 2001 State of the Nation address to Parliament launching the Presidential International Task Force on Information Society and Development and the Presidential National Commission on Information Society and Development. See http://www.gov.za/speeches/index.html.

[100] See Annex 1, Fixed-line market growth and statistics in http://www.bridges.org/africa/satelcom/report.html.

over all public switched telecommunications services (PSTS):[101] including local, national, and international telephony, as well as value added network services (VANS) like voice over Internet Protocol (VoIP, which is currently banned by Telkom).[102]
MTN and Vodacom were issued mobile licenses in 1993,[103] and a third mobile (GSM) license was to be announced in July 2000, but was delayed. In February 2001, the third license was awarded to the Cell C Consortium, which is expected to be active by Christmas 2001.[104]

The Government's proposed telecommunications deregulation plan

The Government has proposed new regulations that will bring limited competition into the fixed-line and mobile markets. On 16 March 2001 the Minister of Communications proposed a managed liberalisation strategy to deregulate telecommunications. The new policy directions extend fixed line services into the mobile arena, provide for the sharing of infrastructures, make the 1800kHz band open to fixed and mobile carriers, address digital divide and universal access issues, allow for a limited used of voice over IP, ensure black empowerment criteria are met, maintain government interest in the telecommunications sector, alleviate communications costs for certain schools, introduce number portability, and set clear timeframes for new licensing regimes.
Specifically, the main points of the plan include:

- The creation of a duopoly for public switched telephone network (PSTN) services by issuing a PSTN license to a second national operator (SNO) for international services, national long distance services, pay-phone, local access services and value-added networks services (VANS). The SNO will use the current Telkom infrastructure for three years. The convergence of fixed and mobile licenses will enable Telkom and the SNO to provide international, national and local services as well as compete in the wireless carrier market. The status quo will remain until the 4th quarter of 2005, at which time a third national operator will be licensed, unless it is found that the market cannot support one.

- All major licenses have a 30% black empowerment prerequisite and 49% international ownership limit.

- The SNO is to include 35% ownership by Eskom (electric company) and Transtel (transportation company) – both state owned entities – in its license application.

- The license of Sentech, a distributor of satellite signal, is to be amended to include international long-distance services directly to consumers as well as the provision of multi-media services. This furthers Sentech's existing role in transmitting broadcast signals. The Government has a vested interest in Sentech.

[101] Public switched telecommunications services (PSTS) include: National long-distance telecommunication service; International telecommunication service; Local access telecommunication service; Public pay-telephone service; All or any telecommunication facilities to be used by any person for the provision of value added network services; All or any telecommunication facilities comprising fixed lines to be used by any Operator for the provision of Mobile Telecommunication Services; and All or any telecommunication facilities to be used by any person for the provision of any Private Telecommunication Network.
[102] A value added network is essentially a data network, and a value added network service (VANS) may be defined as a computer-based telecommunication service which transforms and stores information for future consumption. In terms of the section 40(b)(2) of the Telecommunications Act of 1996, VANS are, yet not limited to, "electronic data interchange, E-mail, protocol conversion, access to a database or a managed data network service". All these licensed services, however, are to be supplied by means of Telkom's infrastructure. VoIP was excluded from all VANS licenses.
[103] See Annex 2, Mobile market growth and statistics in http://www.bridges.org/africa/satelcom/report.html.
[104] The issuing of the third wireless license has been contested by NextCom, a losing bidder for the license. For a review of the events surrounding the issuing of this wireless license, see www.cellular.co.za, follow the link "Timeline for the license" in the focus section of the homepage.

- The Minister of Communications will be able to grant VANS licenses for the provision of voice over IP to small and medium enterprises (SMEs) and telecommunications collectives in under-serviced areas with low telephone penetration (that is, with a teledensity of less than 1%).

- The 1800Mhz band is to be licensed to all fixed and mobile carriers.

- Carriers are to contribute 0.5% of their turnover to the Universal Service Fund from April 2003, a fund managed by the Universal Service Agency to ensure that infrastructure is implemented in areas currently without telecommunications services.

- An e-rate is to be introduced to government-funded schools whereby operators will give a 50% discount on calls made for Internet access.

- Number portability (i.e. the ability for users to continue using their existing telephone number when changing carriers) is to be introduced. The mechanism catering for this will be a central database operated by the ICASA.

- Public emergency communications centres are to be established, and accessed by means of a 112 number service.

Time-frame for Government decision-making

A formal statement of the proposed regulations (a 'Government Gazette') was published on 23 March 2001, opening up the debate to public comment for 30 days. The deadline for comment was 2 May 2001. 34 responses to the new policy directives were made directly to the Department of Communications; many submissions were the result of various forums convened in South Africa.[105] The policy directions will come into immediate effect, except where amendments are needed to the Telecommunications Act and to Telkom's license.

Stakeholders in the New Policies

A number of stakeholders and contributors are involved in the policy-making process, including:

- Congress of South African Trade Unions (COSATU) – a federation of organized labour movements in South Africa, and one of three alliance members in the current government;
- Department of Communications (DoC) – responsible for advising the Minister of Communications on policy matters, including the nature of competition;
- Department of Trade and Industry (DTI) – concerned with trade policy, foreign investment;
- Eskom and Transnet – state owned electric and transportation companies;[106]
- Independent Communications Authority of South Africa (ICASA) – replaced the South African Telecommunications Regulatory Authority (SATRA), and is responsible for the regulation of the ICT sector;
- Ministry of Public Enterprises (DPE) – determines policy processes for the public sector;
- South African Information Technology Industry Strategy (SAITIS) – a project convened in 1994 and supported by the government, to develop a national ICT sector development framework; and

[105] Submissions were compiled by: Mr Pakamile Pongwana, Department of Communications, Nkululeko House, iParioli Office Park, 399 Duncan Street, Pretoria, 0001. Tel: +27 12 427-8510. Fax:+27 12 427-8102. Email:pongwanap@doc.pwv.gov.za.

[106] Telecommunications deregulation falls within a wider context of privatization in the country. The government is also undertaking the privatization of electricity (Eskom), defense (Denel) and transport (Transnet).

- Universal Service Agency (USA) – statutory body established by the Telecommunications Act of 1996, aimed at promoting universal access.

The Department of Trade and Industry advocates early and open deregulation to encourage foreign investment, while the Department of Communications is pushing for extending the monopoly to raise Telkom's IPO value and foster more equitable development. Externally, Telkom and COSATU are advocating slow deregulation and job security, through maintenance of Telkom's monopoly for years to come. The business community, many individual Telkom users, and ICASA, South Africa's nascent regulatory authority, are pushing for rapid deregulation of telecommunications and value added services. ICASA's powers are effectively limited by its position relative to the Department of Communications and a lack of resources.

The Second National Telecommunications Colloquium

On 2-4 February 2001, the Department of Communications hosted the *Second National Telecommunications Policy Colloquium* in Gauteng to give the public and private sectors the opportunity to discuss the government's telecommunications policy plans. A number of stakeholders submitted recommendations for policy at this event.[107] Many felt that the Department of Communications used the colloquium to fast-track the policy-making process, that it paid scant attention to the private sector submissions, and then disregarded constructive input by sticking to its original plans for managed liberalization. Critics claimed that the colloquium was merely a facade for a participatory policy process, and the proposed legislation announced on 23 March ignored feedback from the colloquium.

Policy Implications

The main thrust of the managed liberalisation is a restructuring of the telecommunications market in South Africa so that the demands of organised labour are balanced with generating state revenues. However, this does not take into consideration the need to ensure South Africa's competitiveness within a global economy. The plan does little to address the lack of consumer confidence in regulated services. The high access costs for fixed line or mobile users will continue and further raise Internet access costs. The new policy does not meet the global and local voice and data communication needs of corporate business and SMEs. There is an ongoing perception that a privatised telecommunications sector will negatively effect job creation. Furthermore, the policy debate has begun to illustrate the uncoordinated efforts by various government departments to develop a national ICT framework.

What do the proposed policies mean for the current monopoly operator?

In broad terms the phased deregulation of Telkom's monopoly entails the limited unbundling of telecommunications services, the introduction of price competition among five operators, a decreased responsibility for the roll-out of universal access services, and an increased role for ICASA in regulating Telkom's commercial relationship with the SNO. These proposed changes have also increased market speculation over the viability of the proposed Telkom IPO later this year. More specifically, Telkom will retain its PSTS license, thus continuing its role as infrastructure provider and value added service provider in the telecommunications market. The current monopoly on these services will become a duopoly with the addition of the SNO.

Under the new regulations, Telkom will maintain a monopoly over VoIP, despite a October 1997 ruling by SATRA that Internet access services do not fall under public switched telecommunications services.[108] Value added network service providers can provide VoIP at reduced costs, but this is

[107] See Annex 3 for a list of the parties who provided submissions in http://www.bridges.org/africa/satelcom/report.html.
[108] See Reinhardt Buys (ed). *Cyberlaw @ SA: The Law of the Internet in South Africa*, Pretoria: Van Schaik Publishers, 2000; and with reference to Government Gazette No. 18272 of 1997.

restricted by the current telecommunication regulations. The business community and others have heavily criticized Telkom's control over VoIP and other VANS, since it will negatively impact on South Africa's ability to compete globally in telecommunications and electronic commerce services.[109] Telkom's argument in favour of this restriction is that this monopoly over value added network service ensures their revenues so that Telkom can fund the provision of universal access to the under served (mainly rural) areas.

A third implication for Telkom is the possible rise of self-regulated private telecommunications networks (PTNs).[110] These networks are not restricted from providing voice over IP or data services. The restriction on a private telecommunications network is its inability to bypass Telkom's infrastructure, especially a call that originates outside of its network. The potential of a private telecommunications network, however, lies in the decentralisation of telecommunication network services at a regional or local level.

Finally, the issuing of a second PSTS license means that the SNO will have to duplicate the Telkom infrastructure over time as well as shadow Telkom's costs in the interim period. The network economics, in this instance, impact both on the SNO's profitability and the costs passed on to consumers. Telkom has advocated this position as it effectively protects its interests for another few years while the SNO builds its infrastructure. It is worth noting that the Unions also support this position, as they are trying to protect jobs within the sector. However, under the proposed duopoly, the SNO is disadvantaged because it has to rely on the existing Telkom infrastructure to roll-out its services, it has to include Transnet and Eskom's telecommunication assets, it cannot encourage significant international investment, and has tight time-frames (with resultant penalties) in which to meet the licensing directives set by Government – a deferral, in many ways, of some of the obligations which Telkom itself has not even met, for example, the implementation of telecommunications networks to ensure universal access.

What is the impact on mobile operators?

The new policy direction effectively creates five telecommunications operators in South Africa. The extension of Telkom and the SNO's fixed carrier license into the mobile arena, while encouraging the convergence of networks and services, places a significant burden on the market's ability to sustain competition. While "Telkom and the second operator are to be licensed for fixed-mobile services with technology-neutral licenses, all operators, including MTN and Vodacom, are to be given access to the data-rich 1800MHz GSM frequency spectrum at a fee. All operators are also to be offered third-generation licenses at an unspecified future date."[111] The resultant price war may drive one or more players out of business within the next few years. Consequently, the future telecommunications sector could look much like the current status quo.

Anti-competitive deals may occur between the three mobile operators. Telkom has a 50% stake in Vodacom and, as a result, price collusion could occur across a fixed-mobile service network incorporating the Telkom and Vodacom networks. On the other hand, Johnnic, through its subsidiary M-Cell (owner of MTN), may secure the SNO licence, in which case it may lead a MTN-based convergence of fixed-line and mobile communications. The implications for Cell C, the third mobile provider entering the market, are less clear even though their late entry into the market may allow them to take advantage of convergence technologies and strategic alliances within the telecommunications sector.

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[109] For criticisms from the South African VANS Association (SAVA) see Philip de Wet, *VoIP ban will make SA a laughing stock*", *ITWeb.co.za*, 27 March 2001, http://www.itweb.co.za/sections/telecoms/2001/0103271307.asp.

[110] A PTN is a privately owned data and voice network, and is located on private land (or adjoining land parcels) owned by the same legal entity (for example, Eskom and Transnet have PTNs). A PTN is only licensed when it interconnects and uses the facilities of a public switched network.

[111] Phillip de Wet, *Cabinet approves telecoms duopoly*, ITWeb.co.za, 15 March 2001, http://www.itweb.co.za/sections/telecoms/2001/0103151116.asp.

Telecommunications deregulation in the context of the South African political division

The current and forthcoming policy seems likely to perpetuate political division in South Africa if it follows the current course. The Government voices support for economic growth in the ICT sector but it ignores business interventions in the policy process and over-compensates for equitable development in its policy-making process.[112] The division within government (namely, that of the opposing agendas of the Department of Communications, on the one hand, and the Department of Trade and Industry and Department of Public Enterprises, on the other) has created a situation where the social imperatives of job creation, empowerment and redress are pitted against strategies for sustainable development in the ICT sector. A high-level national policy framework that all departments work within and towards would help. The situation is exacerbated as the government tries to satisfy the needs of its shareholders (the voters) and its clients (the taxpayers), because for historical reasons in South Africa these two constituencies often have widely diverging agendas and objectives.

Responses to the proposed legislation

The Government faces significant challenges to its proposal. Overall, the South African business community and the media have expressed pessimism about the prospects for the plan: the proposed policies for telecommunications have not gone far enough. In particular, the recent decision to license only one fixed-line telecommunications operator to rival the monopoly of Telkom has come under sharp criticism. International business leaders point out that the policies do not go far enough to encourage investor confidence. Similarly, the US Trade Representative may lodge a complaint to enforce World Trade Organisation (WTO) rules on competition. The local business community continue to express fears about South Africa's ability to compete globally in the e-commerce arena due to high bandwidth costs. The regulatory authority, ICASA, raised concerns that the plan will undermine its independence and ability to regulate the ICT sector.

Conclusion

Telecommunication policy has been inconsistent as the Government pursues ICT enabled economic growth, but is unwilling to take the path that this requires. The Government must put forward a coherent high-level national policy framework that all departments work within and towards. This policy should include the rapid licensing of at least one additional fixed-line operator, and the de-bundling and licensing of VANS from basic telephony. Even rudimentary competition would improve the current low quality of service and reduce high costs. Universal Service Provisions should be retained for all licenses to promote equitable development. The current spider's web of conflicting state interests in the various telecommunications companies must be disentangled. Additionally, telecommunications infrastructure should be de-bundled from telephone service to prevent the needless duplication and fracturing of infrastructure. Moreover, the independence of South Africa's regulatory authority, ICASA, must be established to avoid conflicts of interest in the future.

[112] "Equitable development" encapsulates the notion of socio-economic development, improved quality of life, historic redress, and black economic empowerment.

9. Other Resources

This section draws together a list of resources not included in other annexes; including actors, programs and reference materials.

A. International Organizations

G8

- G8 Digital Opportunity Task Force (DOT Force)
  http://www.dotforce.org
- 2002 Summit (Okinawa)
  http://www.g8kyushu-okinawa.go.jp/e
- 2001 Summit (Genoa)
  http://www.genoa-g8.it/
- Okinawa Charter on Global Information Society:
  http://www.g8kyushu-okinawa.go.jp/e/documents/it1.html
- UTLink: Univ of Toronto's G8 Information Centre
  http://www.g7.utoronto.ca/
- G8 Online
  http://g8.market2000.ca/

Internet Assigned Numbers Authority
http://www.iana.org/

Internet Corporation for Assigned Names and Numbers
http://www.icann.org/

International Computing Centre
http://www.unicc.org/

International Telecommunications Union
http://www.itu.org/

- Development Group of the ITU
  http://www.itu.int/ITU-D/index.htm

Organisation for Economic Co-operation and Development (OECD)
http://www.oecd.org

United Nations
http://www.un.org/

United Nations Educational, Scientific and Cultural Organization (UNESCO)
http://www.unesco.org/.

United Nations Development Programme (UNDP)
http://www.undp.org

UNDP's Sustainable Development Networking Programme:
http://www.sdnp.undp.org

United Nations Institute for Training and Research (UNITAR)
http://www.unitar.org/

UNITAR Information Society and development Programme
http://www.unitar.org/isd

World Bank
http://www.worldbank.org/

World Bank's InfoDev Program
http://www.infodev.org

WorLD (World Links for Development)
http://www.worldbank.org/worldlinks/english/index.html

- Telecommunication: http://www.worldbank.org/html/fpd/telecoms/
- TechNet: http://www.worldbank.org/html/fpd/technet/

B. Policy Organizations and Advocates

Private

Computer Systems Policy Project
http://www.cspp.org/

Global Business Dialogue On Electronic Commerce (GBDe)
http://www.gbde.org/

US Internet Council
http://www.usic.org/

World Economic Forum's Digital Divide Initiative
http://www.weforum.org/centres.nsf/Documents/Home+-+Centres+Global+Digital+Divide+Initiative

Non-Governmental Organizations

Benton Foundation
http://www.benton.org/
Benton's Communications Policy & Practice Program:
http://www.benton.org/cpphome.html

Civil Society Internet Forum
http://www.civilsocietyinternetforum.org/

Center for Democracy and Technology
http://www.cdt.org/

Computer Professionals for Social Responsibility
http://www.cpsr.org/

Electronic Frontier Foundation
http://www.eff.org/

Electronic Privacy Information Center
http://www.epic.org/**.**

Global Information Infrastructure Commission
http://www.giic.org

Global Internet Liberty Campaign
http://www.gilc.org/

Internet Law & Policy Forum
http://www.ilpf.org/

Internet Policy Institute
http://www.internetpolicy.org/

Internet Public Policy Network
http://www.internetpublicpolicy.com/

Internet Society
http://www.isoc.org/

Internet Engineering Task Force
http://www.ietf.org/

Markle Foundation
http://www.markle.org/
Markle's Policy for a Networked Society Program:
http://www.markle.org/programs/pns/index.html

The Telecommunications and Information Policy Institute
http://www.utexas.edu/research/tipi/

Third World Network
http://www.twnside.org.sg/

C. Development and Support Work[113]

Multifocus Programs

Acacia Initiative
http://www.idrc.ca/acacia/acacia_e.htm

AmeriCorp's Digital Divide Effort
http://www.nationalservice.org/americorps/digital/index.html

Association for Progressive Communications
http://www.apc.org/

Digital Partners
http://www.digitaldivide.org/

International Institute for Communication and Development
http://www.iicd.org/.

Morino Institute
http://www.morino.org/

NetAction
http://www.netaction.org/

Open Society Institute, Soros Foundation
http://www.soros.org/osi.html

UN Information Technology Service
http://www.unites.org/

Business Support

Africa Technology Forum
http://www.africatechforum.com/

Global Partnerships
http://www.globalpartnerships.org/

D. Volunteer Programs

Geek Corps
http://www.geekcorps.org/

Global Technology Corps
http://www.globaltechcorps.org/

Net Corps
http://www.netcorps-cyberjeunes.org/english/main_e.htm

United Nations Information Technology Service
http://www.unites.org/

United Nations Volunteers
http://www.unv.org/

Volunteers in Technical Assistance
http://www.vita.org/

E. Technical Training

African Virtual University
http://www.avu.org/

Internet Training Centre for Developing Countries
http://www.itu.int/ITU-D-HRD/partnership/ingtu/itcidc/index.html

ITrain
http://unganisha.idrc.ca/itrain/

SchoolNets
www.schoolnet.org.za

[113] Note: numerous other organizations are described in Annex 7.4 "On The Ground Initiatives".

www.schoolnetafrica.org
http://www.en.eun.org/eun.org2/eun/en/index.html

UNESCO Intergovernmental Informatics Program
http://www.unesco.org/webworld/iip/

WorLD (World Links for Development)
http://www.worldbank.org/worldlinks/

F. Healthcare

Healthnet
http://www.healthnet.org/hnet/hnet.html

SilverPlatter
http://www.silverplatter.com

World Health Organization
http://www.who.int/

G. E-Democracy

Democracies Online
http://www.e-democracy.org/do/

E-Democracy Thrives in Winona Minnesota
http://onlinedemocracy.winona.org/startup.html

H. Media Democracy

Internews
http://www.internews.org/

I. Access, Telecenters, Community Technology Centers

World Computer Exchange
http://www.WorldComputerExchange.org

Community Technology Centers' Network
http://www.ctcnet.org/

Information and Communications Technologies in Support of Sustainable Human Development (ICT/SHD) (Pilot Project in South Africa):
http://www.undp.org/info21/pilot/pi-sa.html

InfoDev's List of Similar (Networking) Programs:
http://www.infodev.org/about/other.htm

Learnlink: Academy for Educational Development (AED):
http://www.aed.org/learnlink/

Learnlink's List of Community Technology Center Programs:
http://www.aed.org/learnlink/techlink/comcom.html

Leland Initiative of USAID
http://www.usaid.gov/regions/afr/leland/

Network Startup Resource Center
http://www.nsrc.org/

JokoClub, Senegal
http://www.jokoclub.org/

J. Technology Development

Digital Nations
http://dn.media.mit.edu/prospectus.html
Simputer
http://www.simputer.org/

K. Research Organizations

BellaNet
http://www.bellanet.org/
Center for Strategic and International Studies
http://www.csis.org/
International Development Research Center
http://www.idrc.ca/index_e.html
North-South Institute (NSI)
http://www.nsi-ins.ca/ensi/index.html
UK's ID21 Development Research Site
http://www.id21.org/

L. Businesses

Hewlett Packard's World e-Inclusion program
http://www.hp.com/e-inclusion/en/
Meta-List of Internet Access Providers
http://www.herbison.com/herbison/iap_meta_list.html
Africa Online
http://www.africaonline.com/index1.html

M. Grant Making Institutions

Bill and Melinda Gates Foundation
http://www.glf.org/
Benton Foundation
http://www.benton.org/
Education, Technology Foundations
http://www.hpineducation.hp.com/k12/philanthropy/k12_foundations.html
NetAid
http://netaid.org/
Markle Foundation
http://www.markle.org/
Morino Institute
http://www.morino.org/
World Bank
http:///www.worldbank.org/
Ford Foundation
http://www.fordfound.org/

N. Digital Divide Reports

- "Bridging the Digital Divide: *Thinking about community technology"*
  Josh Senyak & Albert Fong, 30 November, 2000
  http://www.techsoup.org/articlepage.cfm?topicid=12&articleid=164

- "Bridging the Digital Divide" Uday Mohan, 26-9-2000
  http://www.iicd.org/base/show_article?article_id=414&subcat=41
  "Digital Delusions: Issues in Broadband Access Pricing" Liza Carver, Partner, January 1998: http://www.gtlaw.com.au/pubs/digitaldelusions.html
- "Universal Service and Universal Access Issues" Peter Benjamin & Mona Dahms, *Sweden, June 1999.*
  http://www.sn.apc.org/community/paperuni.htm.
- "Closing the Digital Divide: An Initial Review " by Ernest J. Wilson III,
  http://www.internetpolicy.org/briefing/ErnestWilson0700.html
- "As Net Resources Grow, So Will Digital Divide"
  http://www.pcworld.com/news/article.asp?aid=31461
- "Beyond Access: Understanding the Digital Divide"
  http://www.benton.org/Divide/thirdact/speech.html
- (News Item) Group says visas widen digital divide.
  http://www.zdnet.com/zdnn/stories/news/0,4586,2599634,00.html
- UNV on UNITeS and the Digital Divide
  http://www.unv.org/unvnews/89/89unites.html
- Achieving Universal Access - a report by Booz-Allen and Hamilton Associates
  http://www.number-10.gov.uk/default.asp?PageID=1203
- "The Digital Divide Myth", Mick Brady, August 4, 2000
  http://www.ecommercetimes.com/news/viewpoint2000/view-000804-1.shtml
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- "The Internet Belongs to Everyone", by Eric Lee:
  http://www.labourstart.org.uk/icann/
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  http://www.educause.edu/pub/er/erm00/erm006.html
- "The Evolution of the Digital Divide: How Gaps in Internet Access May Impact Electronic Commerce"
  http://www.ascusc.org/jcmc/vol5/issue3/hoffman.html
- "The Internet's Coming of Age" report by NATIONAL RESEARCH COUNCIL
  http://www4.nationalacademies.org/news.nsf/isbn/0309069920?OpenDocument

O. Statistics

Access

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- Broadband in the US – Study
  http://www.ntca.org/press/releases/broadbandstudy.pdf.
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  http://www.isp-planet.com/research/business.html
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  http://news6.thdo.bbc.co.uk/hi/English/sci/tech/newsid%5F843000/843160.stm

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- (News Item) Pedophiles Calling A Fifth Of Internet Kids - Govt Report (Newsbytes)
  http://www.qlinks.net/items/qlitem9330.htm

- Profile of a (US) Net User
  http://www.ecommercetimes.com/news/articles2000/001016-4.shtml
  http://www.yankeegroup.com/

Community Technology Centers, Telecenters

- "Little Engines that did: case histories from the global telecenter movement"
  http://www.idrc.ca/acacia/engine/index.html
- Study on Community Tech Centres in US
  http://www.edc.org/spotlight/Tech/ctcnet2000.htm
- Seattle Community Network
  http://www.scn.org/teched/

Technology in Education

- Papers from US Conference on Educational Technology
  http://www.ed.gov/Technology/techconf/2000/white_papers.html
- "E-Rate and the Digital Divide: A Preliminary Analysis From the Integrated Studies of Educational Technology":
  http://www.ed.gov/offices/OUS/eval/elem.html#technology
- "Teachers' Tools for the 21rst Century: A Report on Teachers' Use of Technology":
  http://nces.ed.gov/pubsearch/pubsinfo.asp?pubid=2000102
- "How the Internet is changing the fourth grade"
  http://europe.cnn.com/2000/TECH/computing/09/25/changing.4th.grade.idg/index.html
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  http://www.salon.com/tech/feature/2000/09/20/technoutopia/
- "Fool's Gold: A Critical Look at Computers in Childhood"
  http://www.allianceforchildhood.net/

P. Overall Technology and Digital Divide Surveys (With a Range of Statistics)

- Research Data on Digital Divide, Resource page from Looksmart.com
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  eus552286/eus65566/eus227431/eus903931/eus904537/r?l&
- Research Data on the Digital Divide, Resource page from Altavista
  http://looksmart.altavista.com/cgi-bin/query?pg=dir&tp=Library/Society/Issues_.26_Policy/Information_Society/Digital_Divide/Research_Data&crid=904537

Q. Discussion Lists

- Digital Divide email list, Benton Foundation
  - http://www.digitaldividenetwork.org/content/sections/index.cfm
- G8 Digital Opportunity Task Force NGO Consultations
  - Canada: BellaNet's DOTCIV list http://www.bellanet.org/dotforce/
  - France: VECAM's site http://www.vecam.org/
  - Japan: Forum hosted by GLOCOM http://www.glocom.ac.jp/dotforce/index.html
  - United Kingdom: OneWorld's site: http://www.oneworld.net/dotforce/
  - United States: Markle Foundation's DIGOPP list
    http://www.edc.org/GLG/Markle/dotforce/

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