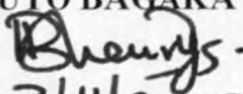


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**UNIVERSITY OF NAIROBI**  
**INSTITUTE OF COMPUTER SCIENCE**

**An Assessment of Electronic Government in  
Kenya – A Case Study of the Civil  
Registration Department of Kenya**

**BY**

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To my Family for their constant source of encouragement and support

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In Loving memory of my late dear parents Andaraniko and Moraa and my  
late two sisters Milcah and Anne

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## List of Abbreviations

<b>APEC</b>	- Asian Pacific Economic Cooperation
<b>ATM</b>	- Automated Teller Machines
<b>CESG</b>	- Communications Electronic Security Group
<b>CITU</b>	- Central IT Unit
<b>CID</b>	- Center for International Development
<b>CSPP</b>	- Computer Systems Policy Project
<b>DOT</b>	- Digital Opportunity Task
<b>ESD</b>	- Electronic Service Delivery
<b>EU</b>	- European Union
<b>GSI</b>	- Government Secure Intranet
<b>IBM</b>	- International Business Machines
<b>ITU</b>	- International Telecommunication Union
<b>ISP</b>	- Internet Service Provider
<b>ICT</b>	- Information and Communication Technology
<b>IT</b>	- Information Technology
<b>ID</b>	- Identification Card
<b>IRS</b>	- Internal Revenue Service
<b>IVR</b>	- Interactive Voice Response
<b>NPR</b>	- National Partnership for Reinventing
<b>NCET</b>	- National Council for Education and Technology
<b>NII</b>	- National Information Infrastructure
<b>NSTB</b>	- National Science and technology Board
<b>NOIE</b>	- National Office for Information Economy
<b>OGO</b>	- Office of Government Online
<b>PC</b>	- Personal Computer
<b>PKI</b>	- Public Key Infrastructure
<b>PRSP</b>	- Poverty Reduction Strategy
<b>SBA</b>	- Singapore Broadcasting Authority
<b>SME</b>	- Small and Medium Enterprises
<b>US</b>	- United States of America
<b>UK</b>	- United Kingdom
<b>UN</b>	- United Nations
<b>UNDESA</b>	- United Nations department of Economic and Social Affairs
<b>WSIS</b>	- World Summit on Information Society

## ABSTRACT

In recent years there has been an increasing focus in many countries on the concept of electronic government, commonly referred as e-government. Many countries see it as a central component of efforts to “modernize” or “reinvent” government. In Kenya there has been discussion around using an e-government initiative to move from the traditional “ancient” model to a modern “networked” model. This Research study analyses the status of e-government in the Civil Registration of Kenya and in particular government-to-citizen (G2C) form of e-government.

Creating e-government in the Civil Registration will involve a major change. The key challenges are not only technological but also those related to culture, infrastructure, economic, structural adjustment, political landscape and business strategy. E-government is not driven by a single discipline such as information technology but a variety. The forces are derived from the social objectives of public administration in balancing efficiency, effectiveness and social efficacy, as well as, coping with the changing political landscape at both organizational and national levels.

E-readiness is a prerequisite to the creation and implementation of e-government. E-readiness involves assessing the Civil Registration’s relative degree of advancement in the areas of Networked World for ICT adoption and the basic applications of ICT providing a robust portrayal of e-readiness level and the e-government status. Data collected from the Civil Registration, the service providers and the public regarding the status, deployment, adoption and usage of ICT has been mapped onto the CID model, a framework for assessing e-readiness thus providing the status of e-government.

The low level degree of e-readiness in the Civil Registration from the assessed areas of the networked world should be of interest to the government, Civil Registration executives, policy makers and stakeholders when developing strategic plans and in investment prioritization. The level of e-readiness in the Civil Registration provides the basis and good reason for a need to carry out a comprehensive collection of a complete and current data on the various ICT and e-readiness indicators in all government agencies. The findings will contribute greatly and consequently form the basis for an e-government strategic plan and ICT policy framework in Kenya.



## CHAPTER ONE

### 1.0 Introduction:

The advent of Information and Communication Technology (ICT) as a tool for service delivery has redefined concepts and fundamentals. Many countries in the world today agree that ICT has the potential to change institutions and mechanisms of service delivery thereby improving the quality of service to their citizens. Along with the spectacular rise of “e-commerce” around the world, we are also witnessing the emergence of a related phenomenon, what is being called “Information Age government” or “electronic government” (e-government). Many countries in the world today regard the development of some form of e-government as a key strategy for ensuring their success in the 21<sup>st</sup> century, and are rapidly implementing major initiatives in this area [15].

E-government, a component of ICT is to fundamentally change how the government operates, implying a new set of responsibilities for the executive, legislature and citizenry bringing about social and cultural change. A common feature of e-government initiatives around the world is their strong focus on making government more citizens-oriented. A richer way of describing e-government is to say that it involves making use of ICT to rebuild government from the outside in (John F. Rockart, 2002). The emphasis is generally focused on the needs of citizens, communities and business, and not those of government agencies and public management systems. E-government can also reinvent the government by identifying the strategies that rethink the core value of key government services, improve service delivery, reduce costs and redefine administrative processes. E-government solutions have been successfully used in a number of countries in the world to promote transparent governance, introduce administrative reforms and contribute to revenue growth [5].

E-government presents challenges and opportunities for transforming both the mechanics of government and the nature of governance itself. It affects all government functions and agencies, the private sector, and civil society. Over time it has the potential to positively change the way government operates and how citizens and businesses interact with government [15]. During the year 2000/2001, the government of Kenya undertook Country-wide Poverty Reduction strategy consultation exercise leading to the poverty Reduction Strategy Paper (PRSP), in which e-government was part of the areas that were extensively discussed [17].

**Definition:** The term "e-government" is being increasingly used to describe the potential for information and communication technologies to dramatically change the way that government provides services and interacts with citizens. There are a variety of disciplines that inform understanding of the e-government. They include political theory, information systems, organization theory and public policy. Subsequently, a variety of definitions both broad and narrow have emerged. A typical example is:

“Electronic Government is a form of organization that integrates the interactions and interrelations between government and citizens, companies, customers, and public institutions through the application of modern information and communication technologies.” (Schedler & Scharf 2001) [14].

**Forms of e-government:** The term “e-government” has spawned acronyms to describe different forms of inter-organizational relationship as described below [6].

### **1. Government-to-Government (G2G)**

G2G aims at serving both intra and inter-government agencies within a nation and among nations. It is sometimes suggested that government ought to improve and upgrade their internal systems and procedures before electronically transacting with citizens and business; thus making G2G the backbone of e-government. Some G2G applications: inter-agency payments, procurement, and standardized forms.

### **2. Government-to-Business (G2B)**

G2B aims at serving the business sector. It usually receives support because it has a direct impact on the private sector and reduces the cost of conducting transactions with the government. Some G2B applications: procurement, taxation, and licensing.

### **3. Government-to-Citizen (G2C)**

G2C aims at serving the citizen. It facilitate citizen interaction with government by enhancing access to public information through the use of websites and/or kiosks, by reducing the time and cost to conduct a transaction, by attenuating the agency-centric nature of some government functions. G2C is perceived to be the primary goal of e-government. Some governments are currently offering a one-stop shopping site for the citizens. Some G2C applications can be civil registration, health, education, and municipal services.

#### **4. Government-to-Employee (G2E)**

G2E aims at serving government employees. It usually based on the use of the Intranet/Internet. Some G2E solution is the implementation of a human resource management system with self service functionalities that allows the employee to apply online for a annual leave, check his total number the balance of his remaining vacation, and review his review his salary slip among other things.

The roadmap to creating and implementing e-government is not straight. The key challenges include technology culture, infrastructure, economic, structural adjustment, political landscape and business strategy factors. E-government is not be driven by one discipline. In addition past research shows that there are peculiarities of developing and using information technology within the public sector. These peculiarity forces derive from the social objectives of public administration in balancing, efficiency, effectiveness and social efficacy, as well as, coping with the changing political landscape at both organizational and national levels [9].

To manage the e-government transition, a system of governance must be implemented that provides a coordinated framework for the transition to online services and must be robust enough to ensure efficient and effective ongoing public service and confidence from all. The transition will require a well-developed and articulated vision, effective political and managerial leadership, sound regulatory framework, coordinated strategy and communication, building an appropriate technical and organizational infrastructure, all appropriately resourced and informed to address the digital divide and re-skill citizens and government [13].

E-readiness is a prerequisite to participating in the global information economy, which depends upon the integration of ICT into society at large [16]. E-Readiness is the degree to which a community is prepared to participate in the Networked World. It is gauged by assessing a community's relative advancement in the areas that are most critical for ICT adoption and the most important applications of ICT. When considered together in the context of a strategic planning dialogue, an assessment based on these elements provides a robust portrayal of a community's Readiness [11].

## **1.1 Scope of Study**

The government of Kenya through the 2003-2007 Economic Recovery strategy for wealth and employment creation policy document prepared by the ministry of Planning and National Development recognizes the economic value and benefits of ICT services both in the rural and urban areas. It further recognizes that, the sector has not been able to achieve its objectives due to low penetration of ICT usage in Kenya. Some of the challenges and impediments advanced include among others the high cost of equipment, poor Telecommunication infrastructure, lack of power supply, awareness, priority, focus, legal framework, co-ordination, resources and capacity [18].

The government in order to foster growth in the sector intends to among other things develop e-government master plan. This blueprint for action is essential in order to realize any goal, expand business opportunities, increase efficiency, improve the quality of life and facilitate an inclusive participation in realizing the potential benefits to the economy. Examining the status of e-government in Kenya will definitely form a foundational basis for the country's e-government blueprint [18].

In order for the government to develop a comprehensive e-government Master-Plan, there is need to develop a comprehensive collection of a complete and current data on various information and communication technologies (ICT) indicators in Kenya. These indicators would be extremely beneficial and critical in guiding the government and other stakeholders in areas among others the infrastructure and access, e-learning, e-society, e-economy and e-policy that are critical to the creation and implementation of e-government.

The study looks at e-government in the Civil Registration Department of the government of Kenya in view of its status and readiness. The Civil Registration as a government agency constitutes a sizable proportion of interaction between the government agency and ordinary citizens. Civil Registration among others deals mainly with the registration of births, deaths and marriages. The study therefore focuses on one of the main forms of e-government (G2C) to test the e-government status in the Civil Registration Department of Kenya. To test e-government in the Civil Registration, an e-readiness assessment has been carried out.

## **1.2.0 Problem definition and solution to the problem**

### **1.2.1 Statement of the Problem**

The government of Kenya budgets and spends large sums of money investing in ICT solutions that are meant to incorporate more productive ways of doing work and consequently serve her citizens. During the fiscal year 2003/2004, the government of Kenya plans to spend Kenya shillings seven Hundred and Ninety million (790M) on ICT solutions in various government agencies. The government through the ministry of Planning and National Development in its 2000/2001 Poverty Reduction Strategy Paper (PRSP) countrywide consultations report, planned to leverage Information Technology in its national priorities of growth and poverty reduction so as to strategically position itself for the global digital economy. The government through the 2003-2007 Economic Recovery strategy for wealth and employment creation policy document prepared by the ministry of Planning and National Development plans to develop an ICT policy framework and e-government Master-Plan.

The Civil Registration Department is one of the main government agencies that are involved in the process of serving the ordinary citizens daily. Use of ICT in the Civil Registration is definitely critical in the daily service delivery to the citizens. In an effort to improve and enhance service delivery, there has been talk that the Civil Registration plans to move to e-government. However, as a government agency, most of the projects for the department are implemented through the central government.

A national e-government blueprint for action is essential in order for any government agency to realize any objectives. The blueprint will guide the government, government agencies, government executives, policy makers, stakeholders and project implementers in the creation and transition management of e-government within and without their jurisdictions. Complete and current data on the various ICT indicators in all government agencies is critical in order to develop an applicable and comprehensive strategy framework. E-readiness assessment is one means of collecting these data and remains to be a prerequisite in the development of this blueprint and subsequently the implementation of e-government.

### **1.2.2 Research Questions posed**

1. What is the status of e-government in the Civil Registration of Kenya?
2. What is the e-readiness level of the Civil Registration of Kenya?
3. What are the main challenges to the delivery of e-government in the Civil Registration of Kenya?

### **1.2.3 Solution to the problem**

In the Poverty Reduction Strategy paper, the government and other stakeholders made some recommendations during the consultative meetings on the way forward leading to the creation and transition of Kenya into an Information Nation. Among the recommendations that were put forward included among others:

- Develop infrastructure and improve access of ICT;
- Enhance effectiveness and efficiency of government systems;
- Develop and link up to a knowledge based economy;
- Train and develop ICT skilled local human resource and;
- Establish an office of ICT-Minister [17].

In the Economic Recovery Strategy for Wealth and Employment Creation 2003-2007, the government of Kenya in its effort to leverage the use of ICT and foster growth in the sector, the government plans to among other things to:

- Mainstream ICT into the main government operations, develop an applicable legislative, regulatory and trade policies that will enhance the development of ICT in the country and;
- Develop a master plan for e-government [18].

As the government strives to create and implement e-government for better delivery of government services to citizens, one questions which stands out clear is “What is the status of e-government in Kenya”? The answer to this question provides a basis and a starting point for the government, the relevant authorities and the stakeholders in the development and implementation of e-government. Collection of data concerning the status of e-readiness in the areas of networked society provides the cornerstone to the planning and development of the e-government Master Plan.

Examining e-readiness and e-government status at the Civil Registration Department will definitely form a foundational basis for a strategy and development framework blueprint for the Civil Registration department. The e-readiness assessment data will go a long way in assisting the Civil Registration Department and the Government in general in the development of medium term and long term objectives and strategies that are meant to achieve efficiency and effectiveness to the delivery of Civil Registration services to the Citizens. These data will also assist in the planning and development of the National sector strategies for ICT. Current and future planning and developments of e-government in the Civil Registration will require these data forming the basis of the approach and direction of investment and prioritization of ICT in the Department. In this regard an e-readiness assessment has been undertaken. The assessment of readiness has been measured in terms of Information Infrastructure and Access, Networked Learning, Networked Society, Networked Economy and Networked Policy.

It is anticipated that the results of this study will be useful in forming a foundation for formulating e-government Strategy Framework for the government of Kenya.

## CHAPTER TWO

### 2.0 Literature Review

There is wide consensus that information and communication technologies (ICT) are central to participation in the emerging knowledge economy and society, hold enormous potential to accelerate economic growth, promote sustainable development and empowerment and reduce poverty. There are specific benefits to be derived across a wide range of sectors, including education, health care, natural resource and agricultural management, disaster response, entrepreneurship and economic development, governance and socio-cultural issues [5].

In a consultation paper by NCET [1] argues that that ICT is rapidly changing the world we live in. ICT is changing the nature of society and the way of working. In Kenya, ICT has revolutionized few sectors including the banking sector, with now most banks offering 24 hours ATM service, Tele-banking service now being offered through the ATM machines and Mobile Telephones, Credit and Debit cards for buying of goods and services through a wide range of outlets. The Mobile telephone facility has enabled most urban dwellers and substantial number of rural dwellers to access telephony facility communication more easily and conveniently, Internet and e-mail services offered by cyber/kiosks has enabled most Kenyans to communicate through the e-mail access and browse the Internet without owning a computer and/or a communication link.

E-government technologies are seen as key drivers in national development and efforts at enlarging their application are being pursued by all countries in the world to varying degrees. Both Qualitative and quantitative surveys indicate that challenges to creating e-governments remain in harnessing these technologies and building the requisite infrastructure and culture for their use and appropriation at the national level. In addition, the political momentum behind transformation of government and governance through e-government is not equally pronounced within the various nations or regions and there is a risk that inequalities in levels of leadership, policies, laws, regulations, strategic public investments, education including ICT education, and connectivity may further increase without deliberate actions and improved coordination [5].



In the context of government reform and good governance, when used appropriately, e-government can be an instrument for democracy building, stimulating broader participation, partnership building, and promoting efficiency, effectiveness, transparency and accountability. In particular, e-government technologies and practices may improve substantially the capacity for re-engineering public administration, allow for greater coordination among different branches and different bodies of government, and can result in a transformation in the relationship between governments and citizens and governments and businesses. It may also dramatically enhance the delivery of public services. E-government applications can lower the cost of reform and increase its effectiveness in unprecedented ways and are noteworthy for their potential to improve the fiscal position of governments, increasing confidence of investors, trade partners and donors, and winning the greater trust of the public at large [6].

E-government can further serve to increase access to information about the ways in which governments operate and help drive knowledge acquisition and utilization. Moreover, it can enhance economic development by reducing red tape, bureaucratic barriers, opening procurement and promoting small and medium enterprises (SME). The most valuable among e-government applications empower people, raise their capabilities, and expand their access to life choices and opportunities. E-government can actually help drive the broader ICT agenda and national knowledge infrastructure [5].

ICT presents vast opportunities. However, considerable challenges do exist to realize these opportunities. Much of the global community is yet to fully benefit from the ICT revolution and the dynamic developments taking place as a result of these technologies. This underpins the need and importance of the activities of the United Nations and the Secretary General, as well as those of the G8, which aim to bring the benefits of ICT to all people in the world and put them at the service of poverty reduction. To these ends, two international initiatives were created: the United Nations ICT Task Force and the G8 Digital Opportunity Task Force (DOT Force). They both represent unique partnerships whereby all relevant stakeholders - public, private and civil society - work to identify critical priorities and coordinate efforts. Moreover, the value placed on ICT as a development tool has found further support in the Millennium Declaration, which resolved to '... ensure that the benefits of new technologies, especially information and communication technologies, are available to all...'. In addition,

the International Telecommunications Union (ITU) is leading the organization to the 2003 World Summit on the Information Society (WSIS), the aim of which is to develop a common vision and understanding of the Information Society and to formulate a strategic action plan [5].

During the 2001 DOT force action plan set up by the US president on "Expanding e-government" initiative, the following reasons were identified as major impediments to increase productivity [9]:

- **Islands of Automation:** The public sector agencies generally acquire systems that address internal needs, and rarely are the systems able to inter-operate or communicate with those in other agencies leading to a situation of "islands of automation". Consequently, citizens have to search across multiple agencies to get service, businesses have to file the same information multiple times and agencies cannot easily share information.
- **Systems Performance Value:** The public sector agencies evaluate ICT systems according to how well they serve the agency's needs and processes and not how well they respond to the citizen's needs. Systems are often evaluated on the internal working benefits rather than both the internal and external performance benefit they deliver to the services they support.
- **Technology Leverage:** The government agencies have for a long time focused on the automation of existing processes rather than creating a more efficient and effective solutions that are now possible with the advent of ICT.
- **Resistance to change:** Budget processes and agency cultures perpetuate obsolete bureaucratic divisions. Budgeting processes have not provided a mechanism for investing in cross-agency ICT. Moreover, agency cultures and fear of reorganization create resistance to integrating work and sharing use of systems across several agencies.

The United Nations ICT Task Force, building on the Millennium Declaration, refers to e-governance and e-government as priority action areas and has established a working group on ICT Policy and Governance, as well as one on National and Regional e-Strategies, in which e-government is a component. In addition, in its Action Plan presented in 2001, the DOT Force made reference to the importance of e-government and e-governance in several instances and called for the creation of an E-government Plan of Action, which was subsequently formulated under the leadership of the Government of Italy and with the support of the UN Department of Economic and Social Affairs (UNDESA), and presented at the 2002 Calgary Dot Force Meeting and the 2002 Kananaskis meeting of the G8 [5].

At the 2002 Palermo International Conference on e-Government for Development, organized by the Government of Italy in collaboration with UNDESA, participants recognized that the growing integration of the world economy and the increasing importance of knowledge in people's work and life create new expectations and demands with relation to government operations. The Conference confirmed that as governments undergo transformation to respond to this challenge, introduction of ICT to their operations can prove revolutionary if put in the context of broad government reform and a transformation process that aims at increased efficiency, effectiveness, transparency and accountability of government operations [5].

The technological gains of the last several decades lie at the core of staggering new surges of wealth and well being within the richest countries of the world. Electronic commerce and related applications of information and communication technologies (ICT) have become tremendous engines for economic growth and productivity and are changing the shape of the world in which we live. Yet the developed world is reaping the vast majority of these gains. It is in this view that the appropriate use of information and communication technologies can also improve the lives of the 80% of the world's population that lives in the developing world [11].

The great divide between rich and poor countries, long observed with regard to economic wealth and social conditions, is equally prevalent and worrisome in the realm of information and communication technologies. While the growth of the Internet and the continuing digitalization of society are much more heralded events in more developed countries, many

leaders in developing nations are left wondering how they can participate in the rapid changes going on around them. How can ICT help their businesses, governments and communities become more productive? How do they get ready for the Networked World? We believe that there now exists a unique opportunity for many of these communities to join global information networks to propel them to greater wealth and prosperity. Without a concerted effort by the developing world to get ready for the global networked economy, however, the gaps in living standards between developed and developing countries will only grow wider, and the productive use of these technologies will remain a phenomenon that is largely confined to the richest parts of the world [11].

E-government strives for a better delivery of government services to citizens, for an improved interaction with business and industry, for citizen empowerment through access to information, and for a more efficient government management. As a result, e-government direct impact on the economy and society can be less corruption, increased transparency, greater convenience, revenue growth, and/or cost reductions [5].

The following benefits are recognized as being associated with e-government applications:

- Better delivery of services and information to businesses and citizens;
- Creating new employment opportunities in public and private sectors;
- Reducing poverty and illiteracy;
- Transparency of government;
- Public sector reform and anticorruption;
- Empowerment through access to information;
- Improving efficiency in government processing;
- Bridging the “digital divide”;
- Contributing to a knowledge-based economy.

## **2.1 E-government developments and Challenges in other Countries**

### **2.1.1 Introduction**

It is highly unlikely that there is any one metric for e-government or a “recipe” for its successful development and implementation, especially at such an early stage in the shift to government online. The very nature and context of government does not lend itself to simple, formulaic rules. There are a whole host of variables — cultural, political, legal and others — that militate against simple transfer of ideas. During the year 2000, the UK government commissioned a report comparing countries and benchmarking any serious attempt to change practice in government (Oakley, 2000). E-government must not be seen as just about access to the Internet but also including services delivered by telephone, digital TV, and kiosks. This is an important point. In the US, the government’s effort to implement electronic service delivery are Internet-focused with minimal use of kiosks. Both the Netherlands and Finland recognize the telephone as a useful means of delivery. But it is in Australia and the UK where Interactive Voice Response (IVR) and call centers are most widely used. Singapore has made a significant investment in broadband multimedia, and the UK is well advanced in the rollout of digital TV. These are all strategies geared and seen as important tools for getting Electronic Service Delivery (ESD) into low-income households [15].

Two of the major enablers of e-government are leadership and funding. Many politicians across the world have championed the digital economy and by extension, e-government. In some cases, such as Victoria, Australia, the connection between e-government and the rest of the economy is made explicit. The Victorian government argues that the public sector needs to understand and use these technologies if it is to exhort the rest of society to do so – it needs to lead by example. In the US, the white house is the most vocal associated with digital government [15].

In addition to top-level leadership, most e-government initiatives have explicit targets for the delivery of ESD. How realistic these targets are, and whether they fulfill a useful purpose is debatable. In the UK, Prime Minister Tony Blair has been active in setting challenging goals for the provision of online services to the public. However, challenging targets are of little use without funding. The smarter administrations throughout the world have realized that this is a long-term venture and cost savings will not be realized quickly. Public/private partnerships will have a role to play in delivery, but some of the cost will undoubtedly be

borne by the taxpayer. As e-government is still in its infancy or at the pilot stage, there is a notable absence of a comprehensive funding model. Who pays, and how e-government is funded, is crucial to its success and this is an area requiring much attention from policymakers [15].

### **2.1.2 AUSTRALIA**

Australia had long been at the forefront of initiatives around e-government and has ambitious objectives and targets. A federal initiative entitled “Internet 2001” aimed to deliver all appropriate Commonwealth services electronically via the Internet by end of 2001. Responsibility for achieving this objective rested with the Office for Government Online (OGO) and the National Office for the Information Economy (NOIE). The formation of these offices gave specific recognition to the importance of e-government [15].

Government statements however tended to concentrate on the practical benefits of increased ICT use, such as lower costs and overcoming the tyranny of distance in such a large country, rather than its role in changing how government operates. The main motivation appears to be cost savings and provision of better services. By February 1999, just over 18% of all households (24% of the population) had home Internet access, making Australia one of the most wired countries in the world by then. As in other countries, city dwellers were most likely to be connected – 79% of those with access live in major cities. Although Internet use was fairly high, there was concern about remote and rural areas of Australia, where many users are not within a local phone call or an Internet Service Provider (ISP). Mobile phone penetration is high – there were almost seven million mobile phones at the end of September 1999 [15].

### **2.1.3 UNITED STATES**

Perhaps surprising in an economy where the dot.com phenomenon is thought to be booming, the US government is less advanced in e-government than many of its counterparts. The main problem is fragmentation. There is little evidence of integration across federal services or between states and federal government. Most e-government initiatives are still at the informational stage and transactional systems are rare [15].

### **National Partnership for Reinventing Government**

The background for e-government in the US goes back to the National Partnership for Reinventing Government (NPR). It was set up in the early days of the Clinton Administration to review government agencies and identify government-wide systems where cost savings could be realized. In late 1998, a two-year strategy was devised to, among other initiatives, move government toward e-government. Although it had some notable successes and made considerable savings, largely due to reductions in the workforce, the impact on e-government has not been significant [15].

Undoubtedly, the next step to be taken was to break down entrenched government “fragments”, although that was to take time. NPR saw a role for greater private sector involvement - industry was already creating numerous portals to government information, although the federal government had not created a suitable data infrastructure, which the private sector could mine [15].

### **Infrastructure and Access**

Despite concern about the “information poor”, most commentators are fairly confident on issues of infrastructure and access to digital technology. The (Oakley, 2000) study quotes Morley Winograd of NPR saying that one of the few government targets for e-government was to wire every school and library in the country by the end of 2000 [15]. Despite all that, there was concern that the degree of skill, comfort, and familiarity with the technology was still sharply uneven. A survey on the digital divide released by the U.S. Commerce Department in July 1999 revealed that ethnic minorities lagged behind whites, even in comparable income groups (CNN, 12/99). However, not all the news was bad. Declining computer prices allowed more low-income families to get wired, and a new federal subsidy program, called the Education Rate or “e-rate”, brought Internet connections to over 80,000 schools and libraries nationwide. However, “such efforts must be followed up with investments in training and education”, according to Keith Fulton, Director of Technology Programs at the National Urban League. “The digital divide was not just about do you have a computer in your home, but can you use it” (ABC, 9/17/99) [15].

### **Leadership**

The role of champions, particularly high-profile political ones, is fiercely contested. Their role has been positive and highly visible. There is little doubt that top-level support is crucial, but the bigger question as to the role of national politicians in this area is yet to be answered. Even though White House was strongly identified with e-government, it was arguable as to whether the same politicians needed to be part of the future administrations in order to accelerate its deployment. That implied some recognition of the momentum that had far been generated for e-government, perhaps suggesting that the key role for politicians was in the early stages.

### **2.1.4 UNITED KINGDOM**

Since the publication of its White Paper, *Modernizing Government* in March 1999, the UK had seen a flurry of activity from government in this area. The UK was perceived to have several clear advantages in the digital world—the English language and a competitive telecommunications market—but there was concern that the country was lagging behind some of its competitors in take-up and use of digital technologies.

In terms of e-government, some of these fears were justified. Use of the Internet among citizens was not as high as in Scandinavia, the US, or Australia. The UK could point to few online public services and fewer that connect several layers of government. The tax system is very complicated, and there is a lack of the large, integrated national databases that can be used to roll out ESD. The UK has some way to go before it is among the world's leading nations in e-government, and often it appears that the government is interested only in getting business online and has forgotten its own role as a driver. However, changes are happening. Many large departments were planning to deploy e-government applications in the near future. The government had appointed an e-Envoy and e-Minister to help drive change. With the opening of e-libraries and other measures to place computers in schools and neighborhoods, the country is closing the digital divide [15].



### **Challenges**

Just like many other countries of the world, UK primary barriers to e-government are cultural and social, rather than technical or legislative. However, technical and legislative barriers do exist in the UK. They include the government's handling of e-commerce legislation and the lack of integrated databases. There are also a number of statutes in the UK that prevent data that is gathered for one purpose from being used for another and the statutes define who can have access to the data. This is a real issue for integrated ESD and the main solution is to allow services to be developed that only need parts of the data [15].

There is also concern that the cost implications of e-government have not been fully realized, especially in the short term where parallel systems are still in operation. Paid-up government and "life event" systems are not cheap and cost savings may not be realized until the long term. But the most challenging barriers are likely to be cultural. New approaches to service delivery cannot be expected to easily arise from within established institutional procedures. If government culture is risk-averse and rule-driven, it is resistant to change. In addition, and more indefinably, the UK has a more ambivalent attitude toward new technology than some of its competitors. Vague cultural factors such as this are difficult to describe, let alone measure, but there is a feeling in the US, Singapore, and Australia (among others) that "new" ways of doing things are probably better. In the UK, the feeling is often the reverse [15].

### **FINLAND**

Together with neighboring Sweden, Finland is generally thought of many as the benchmark of a technologically intensive society. Its Internet penetration is the highest in Europe, if not the world, and over 65% of the Population with mobile phones. Put this together with a small, highly educated, evenly income distribution and socially cohesive population (Oakley,2000), one then sees why there is a persistent feeling that if e-government doesn't work in Finland, then it won't work anywhere [15].

Following a brutal recession in the early 1990s, Finland deliberately reinvented itself as an information society. This manifests itself in both industry and government, where a "Committee for the Future" had been established within Parliament that considers a wide variety of issues, from globalization to the place of privacy in a technology-intensive society.

The Finns took a bold but deliberate approach to implementing e-government. But it is not one that could work easily in other contexts. The success of the Finnish strategy was due in part to the presence of key national databases that cover people, businesses, property, and vehicles. The fact that national databases are not perceived in any way by the Finnish populace as a threat to liberty but a way of minimizing bureaucracy demonstrates how different Finland is in this regard from other countries in the world [15].

### **Strategy**

The Ministry of Finance was responsible for steering e-government and the growth of the Information Society. Its span of control covered central government — 130 different units and federal agencies — but not municipalities or local government. The strategy can be broken down into five sections.

*Data Sharing:* This is the key to the whole Finnish system. A series of central databases cover people, businesses, property, and vehicles. Unique identifiers are used that make it possible to connect information about an individual from different databases, thus reducing the need to collect information again and again from primary sources. Public administrations are forbidden by law to ask a citizen for information that he/she has already given to another department.

*Electronic Transactions:* Despite these advances, Finland is still working on developing a secure infrastructure – in this case a citizen's electronic identity card – to make ESD a reality. The Finnish Population Register will act as the paramount, but not sole, certification authority. The card is voluntary and was launched in December 1999 – but plans commenced in 1996. It is hoped that the card will be used for authentication both in electronic and real-world transactions.

*Communication:* E-government in Finland starts from a strong presumption of openness and the value of public information. From December 1999, a new law ensured that all public information is made public unless there are specific, very restricted grounds for not doing so.

The Internet is the preferred medium for public information and sophisticated information systems are available. Another striking example is the use of technology within the public administration itself. All 2,300 government offices are connected to IP networks and some 80% of civil servants have e-mail. Politicians also make wide use of e-mail.

*Social Services:* The Citizens Act 1993 paved the way for joint provision of various government services, enabling authorities to authorize each other to perform their respective tasks. Some 150 citizens offices now exist around the country providing access to a range of government services, both state and local. However, municipalities have a long history of independence that they assert from time to time. Cooperation is underpinned by a funding system in which local government receives 40% of its income from the central government. This pays for the delivery of public services and it is hoped that by securing cooperation in advance, ESD can be delivered with relative equity throughout the country.

### **Challenges**

The main challenges to e-government in Finland seem to be resources and a lack of skilled personnel rather than the cultural issues so prevalent in other countries. It is recognized that e-government will have to run in parallel with conventional systems for some time and hence savings are not expected in the short term. However, this very technology-aware society is anxious to embrace the new ways of doing things that e-government will provide [15].

## **CHAPTER THREE**

### **3.0 Research Methodology**

#### **3.1.0 Overview**

This research study is searching for information about Civil Registration's e-readiness leading to the status of e-government in the Civil Registration of Kenya. E-Readiness of the Civil Registration is the degree to which the Civil Registration department is prepared to participate in the Networked Society. It is gauged by assessing the agency's relative advancement in the areas that are most critical for ICT adoption and the most important applications of ICT. They include use of Telephone, fax, email, voice mail, telegraph, data exchange, internet, computer applications etc.

#### **3.1.1 E-Readiness Tools**

Some tools have been developed and are to be used to gauge e-readiness of communities (Appendix – 3). The main three models, CSPP, CID and APEC are briefly described. The Computer Systems Policy Project (CSPP) model is designed to help individuals and communities determine how prepared they are to participate in the "networked world". The guide addresses Twenty Six (26) different indicators. The model measures the prevalence and integration of ICT in various regions of the community with more emphasis and focus on competition among providers, speed of access and government policy. Measurements are grouped into five categories namely, Infrastructure, Access, Applications and service, Economy and enablers (Policy, privacy, security, ubiquity).

The Harvard University's (CID) model (Appendix – 4) looks at how information and communications technologies (ICT) are currently used in a society. The model draws heavily from the CSPP guide. The model systematically organizes the assessment of numerous factors that determine the Networked Readiness of a community in the developing world. The guide measures nineteen (19) different categories covering the availability, speed, and quality of access, use of ICT in schools, workplace, economy, and everyday life, ICT policy and training, diversity of organizations and relevant content online. The indicators are divided into five groups namely, Infrastructure and Access, e-learning, e-society, e-economy and e-policy.

The APEC model focuses more on government policies for e-commerce. It helps governments develop their own focused policies, adapted to their specific environment, for the healthy development of e-commerce. The guide addresses 100 indicators grouped into six main categories are measured for "readiness for e-commerce". These are Infrastructure and Technology, Access to network service, Use of Internet, Promotion and Facilitation, Skills and Human Resources and Positioning for the digital economy.

### **3.1.2 E-readiness Tool Used**

The APEC model draws more attention to "readiness for e-commerce". The CID model draws from the CSPP and thus is seen as enhancement of CSPP. Too, the model specifically targets the developing world. As such, this study uses the CID model to gauge the e-readiness and e-government in the Civil Registration Department. The study focuses on the status, deployment, adoption and usage of ICT in the department. In addition to the above, information infrastructure and access, the regulatory framework and Human resource development are also addressed.

### **3.1.3 How does the CID tool define 'e-readiness'?**

An 'e-ready' society is one that has the necessary physical infrastructure (high bandwidth, reliability, and affordable prices); integrated current ICT throughout businesses (e-commerce, local ICT sector), communities (local content, many organizations online, ICT used in everyday life, ICT taught in schools), and the government (e-government); strong telecommunications competition; independent regulation with a commitment to universal access; and no limits on trade or foreign investment.

### **3.1.4 How is the assessment carried out?**

The guide provides a grid with descriptions of four stages of advancement in each of 19 indicators (grouped into five blocks). For each indicator (question), the user chooses from a set of answers (a .., b .., c .., d ..), which directly represent four progressive "stages" (low to high) of development. The stages are then transformed into score points ranging from one (1) to four (4). The 19 questions are divided into the five categories and communities estimate their current stage of development in each category.

### **3.1.5 What result does it produce?**

The guide rates the 'stage' a community is in for each of the 19 indicators. The assessment produces a rating in points 1-4 that indicate which of the progressive stage of development the community is at for each of the five categories. "An overall 'score' for the community is estimated by simply averaging the scores across the criteria."

### **3.1.6 CID Model customized**

The study uses the CID model to gauge the e-readiness and e-government in the Civil Registration Department. Descriptive data estimating the existence of Information Society with the intent of ascertaining status has been collected. With the CID as a general model, not all the indicators are found to be relevant in the study while other indicators in the model are found generate more indicators or questions because of their unique relevance and importance in the study. The objective is to focus more on indicators that are more relevant to the Civil Registration situation without compromising the main objective of examining the e-readiness. The following areas of "Networked World" addressed by the model are approached as follows:

**Network access:** There are six indicators provided by the model. All the six indicators namely: Information Infrastructure, Internet availability, Internet affordability, Network speed and quality, hardware and software and service and support of systems that touch on and affect the civil registration infrastructure and access. All the six indicators were found to be relevant in that case and thus data related to the same was collected.

**Networked Learning:** There are three indicators. Two of them namely school's access to ICT and Enhancing Education with ICT are more concerned with the access status in the both lower and higher educational institutions in the community being addressed and the incorporation and integration of ICT in the country's curriculum of education. These indicators though used to examine e-readiness, do not contribute to the civil registration e-readiness, were found to be irrelevant in this study and were subsequently not addressed. The only other indicator namely, developing the ICT workforce, addresses issues related to opportunities offered to ICT workforce in developing their essential ICT skills both general and specialized in workplaces thereby creating a sustainable ICT industry and also the

support that integrates ICT into the local economy. Data related to this was collected and addressed.

**Networked Society:** There are four indicators. People and Organization Online, looks at the civil registration as a government agency being on the web. It addresses both internal and external society's awareness of the Internet and the online concept. Locally relevant content looks at the language and content of material on the agency website. ICT in everyday life and ICT in the Workplace look at the employment, integration, access and deployment of ICT in everyday life of employees in the civil registration. All the four indicators were found to contribute greatly to the infrastructure, access, culture and human resource development and thus were relevant and consequently data collected.

**Networked Economy:** There are four indicators. Two of the indicators namely, B2C and B2B were not addressed in this research for their focus is more on the business community and the government. However ICT employment opportunities and e-government as indicators were found to be relevant, and indeed the test of e-government being our main focus could not slip through the fingers. E-government indicators addressed the agency's existence of website and the posting of information online, agency's provision of online interactive services to the public, agency's internal employment of ICT, agency's functions that have been put online, agency's functions that can be transacted online, delivery of cheap and effective services to the public online and agency's activities transacted with the public online. Analysis of data and other facts on the above alone could determine the status of e-government in Kenya. ICT employment opportunities were to mainly address on the availability of jobs for the ICT skilled personnel and the competitive advantage they attract to the employer.

**Networked Policy:** There are two indicators. Telecommunication regulation addresses the sector's national Telecommunication regulatory framework and how the regulation promotes sustainable growth of the sector, availability, affordability and universal access of telecommunication services to all. These indicators touch on everybody and thus were addressed. The ICT trade policy looks at the barriers of trade and tariffs on ICT goods and services. This indicator focuses more trade and business and in effect does not touch on the civil registration agency. Therefore the indicator was not to be addressed.

### 3.2 The Population:

Data for this research was collected from the Civil Registration Department offices of the Ministry of home affairs where the docket of civil registration falls. Together with the Civil Registration Department, data was also collected from the service providers including, Telecommunication regulation agency - communication commission of Kenya (CCK), ISPs, TELKOM Kenya and the public. The target sample data were to be obtained through both personal interviews and the questionnaires. The target groups were (1) Civil Registration Department of the Ministry of Home Affairs, (2) The Communication Commission of Kenya, (3) Telecommunication Operators (TELKOM and ISPs) and (4) the general Public.

In general data gathered includes the following:

1. **Infrastructure.** Statistics on service and access data related to Telecommunication, Internet, Wireless and Broadcast.
2. **Society and workforce development.** Penetration of ICT and Internet in the civil registration office. Existence of Civil Registration website. ICT training programs available in the workplace. Use of ICT, Computers and computer related applications in the registration of births, deaths, marriages, adoptions, divorces and other expert and decision support systems.
3. **Policies.** Existence of ICT Legislation, Acts, Regulatory mechanisms, policy-making mechanisms.
4. **E-government and e-economy.** Existence of agency website, any trace of agency posted information on the web, online interactive services offered to the public, which agency functions have been implemented online, internal systems working in the delivery of service to both the employees and the public. What level of efficiency has been achieved with the use of online systems, level of transparency with the online systems in use and the public access to the agency systems online (if exist).

The structure, categorization and stages of CID model were adapted wholesome. The questions in content and specifics were however modified and adapted to the Civil Registration department context. The number of questions in the questionnaire differed with that of the general model, but since the categorization and staging remained the same, the objective of the examination as such could not be compromised.



### **3.3 Procedure and Data Collection**

Prior to the collection of data for the study, approval was obtained from the research supervisor after presentation of the project proposal and sample questionnaire. The next step was to obtain letters of request for data collection with the Civil Registration and the CCK. Using these letters, a request was made to the two institutions for the same. The Principal Civil Registrar however referred the same to the research authorization office within the ministry of education, science and technology who after raising the application and meeting conditions therein gave the approval. The Director General CCK gave the approval with directions on which specific officer(s) were to be consulted and to provide the data.

Data from the Operators was obtained through personal interviews, online information on their respective websites and the questionnaires. They included operators such as TELKOM Kenya, ISPs, CCK and Cyber-Kiosks. Data from the public was obtained through a number of avenues. They included a number of members visiting the Civil Registration Office picked randomly, random selection of staff working in the Attorney Chambers (AG) building but not working for the Civil Registration Department, random selection of staff from SHERIA SACCO Society Ltd, random selection of Staff from Controller and Audit General based at KENCOM House and a random selection of members attending church with me at the Nairobi Central Church.

### **3.4 The Instruments:**

The Instruments used to collect data for this study were the e-readiness questionnaire and oral interviews. The Questionnaire (appendix-1) was constructed to gather information related to e-readiness of the Civil Registration Department from both the office and the user's perspective. The questionnaire was derived at, after studying the various existing e-readiness gauging models and deciding on which area of focus the study was to take. A further step was taken to then narrow down the focus of the study, which further narrowed the choice to which model was more appropriate and to be adapted. The CID model was finally found more appropriate for this study and hence was used. The questionnaire was done in such away that the questions were simplified and easily understood and also it included an overview of the research study, the statement explaining the importance of completing the questionnaire and the guidelines on how to complete the questionnaire.

A total of Forty, (40) questionnaires were prepared and issued to the selected target groups. In adapting the CID model for this study, the model questionnaire raised a total of Twenty Six, (26) questions compared to the general CID model that raises a total of Nineteen (19) questions. This was so because, in a number cases more than one question could be derived from one model question. This was due to the fact that, while adapting the model for the civil registration case, some indicators tended to be more pronounced than others, the different forms of e-government that exist, the culture and political landscape of the country. For example in the model, there is only one question on e-government but in this case, four questions (19-22) were derived on e-government.

Out of the 40 questionnaires Sixteen (16) were issued to the Civil Registration Department, Eighteen (18) questionnaires to the public (6 to Church members, 5 to members visiting the Civil Registration for service, 3 to staff at AG, 2 to staff at the Controller and Audit General Office, 2 to staff at the Sheria Sacco) and Six (6) to the service providers (4 to the Cyber-Kiosk (SkillSoft), 1 to CCK, 1 to ISP (Mitsuminet)). A total of Thirty Six, (36) questionnaires were received back.

Quantitative information gathered was analyzed using frequency statistics. Frequency tables were calculated to analyze the data collected (appendix-2). Questions 1-4 determined the quality and speed of Telecommunication services and the existence of the telecommunication backbone locally. Questions 5-7 determined both the existence of service and support of the telecommunication services and the human resources involved. Questions 8-10 determined the availability of the Internet and the kind of Internet access available. Questions 11-13 determined the existence, availability and affordability of both the Hardware and Software for the Civil Registration Department Internal Use. Questions 1-13 in general determined the Network Access as per the CID model.

Questions 14-16 determined the development of ICT in the workplace as part of ICT workforce development while questions 17-18 determined the employment opportunities in the ICT industry as part of the e-economy. Questions 19-22 determined the status of e-government by use of Telephones, faxes, ICT applications and Online services. This in particular analyzed data on the e-government category as per the CID model. Questions 23-

26 finally determined the people and organizations online, the existence of local and relevant online content, the peoples' embracing of ICT in the workplace and everyday life. This area analyzed data on the e-society category as per the CID model.

In addition to the questionnaire, both qualitative and quantitative data were collected during the interviews and perusal of records. Qualitative data was examined for issues and concerns that fit in the CID model. The issues and concerns about e-government, the perception of e-government in the government offices, the regulatory framework, political goodwill, office cultures, access and the infrastructure. At the Civil Registration Department, two officers were interviewed. Data from the CCK was obtained through an Interview with one of the officers authorized by the Director General. One staff from an ISP and one from a cyber-kiosk were interviewed together with obtaining data from the questionnaires. Other information was obtained from the questionnaire, Document reviews and the provider's organizations websites. Data from TELKOM and ISPs was obtained from their respective websites. Data from the public was obtained through the questionnaire and interviewing of some few who did not mind.

### **3.5 Data Analysis**

The data is organized in five blocks of networked area namely, Networked access, Networked Learning, Networked economy, Networked society and Networked policy. The point levels ranging between 1-4 intervals of one (1), corresponding to the question answer choices provided ranging from (a-d) gauge the stage that best describes the level of e-readiness for each indicator (question). A frequency grid table for each indicator under consideration and the corresponding mean point levels (1-4) have been calculated. The mean points are calculated using the weighted averaging method whereby each level of e-readiness is considered to contribute in strength to the model. Thus the sum of the level and the number of responses is assumed to be the strength of that level. The enumerated mean points are then mapped directly on the CID tool. The mapped mean points are then used directly to describe for each model indicator together with the e-readiness level. Then using these calculated arithmetic means for each category, other level mean indexes have been calculated. First level being the mean index for each block of Networked Area under consideration for the five

areas. These indexes provide a representation and indicator of addressing and describing the level of readiness for each networked area. The second mean index calculated being the overall mean index for the entire model. The overall mean index provides an indicator and a satisfactory gauge of the Civil Registration department e-readiness level. This mean index may also be assumed to represent a good measure of the level of e-readiness in many government agencies in Kenya.

## CHAPTER FOUR

### 4.0 Findings

#### 4.1 Telecommunication Regulation and Infrastructure

The wave of liberalization for the communications sector started in early 1990s with the stakeholders and the general public requesting for opening up of competition in the provision of certain telecommunication services. The move to start liberalization and take off was slow and lacked coordination as the provider was the regulator at the same time. Too the majority of the less energetic retirees of the then KPTC happened to be the Front Runners in competing for the provision of these services.

Liberalization posed certain risks and opportunities as well and imperative for the government of Kenya to create sufficient control mechanisms that will regulate and promote this sector. The government of Kenya through the Communications act of parliament of 1998, split the giant Kenya posts and Telecommunication Corporation (KPTC) into three legal entities namely, TELKOM Kenya Ltd (TELKOM), Postal corporation of Kenya (POSTA) and Communications Commission of Kenya (CCK). POSTA had the specific objectives of ensuring universal access to postal services. TELKOM Kenya was to provide universal access requirements in the telecommunication sub-sector and interconnectivity to other players. CCK was established as a regulatory body for the sector to discharge duties and functions related to Regulations and ethics. Among them were (a) Issuing of Licenses, (b) regulate prices, (c) Establish interconnection principles and guidelines that promote fair competition and ensure protection of consumers and investors interests, (d) manage the radio spectrum and (e) type approve equipment [19].

The government of Kenya through the Kenya Gazette notice no. 8227 of 3<sup>rd</sup> December 2001, published the reviewed Kenya Communications act number two of 1998. The act published by the minister for transport and communications issued the policy guidelines meant to regulate and promote the communications sector. The overall objective of the government in developing these guidelines were for the sector to optimize its contribution to the development of the Kenya economy as whole by ensuring the availability of efficient, reliable and affordable communications services throughout the country [19].

Since the enactment of Telecommunication Act and establishment of the three legal entities in the communication sector, the government through these agencies has tended to open up a

number of services to private sector participation, a move seen as a shift towards liberalization of the sector. A number of areas in the telecommunication sub-sector are now either partially or fully open for competition. Services that are fully open for competition include among others paging services, Internet provision and other value added services e.g. email, voice mail, fax, Video-conferencing, Electronic Data Interchange (EDI), Public telephone resale etc. Certain services though not fully open for competition, were restricted to TELKOM Kenya for a specified period when they are expected to be open up for full competition. These services include among others VSAT facilities and services, Internet node and backbone, International telecommunications Gateway, National Long Distance telecommunication facilities and the local telecommunication facilities and services for Nairobi. Most of the restrictions of these services run up the year 2004 [19].

The first Mobile telephone operator was licensed in 1999 (Safaricom) and the second licensed in 2000 (Kencell). CCK is the process of licensing a third operator before the end of year 2003. There is general feeling that the mobile communication growth has been high growing at the rate of 23% per annum. Other mobile service including personal Communication systems and Trunked Radio systems are open to competition depending on and restricted to spectrum availability. The fixed lines telephone exchange has continued to grow at the rate of 15% per annum in urban setup whereas the growth rate in rural areas is about 18% [20].

While acknowledging what the government is doing in the liberalization of the sector, it is worthwhile to note that, obstacles exist and the rate at which opening up of the sector to full competition has been fairly slow. The monopoly period given to TELKOM Kenya in the provision of certain service is considered too long and may have become a hindrance and obstacle to growth causing minimal and slow growth in the sector leading to poor provision of these services. Of concern in this telecommunication act are the provisions the policy and regulatory framework contains which are meant to assist the government and other stakeholders in developing and promoting the sector. Looking at the act, the guidelines mention little or nothing at all concerning the government strategy to develop the human resources and capacities in the sector. The act does not mention or address the development of trade policies and ethics in the sector. Despite the fact that the act underscores the fact that

great and enormous resources are required in the development and implementation of the government's objective in order to achieve universal access, the act does not mention anything on the strategy and approach the government will use in funding the sector growth.

The public has a general feeling that the cost of telecommunication services is high. Few of the common citizen who agreed to be interviewed during the data gathering process gave an indication and feeling that telecommunication services can still be made cheaper than they are today. While CCK concurred with the public feelings about the high cost of telecommunication services, the organization being the price regulators of these services tended to blame it on the greedy and inefficiencies of the operators. The cost of Internet dial-up connection for example is equivalent to a call charge per unit about Kenya Shillings 6.50 for local calls and Kenya Shillings 24.00 for long distance calls excluding taxes. This generally reflects high charges for any ordinary Kenyan. The high cost too has partly been blamed on the backbone monopoly of TELKOM Kenya and the inefficiencies associated with it and also on the government's high taxes and high license fees on the operators. Other reasons that have been advanced for the slow growth in the sector include among others the poor policy framework on interconnectivity and monopoly of TELKOM Kenya in the provision and access of the national backbone.

The ISPs felt that the rates charged for access are favorable to the majority but the telecommunication access charges are high for most Kenyans. Though a number of cyber-kiosks are now charging as little as one shilling per minute, they complained of poor business and high cost of interconnectivity. There was a general feeling that not most ordinary Kenyans can afford spending like thirty to fifty shillings every now and then to browse the Internet. The ISPs together with the cyber-kiosks also complain of poor, inefficient and disruptive Internet backbone and telecommunication gateway services offered by TELKOM. It is worthwhile to note here that, the cyber-kiosks have generally performed a good job in creating awareness and promotion of use of the Internet.

#### **4.2 Civil Registration Department (Head Office)**

The civil registrar office is headed by the Principal Registrar civil registration. Then structurally followed by the Deputy Principal Registrar. The senior offices down the ladder are as follows: Senior Assistant Registrar, Assistant Principal Registrar, Chief Registrar, Senior Registrar, Registrar 1 – 3 and Assistant District Registrar. These are all senior officers and such have been provided with at least a telephone line and a computer mainly being used by the secretary in typing documents and very little work on spread sheets. There is only one FAX machine stationed at the Principal Registrar's office. There is no computer network installed and there is no software application installed in any of the PCs specifically for the civil Registration functions as in registration of births and deaths. The software installed in these computers is mainly Microsoft office suite used for word processing and spread sheets.

Though there is wide spread of computers in the department, there is no computer network for internal use in serving the public. No computer network connected to the Internet was sighted. It is not clear whether any computer is installed with a modem to connect to the Internet on dial-up. There are no e-mail facilities or Internet surfing facilities. There is an Information Technology section within the department but much of their work is to support the users on Hardware malfunctions, trouble-shooting and Microsoft office suite packages.

There is a wide spread of cellular phones usage in the office acquired on personal basis and used for personal or social reasons. Access to the main telephone (fixed) lines is restricted to a specific level (grade) or cadre of personnel when calling out but access to calling in is not restricted. Every office has at least one extension of telephone for receiving. The FAX is restricted to the Principal Registrar's office and very minimal transactions are carried out with it.

ICT training and manpower development program opportunities exist but most of them are again restricted to a certain level of cadre of personnel and above. There is a general feeling that the majority of personnel in the department especially those in senior positions are computer literate. Every transaction is manual and paper based and the bureaucracy or processes is followed. The office insists on the original documents and photocopies of the originals when presenting documents to start transactions when dealing with the public.



Knowledge of the Internet and e-mail seemed clear to the majority. Knowledge and understanding of online transactions was not clear to the majority. How e-government works and what it is meant to achieve was less understood. There was a general feeling that the government may not achieve the e-government soon because of the government bureaucracy, lack of understanding of e-government and resistance to change, a major factor prevalent in many government offices. The rigidity in the government to change is seen as an obstacle to the development of e-government.

The results from the Questionnaire responses are attached (appendix-2). The mean index for each indicator, block indicator and the model mean index have been calculated. The indexes are based on a scale of between one (1.00) and four (4.00). The 1.00 level indicates the lowest (infancy) level. Level four (4.00) indicates the highest (Maturity) level. Levels 2.00 and 3.00 are between level 1.00 and level 4.00 in ascending order.

## **Network Access**

**Information Infrastructure:** Shows a mean index of 1.75. This is a reflection in stage one but tending to stage two. The index implies that access to telecommunications infrastructure is poor but a small proportion of the civil registration offices have access to the telecommunications network.

**Internet Availability:** Shows a mean index of 1.48. This is a stage one level as per the CID. The results show that there are no ISPs offering local dial-up access and there is no public Internet access in the Civil Registration offices.

**Internet Affordability:** Shows a mean index of 2.14. This is a level two per CID tool. The results show that rates for local calls are high enough to discourage extensive Internet use via local ISPs in the Civil Registration offices and also there are very high charges for lease lines.

**Speed and Quality:** Shows a mean index of 1.80. This is a level one tending to level two as per the tool. The results show that in the civil registration offices, about 50% of the domestic calls are successful. For Voice telephony, sound quality is generally acceptable, about 50% of telephone lines faults are reported per year in the Civil Registration. The Telecommunications Infrastructure supports dial-up modem transfers up to 28.8 kbps.

**Hardware and Software:** shows a mean index of 2.15. This is stage two as per the CID model. The results show that some of the off-the-shelf hardware and software are available in the Civil Registration offices. Basic hardware and software are affordable for most users in the offices.

**Service and Support:** Shows a mean index of 1.86. This is a level one tending to level two of the model. The results show that telephone lines take too long to install, there are very few or no software developers within the civil registration office, a small proportion of technical staff are present and no explicit attention is given to customer service.

The overall mean index for Networked Access of 1.86 reflects a community's poor level and performance in this area. The minimum necessary condition for readiness is access to adequate network infrastructure. This is missing in this particular case and hence a need for a strategy be worked out to create, promote, improve and develop all aspects of Network infrastructure and Access in the civil registration for the various offices to start participating in the networked world.

### **Network Learning**

**Developing ICT in workforce:** The mean index is 1.84. The results show a level one of the CID model. The results indicate that training opportunities for programming, maintenance, support, ICT skills and other ICT professions are very minimal to most of the Civil registration staff.

ICT development programmes leading to a sustainable ICT industry plans are not present. ICT skills development requires some enhancements to create a development program so as attract and develop staff with the civil registration on ICT education and development.

### **Networked Society**

**People and organization online:** The indicator reflects a mean index of 2.41. This is a level two stage as per the model. The results show that very few users regularly use the Internet. It was found out that even the regular users use the Internet outside the their offices.

**Locally Relevant Content:** The mean index is 1.19. This is stage one level. The results show that even those who use the Internet, they use it for other reasons, has no relevant content with the Civil Registration and its business transaction.

**ICT in everyday life:** The mean index is 1.66. The result is a stage one level for this indicator implying that most of the Civil Registration officers do not normally employ ICT in their daily transactions.

**ICT in workplace:** The mean Index is 1.36. The Index reflects a stage one level of the CID model. This implies that most employees have limited access to telephone, there are few computers and access to the same is also limited, most business transaction are paper based, minimal use of fax to transact businesses.

The overall index of 1.65 shows that the community is at level one as per the model implying that the civil registration office has not incorporated ICT into the fabric of its activities.

## **Networked Economy**

**Employment Opportunities:** All transactions in the Civil Registration are paper based. The employment opportunities for ICT skilled personnel contribute very insignificant in improving efficiency of service delivery to the public. However, knowledge of ICT skills gives staff confidence and opportunity to use the various technologies, when faced with situations to use these technologies. An officer may be asked to write a report, he does not need to draft it on paper and give it to the secretary to type but can by himself/herself get on to the computer and write the report. The mean index 2.25 shows that at least there is an appreciation in principle that ICT is essential to every staff in the Civil Registration office.

**E-government:** Issues related to e-government analyzed here included the existence of civil registration website, kind of information posted online (if any), any transaction carried out online between the office and the public, use of telephone and fax in service delivery to the public, use of internal computer application systems in delivery of service to the general public and the general awareness of e-government in the office. The mean index of 1.42 reflects a level one of the indicator implying that no civil registration resources are online. To

some extent, one may conclude that e-government does not exist in the Civil Registration because most of the issues analyzed were none existent.

The overall index of 1.83 for the networked economy reflects a low level of readiness in this area, reflecting lack of awareness, lack of knowledge and lack of development in general as far as e-economy is concerned.

## **Networked Policy**

**Telecommunications Regulation:** The mean index is 2.36 implying stage two as per CID model. In this area, analysis was done on issues related to the National Telecommunication act on liberalization and the provisions therein regarding universal access. The mean index of 2.36 reflects a move towards liberalization but the speed at which the process is taking is low. The policy guidelines in place show in principle the government's stand on and move towards universal access but the implementation is still at the paper level. There is a general feeling that the regulatory body CCK understands the way forward but there seems to be a number of obstacles and thus making the process slow. The will exist, but the bureaucracy, resources, political leadership and government's complex manner of operation are a hindrance.

The model mean index for the model is 1.91. This is a stage one level as per the CID model tending to level two. This is a low level indicator showing infancy stage for the civil registration community in adopting and using ICT. Almost all individual indicators show the same infancy stage of readiness. The result provides a starting point for the Civil Registration office. For the Civil Registration to be ready, they cannot concentrate solely on specific areas but all the areas as they each contribute greatly to the development of e-government.

Whether the Civil Registration alone or the Kenyan community in general is to participate in the networked world, it is must to address all the five main indicators of Networked World aggressively and simultaneously. It will be unrealistic for anyone to think that the government or community can implement for example e-commerce or e-learning or e-government when other areas lack the will, understanding, knowledge, leadership, skilled human resources capacities, infrastructure and a working regulatory framework. The government need take seriously and understand the community's e-readiness low level

standing. This index however low it may look will be very critical when developing the ICT policy framework and the e-government master-plan. Special attention and care is to be taken to account for all the indicators as none can be addressed in isolation. There should be no assumptions and omissions for the fact that little will be achieved if not all factors that affect the nature of the Networked world are taken into account.

## CHAPTER FIVE

### 5.0 DISCUSSION

#### 5.1 Introduction

The Government of Kenya through the ministry of Planning and national development recognizes the economic value and benefits of ICT services both in the rural and urban areas. It too acknowledges that the sector has not been able to achieve its objectives due to a low penetration of ICT usage in the country. Some of the obstacles identified for this low penetration are cost of equipment, poor telecommunication infrastructure, lack of power supply, lack of awareness, priority, focus, co-ordination, resources and capacity [18].

The Government through the ministry for planning and National Development in an effort to revamp the sector intends to:

- (1) Establish an inter-ministerial committee to mainstream ICT into government operations,
- (2) Streamline the education curriculum to incorporate ICT studies,
- (3) Implement a well targeted tax reduction/incentives on both Hardware and Software to make them more affordable,
- (4) Review the legal framework to remove impediments that discourage the adoption of ICT especially e-commerce,
- (5) Develop a master-plan for e-government by end of June 2004 [18].

The findings from the study cite areas including secure and working information infrastructure, access, promoting regulatory framework, political leadership and cultural shift as being prerequisites to successful creation, implementation and use of e-government and e-activities in the Civil registration Department. Issues related to the regulatory framework and access need be worked out so as the same can promote the growth of the telecommunication sector. The culture and ways of doing things requires a major shift for any tangible results to be realized. The Civil Registration department must accept that a number of transactions between the office and the public can now be carried out electronically and online. The Civil Registration, government, the government officers and political leaders must get committed to transforming the Civil Registry into an information society.

The study shows that there are many factors that need be put to focus when addressing the strategy and implementation of e-government in the Civil Registration. It is unlikely that the

government would work in an environment that is devoid of data and facts about e-readiness to address adequately these factors. The Civil Registration Department and the government of Kenya need complete and current data on the community's e-readiness to assist in the development of a working strategy and policy guidelines that will create, develop and promote the growth of e-government and transform the Civil Registry into an information society.

## **5.2 Experiences learned from other countries**

Analysis of the various strategies adopted by different countries of the world in implementing e-government brings out clearly the major factors that need be considered when developing the strategy framework. They include among others telecommunication and Information infrastructures, Network Access, culture, government ICT organizational structure, political momentum and leadership, regulatory framework, implementation strategy and challenges. These can be seen from the comparison done among the countries that happen to be championing e-government in the recent past, namely Australia, US, UK and Finland.

**Infrastructure and Access:** E-government includes service delivery through Internet, Telephone, Fax, digital TV, cyber-kiosks, Interactive Voice Response (IVR) call centers and broadband multimedia among others. US government effort to implement electronic service deliveries are almost all Internet based with minimal use of cyber-kiosks. Finland has a very high penetration of Internet and it also recognizes telephone as a useful tool of delivery. UK and Australia have IVR call centers well spread and widely used. UK is advanced in the rollout of digital TV [15]. The wiring of homes, libraries and schools and bringing Internet to the low-income citizens seems to cut across all these countries. Establishment of a national information databases in Finland seems to have created a major step in moving towards e-government. Whatever strategy used, it is extremely necessary to address issues related to technological infrastructure and access.

**Leadership:** Some major enablers of e-government are leadership, political commitment, working organizational structures and funding. In some countries the connection between e-government and the rest of the economy has been made very explicit. In the US, the white House is the most vocal associated with the digital divide. The former Bill Clinton administration established the National Partnership for Reinventing (NPR) government to

steer the US towards e-government. The UK Prime Minister Tony Blair established the offices of e-minister and e-envoy to set up a white paper (Modernizing Government) and to coordinate and steer the country forward towards e-government. Finland established a "committee for the future" within the parliament and together with the ministry of Finance to coordinate and steer growth of ICT. Australia established the offices of Office for Government Online (OGO) and the National Office for Information Economy (NOIE) to coordinate and steer the government to e-government [15]. Leadership and organizational structures no doubt play a critical role in the coordination, facilitation and implementation of e-government.

**Strategy:** various countries have taken deliberate and bold steps to develop e-government. Though their strategies and approach appears different, the objectives and challenges remain similar. The main challenges appear to be the development of infrastructure, enhancing and harmonizing the national laws and the regulatory frameworks, organizational structure adjustments and setting up targets for implementing e-government. The UK government established the office of electronic commerce to drive the target of 90% of low-value government procurement electronic, enacted the electronic commerce bill to ensure that government departments give equivalent to written and digital documents and set up a target of ten year plan to deliver ESD services. The US government through NPR targeted to wire every school and library within a period of less than two. Finland established and developed a series of central databases, a secure national information infrastructure and enacted laws that ensure openness, security and privacy of public and private information. The government of Finland has also liberalized the provisions of a number telecommunication services by the public [15]. Whatever strategy and approach given, there is not doubt that development of working and applicable regulatory laws, establishing organizational structures that work and reasonable implementation targets are crucial.

**Challenges:** The challenges to e-government in Finland seem to be resources and a lack of skilled manpower. UK and US main challenges seem to be more of cultural, social and legislative while Australia's main challenges seem to cut across the two. Creating e-government will involve enormous resources and major change. The changes cut across the government and citizenry. The key challenges are not only technological but also social, political, governance, economic and business strategy. The Civil Registration Department



would therefore require facts on the e-readiness for any effective strategy and master-plan development of e-government. Issues related to funding of e-government implementation and other ICT activities must be addressed adequately during the master-plan planning and strategy development. The Civil Registration, the government of Kenya can learn a lot from the experiences of these countries as the communities move towards e-government.

### **5.3 What is required in Kenya**

The government of Kenya seems to have ideally recognized the role and potential of ICT in national development. However, the government of Kenya has not moved further to develop the ICT infrastructure, Information society and a comprehensive policy framework for the creation of e-government. Though mentioned in the policy document that the government will mainstream ICT into government operations, invest in adequate ICT education and training and ensure creation of an environment that will legally and commercially promote economic opportunities, increase transparency, efficiency and productivity for Kenyans, there are no signs that, that will be implemented in Kenya [18]. In order for any agency including the Civil Registry to maximize the gains of the information economy, ICT must be incorporated into the fabric of the country's core activities. The digital economy is based on a properly functioning and affordable national backbone that extends access to all. The government policy and regulatory support play a crucial role in the digital economy. The policy framework and strategy must ensure creation of a holistic cross-sector approach strategy that strengthens ICT sector. The government through its regulatory body CCK must move fast to remove and iron out what has been perceived has ICT growth impediments including monopoly of TELKOM Kenya in providing ICT backbone, liberalization of critical services and licensing. The growth of mobile telephones has been tremendous but the costs are still high. A strategy to reduce these costs must be worked out between the operators, the Regulator (CCK) and the government in order to make the service affordable to the majority. The government must support initiatives to integrate and streamline ICT in education and training curriculum and promote the development of the necessary skills through all channels in order to create a wide and diverse multi-skilled and technically competent manpower. Creation of an ICT central point office within the central government will co-ordinate and harmonize ICT activities nationally. The office will provide both political and technical leadership within the central government, plan and promote ICT activities and offer the link

between the government and the private sector. The office will ensure that the government provides the necessary funding and other resources for the development of the sector [17].

#### **5.4 Conclusion**

The study reveals an infancy stage of e-government in the Civil Registration Department of Kenya. The level of e-readiness is low below 2.0 on a scale of 1.0 to 4.0. There is a strong indication that e-government is still an idea on paper with little realities realized. There is a strong feeling that, though the government talks of mainstreaming ICT into government operations, the reality of doing so will not be soon.

By all standards the road to achieving e-government in the Civil Registration will be challenging. It will be much more harder to conceptualize, visualize and manage the transition. The key challenges span from technological, cultural, social, political, environmental, economic and business strategy. Achieving e-government will require enormous resources and a change management process that will build awareness, understanding, coordination, trust, common purpose and genuine willingness to change, a move that will be expensive and slow to achieve. There is an urgent need for the government to create and establish a well articulated and vision mechanism of governance that is clearly mandated and adequately resourced to lead change. Political leadership, commitment and support are critical to achieve these objectives. E-government initiatives require collaboration of the government, private sector and citizenry, strong coordination, facilitation, enormous resources and focused leadership.

The study reveals that e-government will not fit holistic within one government agency. The Civil Registration cannot implement e-government on its own. Integrated effort across several and multiple agencies is required to achieve e-government. E-government initiative requires strong appreciation and acceptance by all stakeholders that participating in e-government is neither voluntary nor optional [15]. E-government requires citizen engagement leading to the need for the government's commitment to effective communication and consultation with the citizens. The development of e-government effort require extensive between the government and citizenry so that it does not become something that the government will be doing for the people instead of what it will be doing with them [6].

The government documents reveals that there is no working ICT policy framework in place. There is a need to develop a well articulated ICT vision and ICT policy framework blueprint giving guidelines on the creation and implementation of e-government with clear and far reaching strategy, with a clear and practical time-table of implementation, taking into account the wider scope and key factors. Without such framework, the government and hence the Civil Registration will never achieve e-government. The education curriculum requires an urgent review so as to incorporate the ICT studies and skills development in order to technologically empower the citizens. ICT must be given a portfolio investment approach just like any other financial investment so as to attract funding both from within and outside. ICT infrastructures, technical discipline and integration of the same take time to develop. The government of Kenya must see these as important to government as the other traditional physical infrastructure of buildings, roads and equipment [15].

### **5.5 Recommendations:**

Creating e-government in the Civil Registration will be challenging. It will not be easy and will certainly take time. Creation of e-government will not fit holistic within the Civil Registration or an IT section of the Civil Registration. Integrated effort across several and multiple agencies of the government, the central government and the private sector will be required to achieve e-government objectives in the Civil Registry. A well developed, articulated and communicated e-government vision and strategic plan for the civil Registry with resources appropriately allocated, is extremely important and need be put in place if development of e-government is to be achieved in the Civil Registry.

The results from the survey and the CID tool reveal an infancy stage of most of the ICT indicators. The overall index of 1.91 reflects stage one tending to stage two of the model. The Civil Registration office need pay attention to all indicators that contribute to readiness and not necessarily concentrating in one focus. The Civil Registry may however start with the adoption and use of basic ICT provisions as a starting point. This will include use of Fax and other computer systems for the management of office-citizen transactions.

Integrated effort and consultations between the Civil Registry and the government is required leading to a number of issues touching the two across the board to be ironed out and streamlined. They include the need for the government to develop infrastructure, a review of the education system and education curriculum, a review of the Telecommunication Act and the laws that are deemed impediments to the opening up of the sector to full liberalization, laws that do not promote the development and growth of e-government and development of e-government and ICT policy and strategy papers to provide guidelines and direction on the ICT and e-government developments. The review of the laws and development of these policy and strategy papers are to take into account the government's complex set of business, organizational, environmental and competitive circumstances in order to create an enabling environment for the development and growth of ICT in the country. The Civil Registry should therefore commence by undertaking the following:

- Undertake a comprehensive study on the current status of ICT;
- Re-define the vision statement for e-government and its context;
- Define the strategy for achieving the reviewed e-government vision with realistic targets, resources and time scale;
- Establish a strategic management group with subtle mechanism that provides a forum for consultation between the Civil Registry, government, citizens and other stakeholders;

## **5.6 Achievements**

With minimal resources the e-readiness of civil registration has been carried out, gauged and revealed. The e-readiness of the Civil Registration provides a reflection of the e-readiness status of many government departments or agencies. The result may be used to project the e-readiness for many government agencies in the country. The findings of this research if considered will definitely contribute enormously and will be quite useful in the creation of the government's e-government strategic plans and review of the ICT regulatory and policy frameworks.

## **5.7 Limitations**

This kind of research required substantial financial resources and time in order to administer the questionnaire through the entire civil registration countrywide. The resources were limited and as such the questionnaire had to be administered in the civil registration head office only. This made the number of respondents fewer. This may have caused a small margin of error on the computed means though the results give the reflection and indication of the objective of the research study.

## **5.8 Suggestions for Further Research**

1. A Study and documentation of the e-readiness in all government agencies.
2. A study to research on the obstacles and impediments slowing down the liberalization process of the Telecommunication sector and how it can be made fast so as to stimulate the growth of the sector before the policy framework is done.

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## Appendix-1

### E-readiness Questionnaire

#### **Introduction:**

The purpose of the survey is to collect information on e-readiness and e-government status in civil registration department of the ministry of Home Affairs. It is estimated that the survey will take 10 – 15 minutes to complete. Your responses will be anonymous and confidential. Please do not indicate your name on the questionnaire. The same will be used for academic purposes only. Your valuable response is meant to provide insight on e-awareness as well as e-status in the department of civil registration, mainly referred here as agency and as such you are therefore request answer the questions as accurate as possible.

**Directions:** For each of the questions that follow, there are four answers (a-d) given which describes the level and/or status of Information and Communication Technologies (ICT) in question. Read the Question carefully, tick one of the four answers you feel best describes the current level or state of the ICT under consideration.

#### **Networked Access**

##### **Speed and Quality**

1. What Percentage (%) of domestic telephone calls made, are successful?
  - a. Fewer than 50% of all calls are successful
  - b. Between 50-70 % of all calls are successful
  - c. Between 70-90% of all calls are successful
  - d. Over 90% of all calls are successful
2. How do you classify the sound quality of the domestic telephone calls?
  - a. Telephone Sound quality is often not acceptable
  - b. Telephone Sound quality is acceptable, but access is restricted to minority
  - c. Telephone Sound quality is acceptable, and majority have access
  - d. Telephone Sound quality is acceptable, access is to all
3. Approximately what percentage (%) of faults of telephone lines reported per year?
  - a. More than 90 %
  - b. Between 50 – 90 %
  - c. Between 10 – 50 %
  - d. Less than 10 %
4. What manner does other agencies access your agency telecommunication infrastructure?
  - a. Link using backbone outside the agency
  - b. Link using inadequate local agency backbone
  - c. Link using sufficient local agency backbone
  - d. Link using adequate high speed agency backbone



## Service and Support

5. Approx. how long does it take to install a mainline from time the order is placed?
- More than six months
  - Between one and six months
  - Between 7 days and one month
  - Within 7 days
6. Approximately how long does it take to resolve a reported mainline fault?
- About six months
  - About one month
  - About one week
  - Within 2 days
7. What proportion of software developers, web designers, technicians, etc are local?
- Very few or none at all
  - Small and inadequate number
  - Sufficient number
  - Adequate number

## Internet Availability

8. What local Internet service provider (ISP) option is available to the agency?
- There are ISPs offering local dial-up access
  - Limited number of ISPs offer dial-up access only
  - Limited number of ISPs offer full internet access
  - Many ISPs offer full internet access with web hosting services
9. What public Internet Access opportunities (adverts, online transactions etc) exist?
- There is no public internet access
  - There limited opportunities for public internet access
  - There are some opportunities for public internet access
  - There are adequate opportunities for public internet access
10. What is the availability of leased and/or high speed dedicated lines?
- There are no leased dedicated lines from the local operator
  - There are no private leased lines. Only one public operator offers leased lines
  - There are at least private operators offering leased lines
  - There many private operators offer leased lines including wireless solutions

## Hardware and Software

11. What kind of marketplace exist in the agency for the H/W and S/W solutions?
- There are no distribution/sales points for H/W and S/W solutions
  - Some off-the-shelf H/W and S/W solutions exist
  - Most ICT is sourced from abroad but there is a strong and growing strategy to configure them for the local market
  - A vibrant and adequate marketplace exist for H/W and S/W
12. What is the relative agency's affordability of the H/W and S/W solutions?
- H/W and S/W solutions are too expensive for small and medium size agencies
  - Some H/W and S/W solutions are affordable for small and medium size agencies or business.
  - A variety of H/W and S/W solutions are affordable generally
  - H/W and S/W appropriate for the local needs are widely affordable
13. Do the H/W and S/W solutions available in the market meet the agency's needs?
- There are no solutions that meet the local business needs
  - Very few solutions meet the local business needs
  - Some solutions appropriate for local business needs are available
  - Solutions that meet local business needs are widely available

## Networked Learning

### Developing the ICT workforce

14. How do you rate the training opportunities for ICT related skills within the agency?
- No training opportunities available
  - Limited training opportunities are available
  - Sufficient opportunities exist
  - A variety and adequate opportunities exist
15. Are there training opportunities offered online, agency staff can take advantage off?
- Such opportunities do not exist at all
  - Limited opportunities exist
  - Available opportunities, but access is limited
  - Widely available and accessible easily
16. What opportunities do the agency offer for ICT related training skills?
- There are no such opportunities
  - Minimal training to a few staff on ICT training
  - ICT trainings are open to the majority
  - ICT trainings are open to all

## Networked Economy

### **Employment Opportunities**

17. How best can you describe employment opportunities available for ICT skilled people within the agency?

- a. ICT skilled people have no jobs literally
- b. ICT skilled people have limited jobs available
- c. Some ICT skilled people are able to get jobs
- d. A good proportion of ICT skilled people get jobs

18. Does the agency require significant proportions of employees with ICT skills to perform their daily work?

- a. Very few agency workers need ICT skills for their daily jobs
- b. Some tasks in the agency demand for ICT skills
- c. ICT skills are becoming a source of competitive advantage for agency jobs
- d. Significant number of agency workers require ICT skills to perform their jobs

### **E-government (online)**

19. Which option according to you best describes online government in the agency?

- a. No agency resources online, all dealings between agency and citizens are paper based.
- b. Agency Website exist, minimal information online, online information updated rarely, most services offered are paper based.
- c. Agency Website exist, some key information posted online, information online frequently updated, some limited transactions may be carried online including use of email, major transactions are mainly paper based.
- d. Most of the key information is posted online, much of the transactions are carried online, Public can interactively transact with the agency online.

### **E-government (Telephone)**

20. Which option according to you best describes telephone government in the agency?

- a. No dealings with agency are communicated by phone, all transactions with the agency and citizens are paper based and in person.
- b. Some minimal transactions between the agency and citizens may be done by phone, but still most services offered are paper based.
- c. Substantial transactions between the Agency and citizens may be carried on phone.
- d. Most transactions between the agency and citizens may be carried on phone.

**E-government (Fax)**

21. Which option according to you best describes Tele-fax government in the agency?
- No dealings with agency are communicated by FAX, all transactions with the agency and citizens are original paper based.
  - Some minimal transactions between the agency and citizens may be done through FAX, most services offered are original paper based.
  - Substantial transactions between the Agency and citizens may be carried through FAX.
  - Most transactions between the agency and citizens may be carried through FAX.

**E-government (ICT Applications)**

22. Which option according to you best describes ICT applications in the agency?
- No computer applications in the agency are used to transact business between the agency and citizens.
  - Limited computer applications exist that are used to transact business between the agency and citizens.
  - Adequate computer applications exist that used to transact business between the agency and citizens, systems are networked, general public mostly served on one desk.
  - Most transactions between the agency and citizens are handled using the computer applications, there exist a networked infrastructure of computer systems, general public mainly served quite fast.

**Networked Society****People and Organization online**

23. What is your opinion about the agency employee's awareness of the Internet?
- Most of them have never heard of the internet
  - A good proportion of them have not heard about the Internet, and most of them do not know anyone who has ever used it.
  - Most of them have heard of the Internet, but few have used it.
  - Most of them are interested in using the Internet and knows others who do

### **Locally relevant Content**

24. What is your opinion about the material content on the agency's website?
- No website exist with information relevant to the agency
  - Website exist but with scanty information relevant to the agency
  - Website exist with information relevant to the agency, infrequently updated
  - Website exist, relevant information available and frequently updated

### **ICT in everyday life**

25. What is your opinion concerning the employee's use of ICT in the agency?
- Employees hardly require employ the use of ICT in their daily working, most transactions are paper based.
  - Some ICTs (e.g. phones, faxes, computers) are selectively employed by some employees in their daily jobs, some computers can be used for email access.
  - Phones are widely accessible, some employees have access to the Internet, majority of employees access the Internet through the private cyber kiosks.
  - Majority of employees use ICT (mobile phones, pagers, phones, computers, etc) to assist in their personal lives. Access to the Internet is widely available using both office and private online kiosks.

### **ICT in work Place**

26. What best describes the ICT in the agency?
- Employees have limited access to telephone, very few officers use computers
  - Some employees have access to telephone, few officers have computers, some networked for internal use, no electronic communications
  - Most employees have access to telephone, a number of computers networked for internal use and with electronic communications capabilities.
  - Computers in the agency are fully networked for both internal use and external communications, Internet access widely available in the office.

## Appendix-2

### Level of Readiness

No.	Questionnaire Item	Level of Readiness				Mean
		1	2	3	4	
1.1	What Percentage of Domestic calls made are successful	18	9	8	1	1.75
1.2	How do you classify the sound quality of domestic calls	12	15	9	0	1.92
1.3	Approx. what Percentage of faults are reported per year	4	22	8	2	2.22
1.4	What manner do other agencies access your telecommunication Infrastructure	25	11	0	0	1.31
	<b><i>Speed and Quality</i></b>					<b>1.80</b>
1.5	Approx. how long does it take to install a mainline once order is placed	12	23	0	1	1.72
1.6	Approx. How long does it take to resolve a reported fault	3	28	5	0	2.05
1.7	What proportion of S/W developers and Technicians are local	16	14	2	4	1.83
	<b><i>Service and Support</i></b>					<b>1.86</b>
1.8	What Public Internet Access opportunity exist	21	13	4	0	1.63
1.9	What local Internet Service Provider option is available	21	8	4	0	1.36
1.10	What is the Availability of Leased/High-band dedicated line	22	12	1	1	1.47
	<b><i>Internet Availability</i></b>					<b>1.48</b>
1.11	What kind of market place exist in the agency for H/W and S/W solutions	5	15	16	0	2.30
1.12	What is the agency affordability of H/W and S/W solutions	10	14	12	0	2.05
1.13	Do the H/W and S/W solutions available meet the agency's needs	12	10	10	3	2.11
	<b><i>Hardware and Software</i></b>					<b>2.15</b>
2.5	What do describe the Tele-density in the Government Office	21	15	0	0	1.41
2.4	How do you describe the Telecommunication access and network services of the operators	17	12	5	0	1.55
2.6	What do describe the Mobile phones growth rate in government Offices	5	16	14	1	2.30
	<b><i>Information infrastructure</i></b>					<b>1.75</b>
2.8	How do you describe the rates of ISPs charged	3	17	15	0	2.34
2.3	How do you describe the pricing of high-band comm lines	7	19	10	0	2.08
2.7	How do you describe the rates of Telephone calls charged for dial-up access	7	22	7	0	2.00
	<b><i>Internet Affordability</i></b>					<b>2.14</b>
	<b>Networked Access</b>					<b>1.86</b>

1.14	How do you rate the ICT training opportunities available within the Agency	7	23	5	1	2.00
1.15	Are there training opportunities offered online	21	8	5	2	1.66
1.16	What opportunities do the agency offer for ICT skill trained staff	10	21	5	0	1.86
	<b><i>Developing ICT Workforce</i></b>					<b>1.84</b>
	<b>Networked Learning</b>					<b>1.84</b>
1.17	How do describe the employment opportunities available for the ICT skilled personnel in the Agency	6	13	14	3	2.38
1.18	Does the agency require significant proportions of employees with ICT skills to perform their daily work	5	22	9	0	2.11
	<b><i>Employment opportunities</i></b>					<b>2.25</b>
1.19	Which option best describes online government in Agency	24	8	3	1	1.47
1.20	Which option best describes phone government in Agency	19	14	2	0	1.63
1.21	Which option best describes Fax government in Agency	23	10	3	0	1.36
1.22	Which option best Describes ICT Applications in Agency	29	6	1	0	1.22
	<b><i>E-Government</i></b>					<b>1.42</b>
	<b>Networked Economy</b>					<b>1.83</b>
1.23	What is your opinion about Agency's awareness of the Internet	7	12	12	5	2.41
1.24	What is your opinion about the material content on the website (if any)	29	7	0	0	1.19
1.25	What is your opinion about day to day use of ICT in Agency	16	17	2	1	1.66
1.26	What is your opinion about workplace use of ICT in Agency	24	11	1	0	1.36
	<b><i>ICT in everyday Life</i></b>					<b>1.65</b>
	<b>Networked society</b>					<b>1.65</b>
2.1	What is your opinion about the National Telecommunications Act on Liberalization	3	17	13	3	2.44
2.2	What is your opinion about the Regulatory provisions in the Telecommunication sector regarding universal access	6	15	14	1	2.28
	<b><i>Telecommunications Regulation</i></b>					<b>2.36</b>
	<b>Overall Networked Regulation</b>					<b>2.36</b>
	<b>E-Readiness Level</b>					<b>1.91</b>

## Appendix – 3

### E-READINESS ASSESSMENT TOOLS

#### (a) CSPP's Readiness Guide for Living in the Networked World

##### **Who created the tool?**

The Computer Systems Policy Project (CSPP) developed this guide. It was published in 1998, and is available at [www.cspp.org](http://www.cspp.org). CSPP is a "public policy advocacy group, comprised of the Chairman and Chief Executive Officers" of US information technology companies.

##### **What is the tool's goal?**

This self-assessment tool is designed to help individuals and communities determine how prepared they are to participate in the "Networked World."

##### **What does it measure?**

The guide measures the prevalence and integration of ICTs in homes, schools, businesses, health care facilities, and government offices, with additional focus on competition among access providers, speed of access, and government policy. Measurements are divided into five categories:

1. infrastructure
2. access
3. applications and services
4. economy; and
5. "enablers" (policy, privacy, security, ubiquity)

##### **How does it define 'e-readiness'?**

An 'e-ready' community has high-speed access in a competitive market; with constant access and application of ICTs in schools, government offices, businesses, healthcare facilities and homes; user privacy and online security; and government policies which are "favorable to promoting connectedness and use of the Network."

##### **How is the assessment carried out?**

The CSPP Readiness Guide provides a series of 23 questions, for community members to ask about the community itself. For each question, the users choose from a set of answers, which represent four progressive "stages" of development. The 23 questions are divided into the five categories listed above. For example, "chose...the level of access to network services provided in homes in your community. a) 25 % of homes have a computer / access device..."

##### **What result does it produce?**

The assessment produces a rating that indicates which of four progressive stages of development the community is at for each of the five categories listed above. "An overall 'score' for the community can be estimated by simply averaging the scores across the criteria."



**(b) CID's Readiness for the Networked World: A Guide for Developing Countries**

**Who created the tool?**

The Center for International Development at Harvard University developed this guide. It was published in 2000, and is available at [www.readinessguide.org](http://www.readinessguide.org). It draws from the earlier CSPP guide, described above.

**What is the tool's goal?**

"The guide... systematically organizes the assessment of numerous factors that determine the Networked Readiness of a community in the developing world." This assessment is meant to serve as a basis for further analysis and planning.

**What does it measure?**

This guide measures 19 different categories, covering the availability, speed, and quality of network access, use of ICTs in schools, workplace, economy, government, and everyday life, ICT policy (telecommunications and trade), ICT training programs, and diversity of organizations and relevant content online.

**How does it define 'e-readiness'?**

An 'e-ready' society is one that has the necessary physical infrastructure (high bandwidth, reliability, and affordable prices); integrated current ICTs throughout businesses (e-commerce, local ICT sector), communities (local content, many organizations online, ICTs used in everyday life, ICTs taught in schools), and the government (e-government); strong telecommunications competition; independent regulation with a commitment to universal access; and no limits on trade or foreign investment.

**How is the assessment carried out?**

The guide provides a grid with descriptions of four stages of advancement in each of 19 categories (placed into five groups). Communities estimate their current stage of development in each category. No prescription is given on how that estimate should be made.

**What result does it produce?**

The guide rates the 'stage' a community is in for each of the 19 categories, and descriptions are given of what is required to be in a particular stage. "The Guide does not offer prescriptions for improved Readiness."

## (c.) APEC's E-Commerce Readiness Assessment

### **Who created the tool?**

The Asian Pacific Economic Cooperation (APEC) Electronic Commerce Steering Group developed this guide. It was published in 2000, and is available at <http://www.ecommerce.gov/apec/>, and [http://www.ecommerce.gov/apec/docs/readiness\\_guide\\_files/readiness\\_guide\\_5.pdf](http://www.ecommerce.gov/apec/docs/readiness_guide_files/readiness_guide_5.pdf). More detail on the measurements can be found at [http://www.ecommerce.gov/apec/docs/readiness\\_background.html](http://www.ecommerce.gov/apec/docs/readiness_background.html).

### **What is the tool's goal?**

"To help governments develop their own focussed policies, adapted to their specific environment, for the healthy development of e-commerce."

### **What does it measure?**

Six categories are measured for "readiness for e-commerce."

1. basic infrastructure and technology (speed, pricing, access, market competition, industry standards, foreign investment),
2. access to network services (bandwidth, industry diversity, export controls, credit card regulation),
3. use of the Internet (use in business, government, homes),
4. promotion and facilitation (industry led standards),
5. skills and human resources (ICT education, workforce), and
6. positioning for the digital economy (taxes and tariffs, industry self-regulation, government regulations, consumer trust).

### **How does it define 'e-readiness'?**

A country that is 'ready' for e-commerce has free trade, industry self-regulation, ease of exports, and compliance with international standards and trade agreements.

### **How is the assessment carried out?**

Participants are asked 100 multiple-choice questions grouped into the six categories listed above. The possible answers indicate progressive levels of e-readiness for a country. No overall scoring occurs.

### **What result does it produce?**

The product of the assessment is the answers to the 100 questions. Countries are supposed to work on areas with less than optimal answers, since they are "impediments...to the deployment of e-commerce."

## ANNEX – 4

### Readiness for the Networked World - A Guide for Developing Countries

We would like to acknowledge the Computer Systems Policy Project (CSPP) for their assistance and original work on Global Electronic Commerce Readiness, and our colleagues throughout the world who provided their input and comments during the development of the Guide.

We are especially grateful to IBM for their support of this project.

The technological gains of the last several decades lie at the core of staggering new surges of wealth and well-being within the richest countries of the world. Electronic commerce and related applications of information and communication technologies (ICTs) have become tremendous engines for economic growth and productivity and are changing the shape of the world in which we live. Yet the developed world is reaping the vast majority of these gains.

It is our view that the appropriate use of information and communication technologies can also improve the lives of the 80% of the world's population that lives in the developing world.

The great divide between rich and poor countries, long observed with regard to economic wealth and social conditions, is equally prevalent and worrisome in the realm of information and communication technologies. While the growth of the Internet and the continuing "digitalization of society" are much heralded events in more developed countries, many leaders in developing nations are left wondering how they can participate in the rapid changes going on around them. How can ICTs help their businesses, governments and communities become more productive? How do they get ready for the Networked World?

We believe that there now exists a unique opportunity for many of these communities to join global information networks to propel them to greater wealth and prosperity. Without a concerted effort by the developing world to get ready for the global networked economy, however, the gaps in living standards between developed and developing countries will only grow wider, and the productive use of these technologies will remain a phenomenon that is largely confined to the richest parts of the world.

Building upon earlier work by the Computer Systems Policy Project (CSPP) on Global Electronic Commerce Readiness, and with the support of IBM, we have created a systematic but flexible approach to assessing Networked Readiness. This Guide is a tool that provides the first step in creating a strategic approach to planning for developing world communities. Our collective understanding of Networked Readiness is still in its infancy, particularly with respect to the largely untapped markets and resources of the developing world. The landscape is shifting rapidly, and we recognize the challenge of creating a methodology that must serve diverse communities and apply to a rapidly evolving subject matter. To that end, the Guide is a general framework that each community should tailor to its own needs. It should be used not for comparison among communities, but for appraisal within them.

It is our hope that Readiness for the Networked World: A Guide for Developing Countries will become a valuable resource that businesspeople, policy-makers, community leaders and others

will use to unlock the tremendous potential that ICTs hold as a catalyst for development. It is not an easy task, for there exist myriad obstacles to Readiness, but with hard work and cooperation among the public, private, and non-profit sectors, we believe that the communities in the developing world can begin to better capture the benefits of the Networked World.

**Jeffrey D. Sachs**

**Director**

**Center for International Development at Harvard University**

### **WHAT IS THE NETWORKED WORLD?**

Ever-evolving and increasingly powerful information and communication technologies (ICTs) have fundamentally changed the nature of global relationships, sources of competitive advantage and opportunities for economic and social development. Technologies such as the Internet, personal computers and wireless telephony have turned the globe into an increasingly interconnected network of individuals, firms, schools and governments communicating and interacting with each other through a variety of channels. The explosion of this technologically mediated global network has resulted in a world in which virtually everyone, everywhere, has the potential to reap the benefits of connectivity to the network.

### **THE NETWORKED WORLD IS:**

An artisan in a rural village using her community center's computer to sell handicrafts on the World Wide Web. Healthcare workers accessing online databases to research recent health advisories. Students in different countries collaborating on a science project over the World Wide Web. Programmers creating customized software for distant clients through the Internet. Government procurement officers using the World Wide Web for purchases and contracts. A farmer using a wireless handheld device to research market prices.

### **WHAT ARE THE BENEFITS OF THE NETWORKED WORLD FOR DEVELOPING COUNTRIES?**

Success in the Information Age depends upon the widespread integration of information and communication technologies into society-at-large. New value propositions based upon ICTs emerge as individuals begin to accept and understand their usefulness. This change in attitude and behavior leads to creative solutions and new models that can radically reshape how businesses, hospitals, schools and governments work. In the more developed nations, the deployment of ICTs is more widespread and is supported not only by better infrastructure, but also by more fundamentally sound societal building blocks such as healthcare and education. The developing world, on the other hand, suffers from serious deficits and profoundly uneven distributions within these areas.

Rapid increases in computing power, plunging prices for silicon chips and electronics, and advances in wireless communications have made powerful technologies accessible to many parts of the world which have historically lagged far behind in technology adoption. Suddenly, this accessibility allows developing nations to achieve significant, shared and sustained gains from joining the Networked World, particularly if broad development goals are kept in mind as communities in these nations focus on their own Readiness.

The new ICTs are a powerful yet neutral tool that can be used to address a host of issues in every community – their real power, therefore, lies in their ability to support holistic development that promotes long-term social and economic benefits. If information and communication technologies are used effectively, they can help to create a trained, educated and healthy workforce that can build a vibrant and successful economy. The value of a network increases as its number of users grows. By participating in the global information network, developing nations not only add value to the rest of the world, but also benefit from the ability to use the network to communicate and trade with all other users. For this reason it becomes ever more important for the developing world to get ready for the Networked World.

Getting ready for the Networked World creates new opportunities for firms and individuals in the developing world, eliminates barriers that have traditionally stifled flows of information and goods to and from developing nations, and promotes efficiency in a host of activities. Students can learn more about the world and about themselves through use of the network. Businesspeople can find new market opportunities and more efficient ways to run their firms. Governments can more effectively provide public services. Individuals can communicate with friends and family and become more informed about virtually anything that is on the network.

Participation in the Networked World can provide new ways for developing countries to improve their economic, social and political well-being. These opportunities for positive change are increasingly relevant and achievable as information and communication technologies become more powerful and less expensive.

#### **WHAT ARE THE BENEFITS OF PARTICIPATING IN THE NETWORKED WORLD?**

##### **Creates New Opportunities**

- Increases convenience and choice for consumers
- Extends market reach for businesses and supports fair return on goods and services
- Allows new business models to develop

##### **Eliminates Barriers**

- Provides access to information to all on the network
- Overcomes physical and virtual isolation
- Permits individuals to become better informed of government policies and processes

##### **Promotes Efficiency**

- Streamlines product and service delivery
- Increases transparency of operations
- Reduces transaction costs

#### **WHAT IS READINESS?**

Readiness is the degree to which a community is prepared to participate in the Networked World. It is gauged by assessing a community's relative advancement in the areas that are most critical for ICT adoption and the most important applications of ICTs. When considered together in the context of a strategic planning dialogue, an assessment based on these elements provides a robust portrayal of a community's Readiness. The value to a community of assessing its Readiness lies in evaluating its unique opportunities and challenges. Most communities will not be uniformly Ready across all evaluation criteria. The result is not a simple "yes" or "no," but rather a complex map or

detailed snapshot of a community's potential. A community may be well poised for some applications of ICTs, but unable to use others. The scope and detail of the Guide's output makes it a powerful tool for identifying a community's strategic priorities for participating in the Networked World.

## **WHAT IS THE GUIDE?**

This Guide is an instrument that systematically organizes the assessment of numerous factors that determine the Networked Readiness of a community in the developing world. The Guide requires significant participation and interpretation on the part of its users. It examines 19 different categories of indicators, ranking each by levels of advancement in Stages One through Four. The Guide neither offers specific advice nor suggests that the only route from Stage Two to Stage Four be through Stage Three. Nor does it provide an overall score; it seeks only to offer a starting point in an ICT planning process. The categories are linked, each driving the others, such that a community cannot concentrate solely in one area, but must pay attention to each, noting where it might be able to capitalize on synergies among the categories. The categories fall within five groups:

### ***Network Access:***

What are the availability, cost and quality of ICT networks, services and equipment?

### ***Networked Learning:***

Does the educational system integrate ICTs into its processes to improve learning? Are there technical training programs in the community that can train and prepare an ICT workforce?

### ***Networked Society:***

To what extent are individuals using information and communication technologies at work and in their personal lives? Are there significant opportunities available for those with ICT skills?

### ***Networked Economy:***

How are businesses and governments using information and communication technologies to interact with the public and with each other?

### ***Network Policy:***

To what extent does the policy environment promote or hinder the growth of ICT adoption and use?

## **WHO SHOULD USE THE GUIDE?**

The Guide is targeted at communities in developing countries seeking to define a strategy to participate in the Networked World. A "community" may be any size: a country, province, city or village. The Guide will naturally yield unique results for each community. For instance, the issues that are most easily addressed at a municipal level may be more challenging at a national level, and vice versa. Likewise, the value of each category will vary for each community. Available data are also of different character and quality in each community. This will be reflected in the relative precision of each assessment. In referring to its audience as the "developing world," the Guide groups together a great number of communities with widely different characteristics. There is a great deal of variation, not only among countries, but also within them. This is particularly true with respect to comparative conditions between rural and urban areas.

The Guide attempts to be a one-size-fits-all model that is flexible enough to accommodate any community in the developing world, recognizing that there are certain limitations to this approach. Just as communities are different from each other, leadership styles and goals in the development and implementation of ICT initiatives may arise from different places in each community. The composition of leadership groups using the Guide will therefore vary case by case. In some communities, businesses may take the lead. In others, academia or government may seize the initiative. In any case, a broad partnership among leaders across these sectors may produce the most thorough assessment and provide the best foundation for cooperation on future actions to improve Readiness.

## HOW SHOULD THE GUIDE BE USED?

There is no one correct way to use the Guide; each community should determine how the Guide best addresses its own needs. Depending on the resources and goals of the community, the assessment process and results will vary in detail, depth and scope. In general, however, users of the Guide should estimate their own community's current stage within each Readiness category. Communities may have difficulty placing themselves in a specific stage within some categories, as certain indicators within a stage may not be consistently linked. A community facing this situation should realistically determine which indicator is most relevant to its own ICT goals. While the Guide alone does not offer prescriptions for improved Readiness, it is useful for giving communities an idea of their current state of preparedness to participate in the Networked World. In order to decide where to go, each community must first know where it is. The Guide provides a firm base upon which to build a planning dialogue and is an important step in making sound policy and investment decisions.

### **Network Access:**

The minimum necessary condition for Readiness is access to adequate network infrastructure. Without access to global communications networks, no community can participate in the Networked World. Access is determined by a combination of the availability and affordability of use of the network itself, as well as of the hardware and software needed for network interface. The quality and speed of the network are also important in determining how the network is used. The customer service orientation of access providers is a major factor in network application adoption and usability.

Because of the growing importance and unique character of the Internet, which provides a global platform for both data and (increasingly) voice services, the assessment of network access should be carried out in the context of Internet access, rather than access to either voice or data. The significance of the Internet will only continue to grow in terms of global trade and communication.

*Information Infrastructure.* For most communities in the developing world, a lack of access to voice and data services remains a significant impediment to Networked Readiness. Communications infrastructure is deployed with widely varying local and regional rates of penetration, depending on factors such as geography and/or income levels. Local network access may be provided by any one of a number of media that make up the communications network (including twisted pair copper wire, coaxial cable, wireless local loop, satellite and fiber optics). While in the future, mobile wireless technologies will undoubtedly provide an attractive option for data access (see box insert: "The Promise of Wireless Communications"), as will cable



networks and perhaps even the electrical grid, currently most Internet access in the developing world is provided through the traditional telecommunications network.

*Internet Availability.* Internet access is enhanced by competition among Internet Service Providers (ISPs) that operate locally. The range of services offered, number of dial-up lines (which helps determine ISP capacity) and transmission capacity all influence an ISP's usefulness. The availability of leased lines is particularly important in making the Internet available to the business community. Finally, in many communities in the developing world, public access is essential to making the Internet available to greater numbers of individuals and firms. Telecenters, Internet cafes and community information centers assume great importance in making the Internet available to those who do not have personal access at home, school, work or elsewhere. *Internet Affordability.* The prices which businesses and individual consumers pay for Internet access are in most cases determined by a combination of fees for basic telephony and ISP services. In communities where the sum of ISP and telephony fees is prohibitively high, a disincentive to network usage exists, and access is curtailed. Pricing packages can be structured in ways that are conducive to Internet usage – per minute or hourly pricing (unlike flat rate pricing) for both Internet and telephone service can limit users' time online and therefore inhibit the use of the network for many activities such as electronic commerce (e-commerce). The provision of tiered pricing packages can improve the affordability for many subscribers by allowing them to purchase only what they need.

*Network Speed and Quality.* The available bandwidth, both for individuals' local access and for a community's connection to the Internet backbone, determines the number of users and types of online activities the network can support. Bandwidth-intensive activities, such as large file transfers or video streaming, may be unavailable to communities with constrained access to the network. The quality of the network, including servers, also determines its usage. High numbers of mainline faults, poor connections, dropped connections and packet loss can render any network useless or operationally sub-optimal, thus discouraging use of and investment in new technologies.

*Hardware and Software.* A vibrant market with numerous hardware and software options can encourage more specialized usage of the network, including ICT solutions that are tailored to local needs. More widespread retail and wholesale distribution channels for both hardware and software increase opportunities to use the network within the community. The prices of hardware and software are particularly important in the developing country context, where generally low-income levels cannot support high-priced consumer items.

*Service and Support.* A strong customer service orientation is important in determining the success of network deployment. Long waiting periods for installation and repair and a lack of support services by telephone companies and Internet providers pose major obstacles to Readiness. The quality and number of technical support professionals are essential in maintaining the network and providing service.

**Transport Infrastructure, Distribution Channels, Electricity and Local Conditions** There are a number of factors that are important for economic development in general that deserve special mention because they can play a crucial role in Networked Readiness.

- Where information technologies facilitate the buying and selling of tangible goods, the non-ICT infrastructure in a community is essential in enabling Readiness. The availability and efficiency



of traditional physical transport infrastructure such as roads, railways, ports and airports are extremely important for the movement of ICT equipment and of ICT-facilitated trade in goods.

- Local distribution networks can also influence Readiness. The nature and quality of delivery channels are determined by a variety of factors (e.g. postal services, private shipping services, warehousing, licensing and permits). Each of these factors can pose certain limitations on the movement of goods that accompanies the growth of commercial activity associated with information and communication technologies. Inefficient customs services can also be an impediment in this respect.

- Particularly in the developing world, the reliability and cost of electric power must be considered carefully in light of Readiness. The one billion people globally who do not have electricity consequently face tremendous challenges in Networked Readiness terms.

- Proper functioning of ICT equipment is also dependent upon local conditions that may affect how the technologies perform – factors such as heat and humidity (especially where air conditioning is rare or unattainable), dust or exposure to other elements can render many information and communication technologies unusable.

#### -The Promise of Wireless Communications

In the context of the developing world, wireless telecommunications hold great promise for overcoming many deficits of infrastructure and access. There are many advantages to wireless technologies that make them well-suited for extending existing networks.

- Lower cost and less time to deploy the infrastructure than traditional fixed lines.

- Faster activation of individual connections than in fixed line systems. This cuts down on subscriber waiting lists for access to the network.

- Avoids potential problems and costs related to theft of copper wire and other equipment.

- Mobile wireless offers convenience and flexibility to the user.

- Global experience suggests that the rollout of wireless networks can accelerate competition in the telecommunications market, leading to faster rates of innovation, rapidly declining prices, faster network growth and better service quality.

- Currently there are limited data applications for mobile wireless. However, as third-generation handheld devices come on to the market, and the deployment of broadband wireless becomes a more cost effective market solution, there will be even more opportunities to extend productive connectivity throughout the developing world.

- With increasing availability of mobile data applications, handheld devices should become a good substitute for traditional access to data, removing the need for larger, more expensive personal computers.

- Improvements in human interface technology, including voice recognition, may also lead to simpler, easier-to-use devices that will be more accessible to a broader population.
- Innovative solutions for extending access become available with the declining cost and increasing power of handheld devices. These include the development of “disposable phones,” or pre-paid plans with extremely low-cost telephones.

### **Networked Learning:**

Without an educated, ICT-savvy populace, no community can fully participate in the Networked World. To foster this resource, information and communication technologies must be incorporated into the learning system. Lamentably, although the use of ICTs in education is one of the most powerful catalysts to Networked Readiness, it is an opportunity that is often squandered, misunderstood or underestimated.

*Schools' Access to Information and Communication Technologies.* Schools must integrate ICT tools into their learning processes if they are to be part of the Networked World. Programs that give students access to information and communication technologies in the classroom provide an important step to improving Readiness. A school's Readiness in terms of access can be broken down into six broad areas: number of computers, physical access to the technology, types of computers, diffusion of the network, access to and organization of electronic content, and quality and speed of connectivity in the school. In general, the diffusion of information and communication

technologies is driven by unit cost per pupil. Computers tend to be adopted first at the university level, then by the secondary school system, and finally by primary schools.

*Enhancing Education with ICTs.* While putting ICTs into schools is an important first step to Readiness, the technologies need to be properly harnessed to improve the learning process. Teachers must be trained to use the Internet and computers as tools for the students' benefit; this training is central to Readiness. Curricula must be redesigned to encourage the use of ICTs in the pursuit of problem solving, group learning and research. Students should be taught from the earliest age possible to use information and communication technologies to enhance and improve their learning experiences. Full integration of ICTs into the learning process is optimal, and collaborative, project-based learning can make up a solid pedagogical strategy for ICT-enhanced education.

*Developing the ICT Workforce.* It is essential that there exist opportunities within the community to offer future ICT workers both first-time and continuing training in essential skills such as software programming, hardware engineering and World Wide Web design. These opportunities are fundamental to creating a sustainable ICT industry and support the integration of ICTs into the local economy.

*Illiteracy and ICTs.* While cutting-edge digital media do extend the usability of the Internet, it is still largely a text-driven medium. Illiteracy seriously limits the ability of many communities to utilize computers and online resources, particularly in the developing world, where illiteracy rates can be quite high.

### **Networked Society:**

Readiness depends upon the community's incorporation of information and communication technologies into the fabric of its activities in order to maximize the gains of joining in the Networked World. In society-at-large, ICTs can have a profound effect upon people's professional and personal lives by providing easier access to information, more efficient ways to communicate and powerful organizational tools. To understand how a community is using ICTs, it is important to assess not only how many members of the community have access to the technologies, but also how they are using them.

*People and Organizations Online.* One of the hardest indicators to track is the actual number of online users. Particularly in the developing world, where multiple users share many electronic mail (e-mail) accounts and other online tools, there are few reliable indicators that accurately map how many people are online. The exponential growth in online usage also makes tracking current use difficult. This is nevertheless an important indicator. As more people access the Internet regularly, and networks of users grow, there is greater demand and opportunity for online interaction, as well as better meshing with the Networked World at-large. As more organizations gain an online presence, it becomes more likely that the community will use information and communication technologies to augment or carry out its activities and needs. One of the most important drivers of online growth is awareness – people must first know and understand what the Internet is in order to participate. Particular attention should be paid to the demographics of Internet users in the community. Particularly at lower stages of Readiness, groups such as women, the physically disabled, and racial and ethnic minorities often do not participate in the online environment. A community is more Ready when there are not large discrepancies in online presence among different groups.

*Locally Relevant Content.* Community members find the Internet medium more useful and relevant to their own lives when online content reflects their own interests and needs. Locally relevant content is a major driver of growth of Internet usage. Interactions such as chat rooms, online interest groups, special interest software, bulletin boards, list-servers and websites all drive the community to use ICTs more widely in their lives. Similarly, online content is more relevant when it is available in local languages. English language dominance on the Internet remains a serious impediment to the world's non-English speaking communities. While the preponderance of English is waning, and other world languages are gaining, most of the world does not speak a language that is strongly represented either in software or on the World Wide Web.

*Information and Communication Technologies in Everyday Life.* Communities participate more directly in the Networked World when information devices, such as radios, faxes, televisions, telephones, pagers and computers are culturally accepted and widely incorporated into daily life. It is important to examine both penetration of ICT devices into a community and their applications. In communities where either income levels or the network infrastructure cannot support high levels of individual access, public shared facilities provide a needed alternative. Such venues may include telecenters, cybercafes and community information centers. Strategies for drawing people in to use these facilities are essential. Information and Communication Technologies in the Workplace. The more that business and government offices are already using information and communication technologies, the better prepared they are to participate in the global networked economy. In order to realize important efficiency gains from ICTs, businesses and governments need to not only make technologies available to their employees, but also effectively incorporate them into their core processes.

## **Networked Economy**

Businesses and governments that are able to effectively employ information and communication technologies find more sophisticated and efficient ways of managing their external relationships and communications. This growing ICT usage helps form the critical mass of electronic transactions which supports a networked economy, both in terms of the network size and the demand for associated goods, services, labor and policy reform.

*ICT Employment Opportunities.* A thriving job market for ICT professionals provides added incentive for growth of ICT adoption, training programs and overall use of information and communication technologies within the economy. The retention of technical workers becomes an important competitiveness issue for the community.

*Business-to-Consumer (B2C) Electronic Commerce.* Online retail options enhance consumer choice and access to products. They also allow businesses to reduce costs associated with physical infrastructure and to augment their marketing outreach and public relations via a dynamic communications channel.

*Business-to-Business (B2B) Electronic Commerce.* When businesses move their dealings with other businesses online, they can often communicate more easily at lower costs, hold smaller inventories, and process billings and payments more quickly, among other advantages. Moreover, networked businesses are likely to explore new business models, including dynamic business partnerships and radical market restructuring.

**E-Government.** Governments can take advantage of information and communication technologies to improve connections with their constituents, including using the Internet to post information online and to offer interactive services for the public. Governments can also lead by example and become a catalyst for the networked economy by investing in information and communication technologies for their internal use, leading to more efficient operations and the creation of a local market for ICT equipment and services. Relationships with government contractors and procurement mechanisms can be streamlined by putting them online. ICTs can make government activities more transparent to citizens and other observers.

### **Network Policy:**

Public policy can be a help or a hindrance to the networked economy. The favorable climate that public policy can create for Internet use and e-commerce encourages communities, organizations and individuals to invest in and use information and communication technologies. Important aspects of Networked Readiness dealt with elsewhere in the Guide (such as Internet availability and affordability, hardware and software availability and affordability, ICTs in schools and electronic commerce) are all influenced by public policy. For a community to become ready for the Networked World, the appropriate policy-makers must realize the implications of their decisions upon ICT adoption and use.

*Telecommunications Regulation.* Effective regulation should promote competition, ensure affordable pricing for consumers and maximize telecommunications access in the community. Liberalization within the telecommunications sector should establish a regulatory framework that encourages multiple carriers to operate competitively. As more operators enter and compete in the marketplace, service offerings become more accessible and affordable, are deployed more

rapidly and reach higher levels of quality. At the same time, regulation should encourage universal access to telecommunications services.

*ICT Trade Policy.* Information and communication technologies become more available and affordable when there are low barriers to trade, including tariffs on ICT equipment and software, and electronically ordered or delivered goods and services.

### **The Business and Economic Environment**

Use and deployment of information and communication technologies is largely being driven by the private sector. Accordingly, the overall business climate of a community, while affecting diverse development concerns, is of particular importance with regard to Networked Readiness and electronic commerce. The following factors, often influenced or determined by national policy, should be considered:

- perceived political risk
- predictability of the legal environment
- soundness of economic and monetary policies
- openness to foreign direct investment
- convertibility of local currency
- restrictions on capital flows
- credit card usage
- credit card processing protocols
- access to credit
- entrepreneurial culture
- access to startup capital
- regulations and restrictions on small business

### **What Next?**

The results from the Readiness assessment act as the starting point in a participatory planning dialogue. They should heighten awareness of the opportunities and challenges of joining the Networked World.

A planning process should be undertaken as a true partnership among business, government and other members of the community. The process should encourage but not require participation from the whole community. Participants should be key stakeholders that might include local carriers (incumbent and competitors), ISPs, high-tech companies, business users, appropriate government officials, educators, universities, bankers and community groups.

Just as the other components of Readiness have been assessed, the nature and progress of the planning dialogue that is currently underway within the community should also be carefully understood. This is valuable whether a plan has already been put into action or if there is not yet any planning underway.

The following concepts should be kept in mind during the planning dialogue: Communities at lower stages of Readiness can get ideas for improvement from the higher stage indicators. It is important to note, however, that the path from Stage One to Stage Three does not necessarily lead through Stage Two. Indeed, the absence of ICT development within a particular community may present unique opportunities for rapid ICT adoption and a “leapfrogging” of stages of

**Readiness.** Reaching Stage Four does not mean a community is finished; there is a need for continual improvement, especially in light of the speed with which ICTs and their applications develop and change. Preparing people is at least as important as preparing the technology they will use. The importance of education in Readiness cannot be overestimated – a heavy emphasis upon incorporating ICTs in the educational system can yield tremendous long-term benefits by investing in the future Readiness of the workforce, society and economy. Each community must decide its own priorities and resource allocation to get Ready, but it should be careful not to sacrifice long-term gains for short-term benefit. A close working relationship between business and government is critical. ICTs are constantly becoming more powerful and less expensive. Applications that may be prohibitively expensive in the present may prove to be quite affordable in the near future.

## **NETWORK ACCESS**

### *Information Infrastructure*

#### **Stage 1**

Access to telecommunications infrastructure is very poor. (Roughly: There are very few shared facilities for telecommunications access. Telephone penetration is very low, with a teledensity of less than 2 mainlines per 100 people. Mobile wireless penetration is below 0.5% of the population. No cable services are available.)

#### **Stage 2**

A small minority in the community has good access to the telecommunications network, but most of community does not. (Roughly: Teledensity is between 2 and 8 mainlines per 100 people. Mobile wireless penetration is between 0.5% and 3%. Cable penetration is below 5% of all households in the community.)

#### **Stage 3**

A sizeable portion of the community has good access to telephone services. Growth in mobile wireless telephony is accelerating. (Roughly: Teledensity is between 8 and 40 mainlines per 100 people. Mobile wireless penetration is between 3% and 14%. Between 5 and 10% of households in the community subscribe to cable services.)

#### **Stage 4**

There is widespread access to telecommunications and network services. (Roughly: There is high teledensity of 40 mainlines or more per 100 people. Penetration of mobile wireless telephony is high and growing, with at least 14% of the community subscribing. Cable penetration is high, at 10% of households or higher.)

### *Internet Availability*

#### **Stage 1**

There are no Internet Service Providers (ISPs) offering local dial-up access. There is no public Internet access.

Businesses are unable to lease dedicated lines from the local telephone operator, or there is a multi-year wait to do so.

#### **Stage 2**

A limited number of Internet Service Providers offers local dial-up access. There are more than 1,000,000 inhabitants per local ISP. Some providers offer only e-mail services. There are limited opportunities for public Internet access. Users often have difficulty establishing a dial-up connection to a local ISP. There is no competition in commercial leased line provision. Businesses may only lease lines from a single telephone operator.

### Stage 3

There are between 500,000 and 1,000,000 inhabitants per local ISP. ISPs provide full Internet access. Subscribers may have some options between various Internet service packages. There are some opportunities for public Internet access. It is normally possible for users to establish a dial-up connection to a local ISP, except during peak hours. One or two private providers leased lines to businesses.

### Stage 4

There are more than two local ISPs per 1,000,000 inhabitants. Higher bandwidth solutions such as DSL (digital subscriber line) and cable modem access are available. Most customers can tailor services to meet different demands for speed, service, security, quality and cost. ISPs provide web hosting services to their subscribers. There are adequate opportunities for public Internet access for those without access at home, school or work. Users are able to establish a dial-up connection to a local ISP on a reliable basis. Multiple private providers leased lines to businesses. Wireless solutions may be available in addition to fixed line solutions.

## *Internet Affordability*

### Stage 1

Most users are charged long distance or international rates for dial-up access. ISP rates are so high that few individuals can afford Internet access.

### Stage 2

Rates for local telephone calls are high enough to discourage extensive Internet use via local ISPs, even among most who can afford Internet access. Local access solutions exist, but rates for ISP services are high enough to discourage extensive Internet use. The lack of competition in the provision of commercial leased lines is reflected in prohibitively or very high leasing fees.

### Stage 3

Telephone charges for Internet access reflect emerging competition in the telecoms market, yet they are high enough to discourage extensive use by some users. Internet access is priced within reach of the majority of citizens. Competition in leased line provision for businesses has been introduced, and prices are falling but are still high.

### Stage 4

Prices for telephone usage are set competitively and are affordable for nearly all citizens. Flat rate pricing may be in effect for local telephone calls. Prices for Internet access are set competitively and are affordable for nearly all citizens. Flat rate pricing may be available. Free ISP services may be available, particularly in communities with time-metered pricing of local phone calls. Higher bandwidth solutions such as DSL services and cable modem access are priced competitively, which may include tiered pricing based on speed of access or usage-based pricing based on total volume. "Always-on" connections are available without time-metered pricing. Pricing for leased business lines is set in a competitive environment featuring multiple vendors.



## *Network Speed and Quality*

### **Stage 1**

Fewer than half of all domestic telephone calls are successful. For voice telephony, sound quality is often not acceptable for regular conversation. More than 100 faults are reported per year for each 100 telephone mainlines. No services beyond limited electronic mail capabilities are supported by the local telecommunications infrastructure. Large businesses which want access must link their networks directly to infrastructure backbone outside their community.

### **Stage 2**

50-70% of domestic telephone calls are successful. Dropped connections are frequent and extremely disruptive. For voice telephony, sound quality is acceptable for regular conversation. Between 50 and 100 faults are reported per year for each 100 mainlines. The telecommunications infrastructure in most areas of the community supports dial-up modem transfer speeds of 9.6 Kbps or less. Some areas may support speeds of 14.4 Kbps. Large businesses and ISPs can link their networks to a local infrastructure backbone, but backbone capacity is frequently inadequate to support user demands. Packet loss is significant and regularly disruptive for any online activities.

### **Stage 3**

70-90% of domestic telephone calls are successful. Connections are dropped with noticeable frequency and are somewhat disruptive. Fewer than 50 faults are reported per year for each 100 mainlines. Users have access to dial-up modem transfer speeds of up to 28.8 Kbps. Leased lines with transfer speeds of up to 64 Kbps are widely available for businesses and ISPs. Limited higher-speed lines are available in some areas. Backbone facilities serving the community are usually sufficient, although regular peak demand periods result in slower network response times.

Packet loss by the network may occur but is not generally disruptive.

### **Stage 4**

Dropped connections are fairly infrequent and not a major disruption. Over 90% of domestic telephone calls placed are successful. Fewer than 10 faults are reported per year for each 100 mainlines. There is widespread access to dial-up modem transfer speeds up to 56 Kbps, with some access to high speed solutions such as DSL, cable modems and wireless media. High-speed services of 1.5 Mbps are common, with higher speeds available in some areas. Adequate backbone capacity exists to support community needs without significant transmission delays except during infrequent periods of high demand. Packet loss by the network is below 10%.

## *Hardware and Software*

### **Stage 1**

There are no distribution/sales points for ICT hardware/software within the community. ICT hardware and software are too expensive for all but large businesses and a small minority of citizens and small and medium-sized businesses.

### **Stage 2**



Some off-the-shelf hardware and software solutions are available locally, but there are none or very few in the native language of the community. Basic hardware and software are affordable for some citizens and small and medium-sized businesses.

#### Stage 3

Most ICT products are sourced from abroad, but there is a strong and growing localization industry to adapt products to local needs. Some software appropriate to local needs and languages is available. A variety of hardware and software solutions are available and affordable to most small and medium-sized businesses, as well as many individuals.

#### Stage 4

A vibrant marketplace exists for software and hardware with a competitive retail and wholesale market for these products. Hardware and software appropriate to local needs and languages are widely available and affordable.

### *Service and Support*

#### Stage 1

Telephone mainlines take at least four years to be installed from the time their orders are placed. It takes over six months for reported mainline problems to be resolved, if ever. Very few or no software developers, programmers or computer technicians are present in the community.

#### Stage 2

Mainlines take at least six months for installation. It takes over one month for reported mainline problems to be resolved. Providers pay no explicit attention to customer service. A small community of software developers, web designers, network administrators and other technical personnel exists.

#### Stage 3

Mainlines take at least one month to be installed. It takes over one week for reported mainline problems to be resolved. There is a growing customer service ethic among service and support providers, although it is not a priority for most. Some ICT maintenance and technical support services are available. A nascent software industry is present in the community, and there is a growing number of hardware technicians, web designers and network administrators.

#### Stage 4

Mainline installation is usually completed within a few days. Service providers can be contacted in a number of ways (e-mail, telephone, mail). Reported problems are usually resolved within 48 hours. Online help is available and may allow for immediate resolution. Customer service is considered a source of competitive advantage for the service provider. ICT maintenance and technical support are widely available. A competitive and sophisticated web design market exists, incorporating the latest development technology.

## **NETWORKED LEARNING**

### *Schools access to ICTs*

#### Stage 1

There are no computers in schools.

#### Stage 2

Where there are ICTs in schools, it is primarily at the university level, and there are generally fewer than five computers in a school or faculty. Access to the computer(s) is limited to computer teachers and/or administrators. Computers tend to be older generation models, such as stand-alone 486 PCs or the equivalent. Where there are multiple computers installed, they are not networked. Use of the computer(s) is limited to electronic documents that are available on the hard drive or diskettes. There may be connectivity for store-and-forward e-mail.

### Stage 3

Computers can be found at the university level as well as in primary and secondary schools. Up to 10 to 15 computers can be found in laboratories for classroom group work, with about four students per computer. Computer labs are generally only open for computer studies during the day and closed after school, or may be open to teachers for class preparation but closed to students. Computers tend to be older generation models, such as 486 PCs or higher, and they may be networked with a file and mail server. There may be an internal Local Area Network (LAN) in place. If there are multiple computer labs, they may be connected through the school network. Where there are stand-alone PCs, they may have a limited CD-ROM library. The networked lab achieves connectivity through a dial-up connection to the Internet, which supports limited World Wide Web access.

### Stage 4

Most schools at all educational levels have access to computers. There may be a number of computer labs in each school, and computers may be found in the classroom. In some cases, students and teachers may have individual laptop computers. Computer labs are open to students and reserved for subject matter classes to use, and are open after school hours. The lab may be open to the community and other schools after school and on weekends. There may be an internal Web server on the school network - computers as well as other devices are connected to the network. Classrooms may be wired and connected to the school's Wide Area Network (WAN). Clusters of schools may be connected to a regional WAN to share electronic resources. A national school network may be in place. Connectivity may be obtained through a leased line or wireless connection with at least 64 to 128 Kbps of dedicated access.

## *Enhancing Education with ICTs*

### Stage 1

Computers are not used by any teachers or students.

### Stage 2

Only a few teachers use computers in a very limited fashion. Teachers' basic computer literacy involves skills such as use of the keyboard and mouse, a basic understanding of the computer's operating system, manipulation of files, and cutting and pasting. Computers are mainly used at the university level.

### Stage 3

Teachers and students use computers to support traditional work and study. Teachers who use computers are generally proficient with word processing applications and may access information offline from CD-ROMs. They may employ computers in some basic drill-and-practice lessons. In some cases, teachers access and organize information from the World Wide Web in their work, share information using e-mail, and create information in electronic format to share with others both inside and outside the school.

### Stage 4

Information and communication technologies are fully integrated into the curricula, are used in the classroom and are essential to the learning process. The curricula may feature collaborative, project-based learning activities that enable students to use the Internet and advanced software skills to work with other students and teachers in their school, outside their community and internationally. Teachers are well-trained in methods for incorporating computers and ICTs into their instruction and curricula.

### *Developing the ICT Workforce*

#### Stage 1

Training opportunities for programming, maintenance, support, Web design and other ICT professions are virtually non-existent.

#### Stage 2

There are limited opportunities for training in ICT skills development.

#### Stage 3

Technical classes and programs on ICT-related subjects are available from a variety of public and private centers.

Some limited online access to training is available. Some employers offer training in the use of information and communication technologies to their employees.

#### Stage 4

There are many technical schools with specialized curricula in information and communication technologies and computer science. There are a variety of training opportunities relating to information and communication technologies available through vendor certification programs, employers, educational institutions, private training centers and distance learning courses. Online resources and courses are widely available for the development of technical skills.

## **NETWORKED SOCIETY**

### *People and Organizations Online*

#### Stage 1

Most of the population has never heard of the Internet. Less than 0.05% of the population has used the Internet at any time during the past three months. No business entity in the community has a registered Internet domain name.

#### Stage 2

Much of the population has never heard of the Internet, and most people do not know anyone who has ever used it. Less than 0.5% of the population has used the Internet recently, and few are regular users. Some local businesses and institutions have registered domain names. There are fewer than two of these domains per 1000 inhabitants. There is no advertising in traditional media for online companies or resources.

#### Stage 3

Most of the population has heard of the Internet, although few have used it. Less than 10% of the population uses the Internet regularly. The overwhelming majority of Internet users are males between the ages of 10 and 35. The number of registered domains locally is at least 2 per 1000 people. Advertising in traditional media for online companies or resources is infrequent.

#### Stage 4

Most of the population is interested in using the Internet and knows others who do. At least 10% of the population accesses the Internet with some regularity. Males between the ages of 10 and 35 no longer represent the overwhelming majority of Internet users. The number of registered local domains is at least 20 per 1,000 population. Advertising in traditional media for online companies or resources is fairly common.

### *Locally Relevant Content*

#### Stage 1

No websites exist providing information on local topics. Few or no websites are available in local languages or a dominant Web language spoken locally.

#### Stage 2

Few websites covering local topics exist, and most of them are created and hosted outside the community. Some websites are available in local languages or a dominant Web language spoken locally. There is little use of online bulletin-board systems, Usenet groups, newsletters, and/or listservs.

#### Stage 3

Some local websites are available, though most carry static content and are updated infrequently. Websites carry diverse types of information relevant to different groups within the community. Many websites are available in local languages or a dominant Web language spoken locally. There is some use of online bulletin-board systems, Usenet groups, newsletters, and/or listservs. There are opportunities for Web-related training, although they may be expensive and accessible only in certain areas.

#### Stage 4

Many websites provide dynamic information on local topics and are updated at least several times per week. Local content is generated by citizens at all levels of society, including websites and online bulletin-board systems, Usenet groups, newsletters, and/or listservs. A significant amount of information is available through websites in local languages or a dominant Web language spoken locally. Many affordable opportunities exist for Web-related training.

### *ICTs in Everyday Life*

#### Stage 1

Members of the community do not normally employ information and communication technologies in their daily lives. Most social communication is paper based and/or oral.

#### Stage 2

Information and communication technologies (telephones, fax machines, pagers, computers) are used to a limited degree by some members of the community. Public telephones are available in some parts of the community and are used regularly by many community members. Personal computers with e-mail capability are made publicly available by some businesses, but most users are from outside the community (e.g. tourists and visiting businesspeople).

#### Stage 3

Public telephones may be found in most parts of the community and are heavily used. Some members of the community have Internet access at home. Growing numbers of community

members use telecenters, cybercafes and other businesses that offer computer use and online services to the public for a fee.

#### Stage 4

Many members of the community use information and communication technologies (wireless phones, digital assistants, pagers, personal computers) to assist in their personal lives. Many members of the community use information and communication technologies for household commerce (online shopping, banking, investing) and for a variety of social and commercial interactions with other people (including bartering, consumer-to-consumer trade, online chat). Citizens without access through home, school or work use a variety of public and private Internet access options, including online cafes and community centers.

### *ICTs in the Workplace*

#### Stage 1

Employees have limited access to telephones. A small minority of business and government offices have at most a few computers, none of which are networked. Most business communication takes place in person or by mail. A small number of businesses use telephone and fax.

#### Stage 2

Organizations achieve sporadic efficiency gains through limited deployment of ICT systems in their internal workings. Some employees have access to telephones. Few offices have computers that are networked for internal file sharing and basic enterprise applications. In offices where there are computers, only some employees use them for their work, though not for electronic communications.

#### Stage 3

Organizations achieve some efficiency gains through some degree of deployment of ICT systems in their internal workings. Many computers in business offices are internally networked for data processing, management reporting, and other enterprise applications. Some employees conduct research and business transactions over the Web, though most often they use a shared workstation to do so. Some employees use e-mail for internal communications.

#### Stage 4

Organizations achieve major efficiency gains through widespread deployment of ICT systems in their internal processes. Computers in offices are fully networked. Different office locations are connected to each other through external networks. These networks may extend nationally or internationally. Most employees have Internet access from their own workstations. Most employees have their own e-mail accounts for internal and external communications. Workers commonly list their e-mail and website addresses on their business cards.

## **NETWORKED ECONOMY**

### *ICT Employment Opportunities*

#### **Stage 1**

Few, if any, local businesses hire workers on the basis of their technical background.

#### **Stage 2**

Although there are some employment opportunities that call for technical skills, most workers with ICT experience either must leave the community to find employment or are unable to find work in their field.

#### **Stage 3**

Technical skills in the community are becoming a source of competitive advantage and are beginning to attract investment and employment opportunities by companies from outside the community.

#### **Stage 4**

A significant number of employees in the community require technical skills to perform their jobs. A sizeable portion of the community's economy is based on the management of and trade in information, employing a large number of "knowledge workers." Information and communication technologies are considered central to the strategies of many organizations.

### *B2C Electronic Commerce*

#### **Stage 1**

No businesses in the community operate websites. There is little awareness of online business, and all dealings between businesses and consumers consist of oral and/or paper-based transactions.

#### **Stage 2**

Some local businesses operate websites. The basic information they provide is static and infrequently updated. Some businesses accept orders placed by telephone or fax. Some businesses distribute hard-copy catalogs for remote browsing of goods and services.

#### **Stage 3**

Many businesses post key information on websites. Information is often not kept current and relevant. Websites provide information on goods and services for sale. Purchases take place primarily in person, by fax or by telephone, though electronic mail may expedite the process. Some businesses may have introduced online ordering.

#### **Stage 4**

Many businesses in the community have incorporated the World Wide Web into their sales, marketing, and customer service systems. The total volume of online retail is a noticeable component of the community's commercial activity, as may be evidenced by advertisements for commercial websites in traditional media and other indicators.

## *B2B Electronic Commerce*

### **Stage 1**

Businesses have few sources of market information. The efficiency of most B2B interactions is hampered by this lack of transparency, as are prospects for new business opportunities. B2B transactions are carried out in person or remotely through paper-based transactions.

### **Stage 2**

B2B interactions remain inefficient with little transparency. Faxes and telephones are commonly used to facilitate orders or for remote client support, although some paper-based transaction (e.g. signature) is required.

### **Stage 3**

The deployment of electronic systems has increased efficiency and transparency and lowered transaction costs in B2B interactions. Some B2B transactions are supported by electronic systems (e.g. proprietary systems and databases), but some paper-based transaction (e.g. signature) is usually required at some point. Electronic B2B transactions are a small percentage of overall B2B commerce.

### **Stage 4**

Many efficiencies in B2B transactions are apparent as a result of the deployment of electronic systems. These efficiencies have changed market structures and redefined industry practices. Many businesses have incorporated the Web into sales, procurement and inventory management. Some transactions occur online over automated, fully-integrated systems. Order processing and delivery may be executed electronically and monitored through online tracking systems. Overall levels of electronic B2B transactions are a noticeable and growing percentage of total B2B transactions within the community.

## *E-Government*

### **Stage 1**

No government resources are online. There is no awareness of online government, and all dealings between government and citizens or businesses are in person or paper-based. There is limited information available by phone.

### **Stage 2**

A few governmental websites exist, providing basic information, often directed at parties outside of the community. This information is static and infrequently updated. Some limited interaction with the government is possible by telephone or fax. The government distributes some information about services, procedures, rights and responsibilities in hard copy.

### **Stage 3**

Some governmental agencies post key information on websites, including directories of services, hours of operation, and downloadable forms. Information is often not kept current and relevant. Transactions take place primarily in person, by fax or by telephone, though electronic mail may expedite the process. The government manages relationships with some contractors and suppliers online or with other electronic mediation.

### **Stage 4**

All governmental agencies post key information on websites and some have incorporated the Web into their strategy for interaction with the public. Interactive government websites allow the public to conduct transactions (e.g. apply for permits, pay taxes) online. Much government

procurement and many interactions with suppliers take place online or with other electronic mediation.

## **NETWORK POLICY**

### *Telecommunications Regulation*

#### **Stage 1**

There are no plans for the liberalization of the community's telecommunications sector. There are no regulatory provisions which promote universal access to telecommunications services. All services are provided by a single operator, whether private or state-owned. Voice and data service offerings are limited.

#### **Stage 2**

Plans for the liberalization of telecommunications services are in place or are being formulated. Provisions for universal access to services have been established, though they are ineffective.

#### **Stage 3**

Plans for the liberalization of the telecommunications sector are in place and are being implemented. Progress is being made in achieving universal access, but there are many hurdles in implementation. Services such as data, paging and mobile telephony are available from competing private providers. Alternative carriers compete for private network services, leased lines and other telecommunications services for businesses. Incumbent provider networks are being opened to competition through interconnection and/or unbundling obligations.

#### **Stage 4**

The telecommunications sector has been liberalized, with a regulatory regime in place to promote open competition. Regulation is effective in promoting universal access. An independent regulatory body sets and enforces telecommunications regulations. Citizens and businesses have a number of options for their telecommunications and data services. Incumbent networks have been opened to competitors, and new competing carriers are taking advantage of these arrangements to offer services. There is vibrant competition among mobile wireless providers. Spectrum has been allocated consistently with international standards, and licensing arrangements encourage new market entrants. The provision of value-added services such as broadband Internet is recognized as a source of competitive advantage.

## *ICT TRADE POLICY*

#### **Stage 1**

Trade in equipment for information and communication technologies is impeded by high tariffs and other restrictions, including cumbersome technical standards or licensing requirements. Service sectors are not open to trade, creating a barrier for electronic commerce and the building and operation of ICT networks. Domestic regulations may create de facto trade barriers for ICT use. There is little or no foreign direct investment.

#### **Stage 2**

Trade barriers for ICT equipment have been reduced, but are still relatively high. There has been some opening in service sectors related to electronic commerce and ICT networks. Foreign direct investment is allowed in network sectors under certain conditions.

#### **Stage 3**



Trade in ICT equipment is not restricted through unnecessary standards or licensing requirements, and tariffs are low and uniform.

The community has at least temporarily agreed not to apply disproportionate tariffs on electronically delivered products. There has been significant opening in services that facilitate electronic commerce and building and operations of ICT networks, but some restrictions remain. Foreign direct investment in the ICT sector is encouraged with some restrictions.

#### Stage 4

If tariffs exist on ICT goods, they are low and uniform. Trade in services is fully liberalized, including services delivered electronically. The community has explicitly affirmed that it will not apply disproportionate tariffs on electronically delivered products. Foreign investment in the ICT sector is encouraged and subject to few or no restrictions.

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