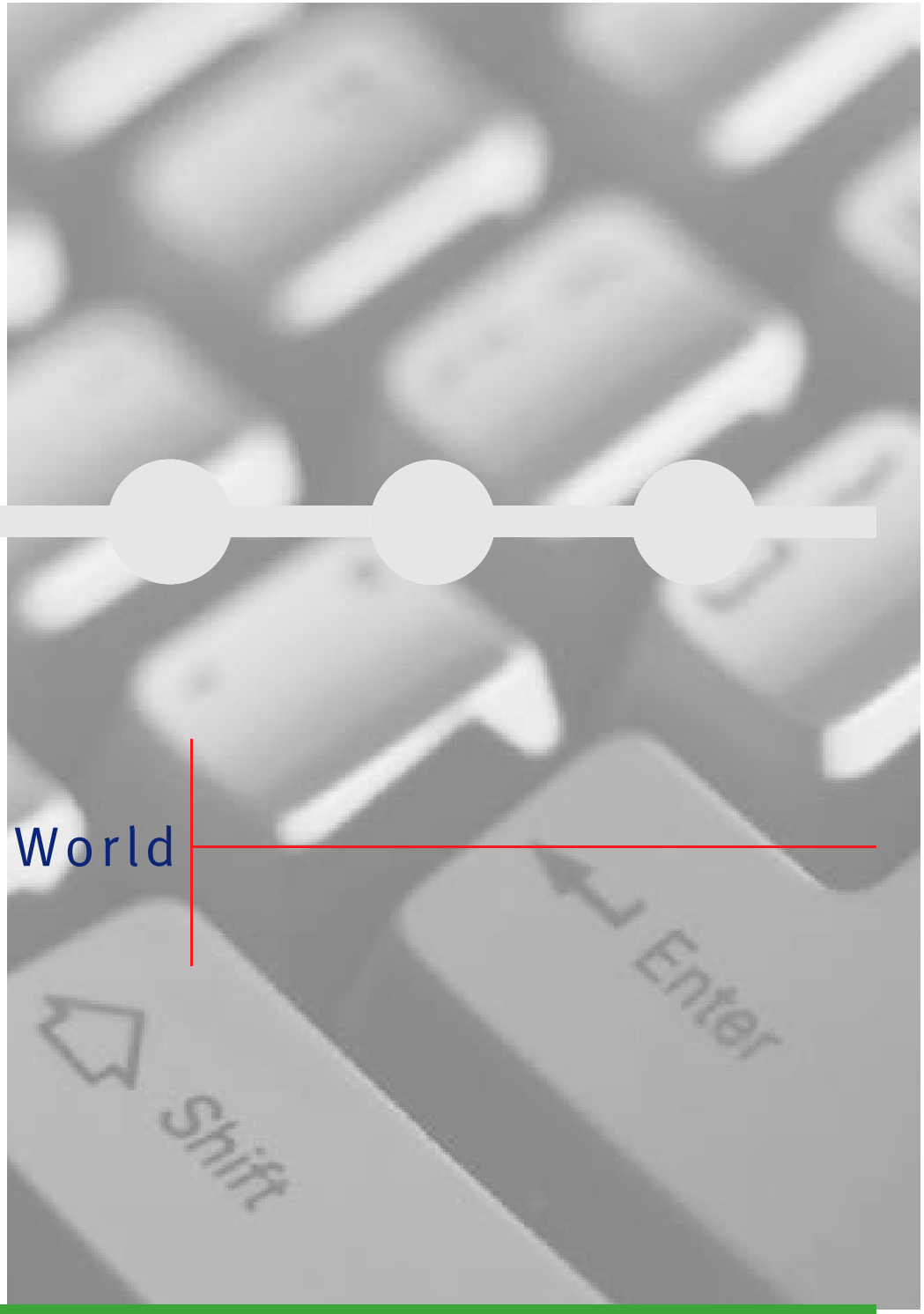
Readiness for the Networked World

A Guide for Developing Countries



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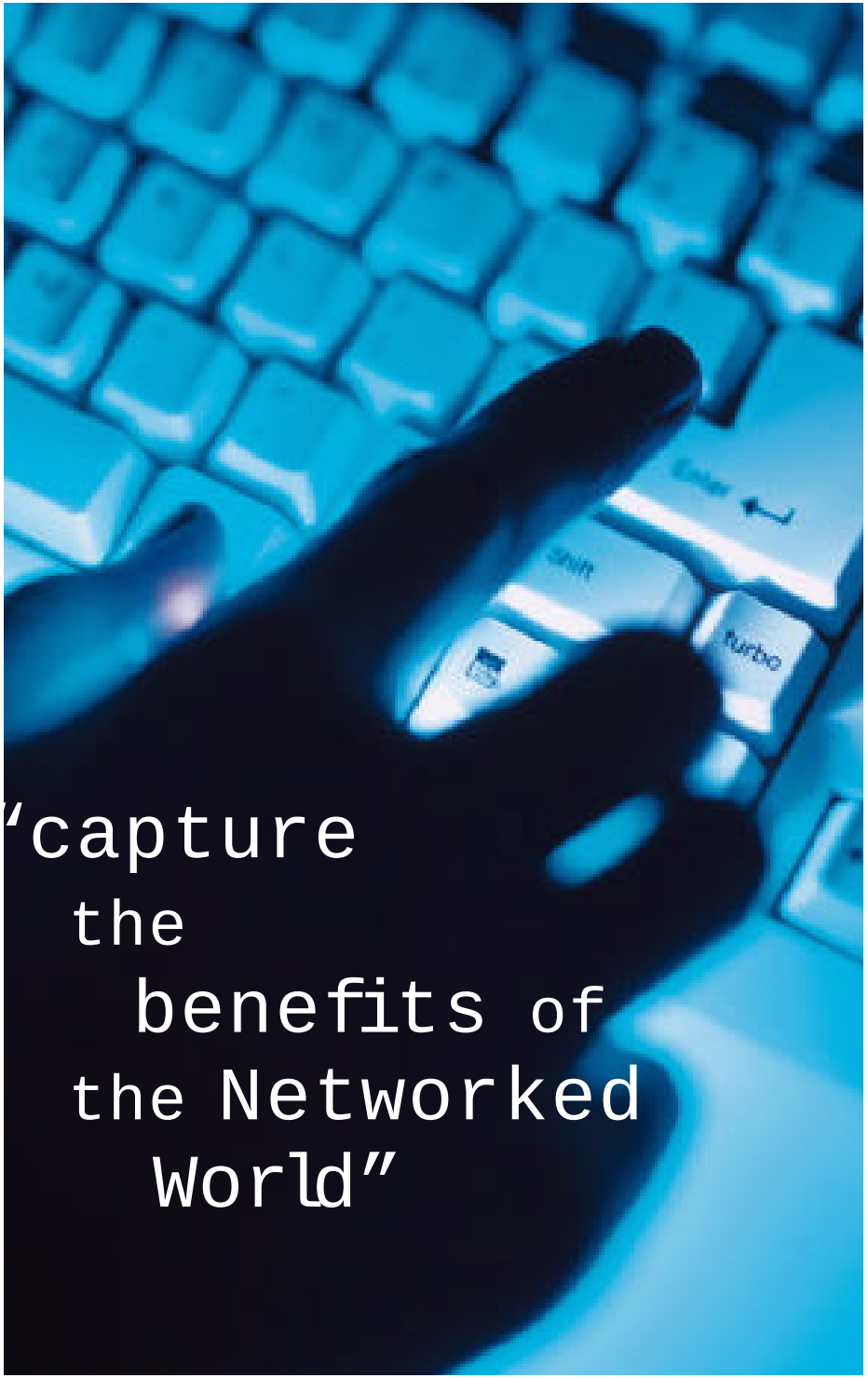
We are especially grateful to IBM for their support of this project.



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.

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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.

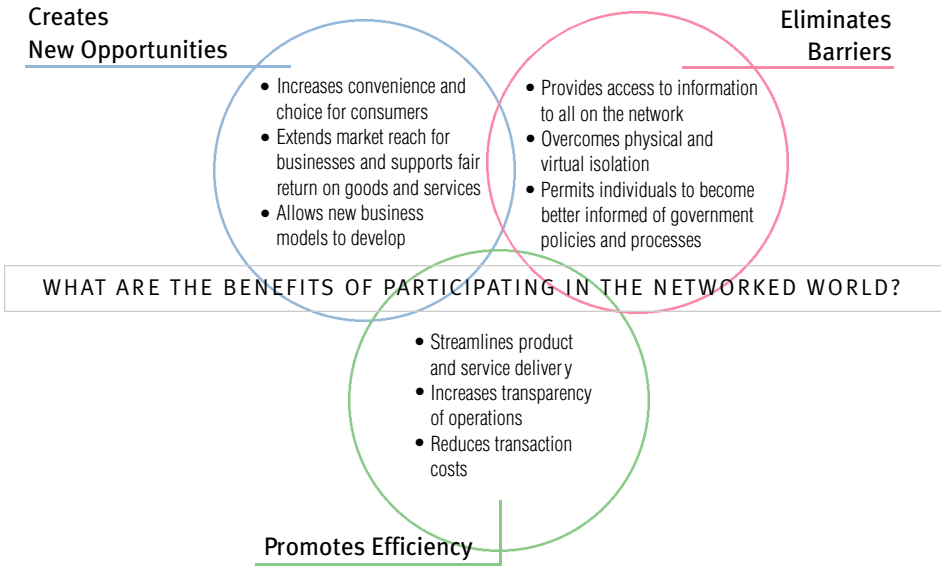
Rapid increases in computing power, plunging prices for silicon chips and electronics, and advances in wireless communications have made powerful technologies accessible to many parts of the world which have historically lagged far behind in technology adoption. Suddenly, this accessibility allows developing 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 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 ICTadoption 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 ICTnetworks, 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 ICTworkforce?
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 ICTadoption 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 ICTinitiatives 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 ICTgoals.

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 ICTsolutions 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.

	Information Infrastructure	Internet Availability	Internet Affordability
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.)	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.	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	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.)	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.	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	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.)	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.	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	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.)	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.	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 DSLservices 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	Hardware and Software	Service and Support	
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.	There are no distribution/sales points for ICThardware/software within the community. ICThardware and software are too expensive for all but large businesses and a small minority of citizens and small and medium-sized businesses.	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 1
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.	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.	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 2
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.	Most ICTproducts 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.	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 ICTmaintenance 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 3
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%.	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.	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. ICTmaintenance and technical support are widely available. A competitive and sophisticated web design market exists, incorporating the latest development technology.	Stage 4

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.

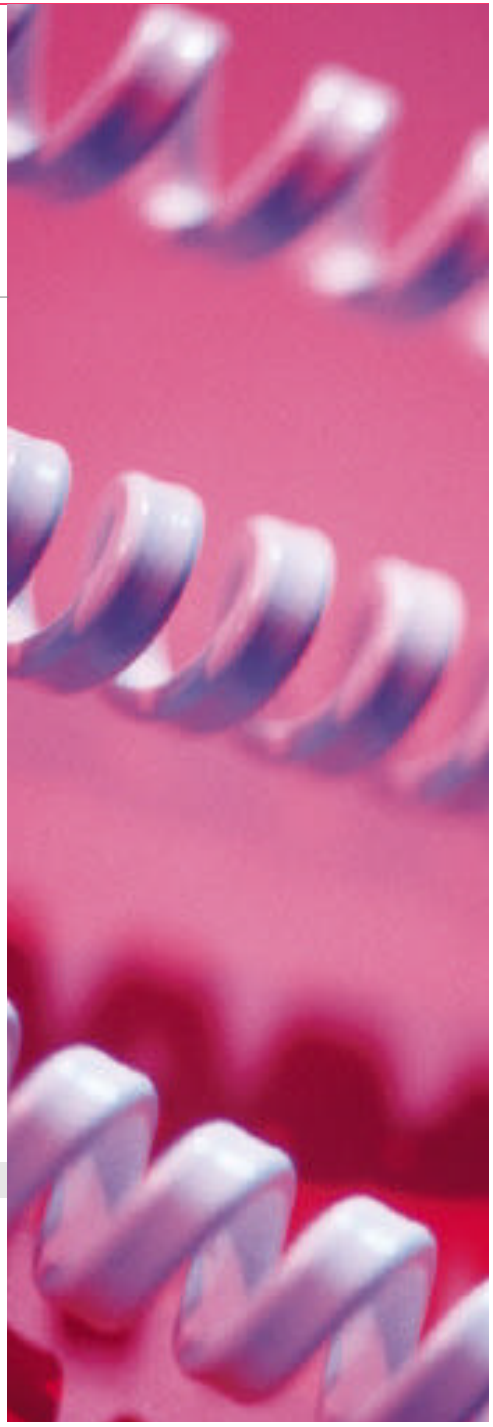
Schools'Access to Information and Communication Technologies. Schools must integrate ICTtools into their learning processes if they are to be part of the Networked World. Programs that give students access to information and communication technologies in the classroom provide an important step to improving 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 ICTindustry 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.



Schools' Access to ICTs	Enhancing Education with ICTs	Developing the ICT Workforce	
There are no computers in schools.	Computers are not used by any teachers or students.	Training opportunities for programming, maintenance, support, Web design and other ICTprofessions are virtually non-existent.	Stage 1
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.	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.	There are limited opportunities for training in ICTskills development.	Stage 2
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.	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.	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 3
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.	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.	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.	Stage 4

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, listservs 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 ICTdevices into a community and their applications. In communities where either income levels or the network infrastructure cannot support high levels of individualaccess, 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.

People and Organizations Online	Locally Relevant Content	ICTs in Everyday Life	ICTs in the Workplace	
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.	No websites exist providing information on local topics. Few or no websites are available in local languages or a dominant Web language spoken locally.	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.	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 1
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.	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.	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).	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 2
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.	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.	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.	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 3
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.	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.	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	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 web-site addresses on their business cards.	Stage 4

networked ECONOMY

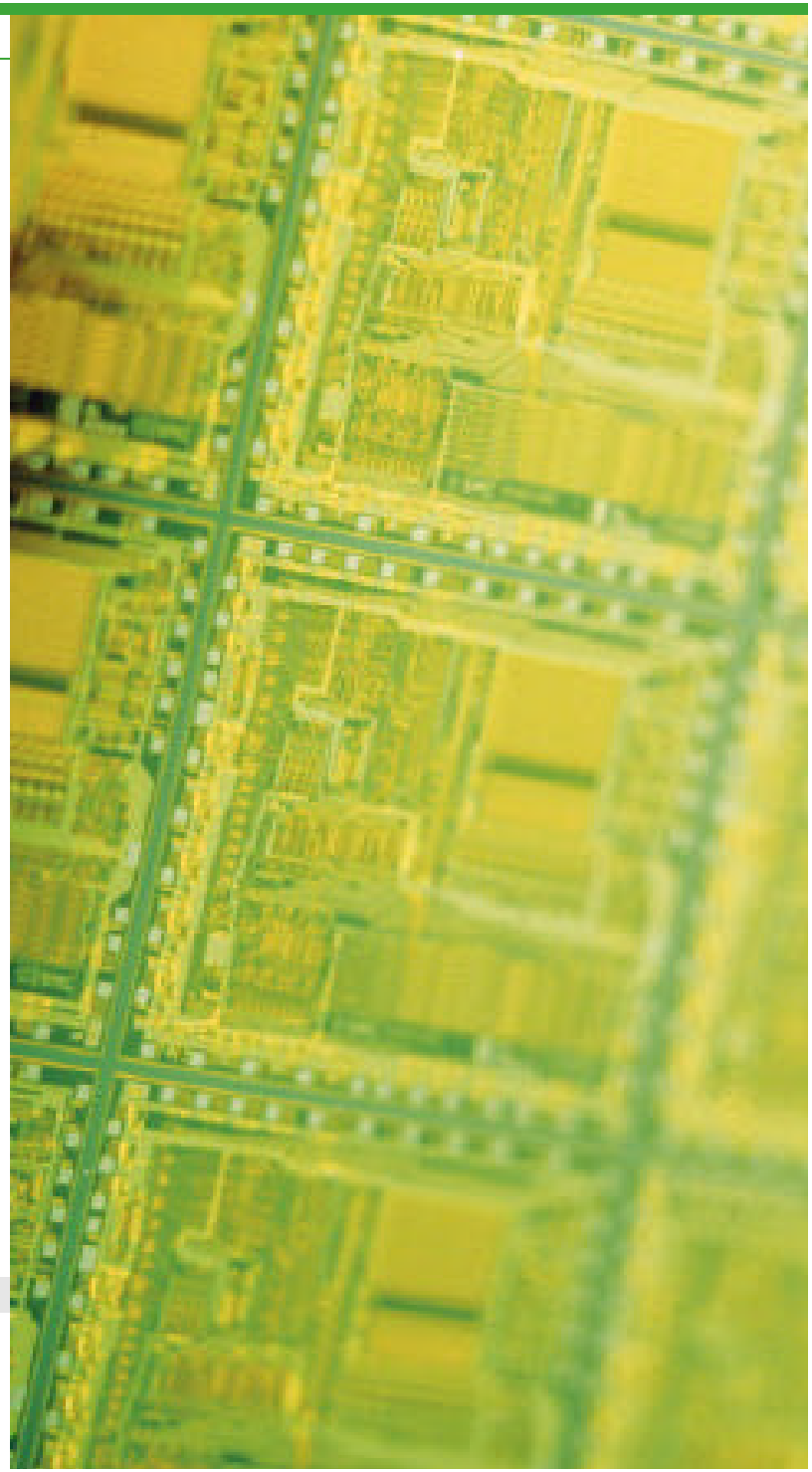
Businesses and governments that are able to effectively employ information and communication technologies find more sophisticated and efficient ways of managing their external relationships and communications. This growing ICTusage helps form the critical mass of electronic transactions which supports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

ICTEmployment Opportunities. A thriving job market for ICTprofessionals provides added incentive for growth of ICTadoption, 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 ICTequipment 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.



ICT Employment Opportunities	B2C Electronic Commerce	B2B Electronic Commerce	E-Government	
Few, if any, local businesses hire workers on the basis of their technical background.	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.	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.	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 1
Although there are some employment opportunities that call for technical skills, most workers with ICTexperience either must leave the community to find employment or are unable to find work in their field.	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.	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.	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 2
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.	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.	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.	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 3
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.	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.	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.	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.	Stage 4

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 ICTadoption 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 ICTequipment 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

Ongoing Public Policy Challenges

There are a number of policy issues surrounding the Internet and electronic commerce whose stages of resolution are not clear, but which must be considered for their profound impact upon Networked Readiness.

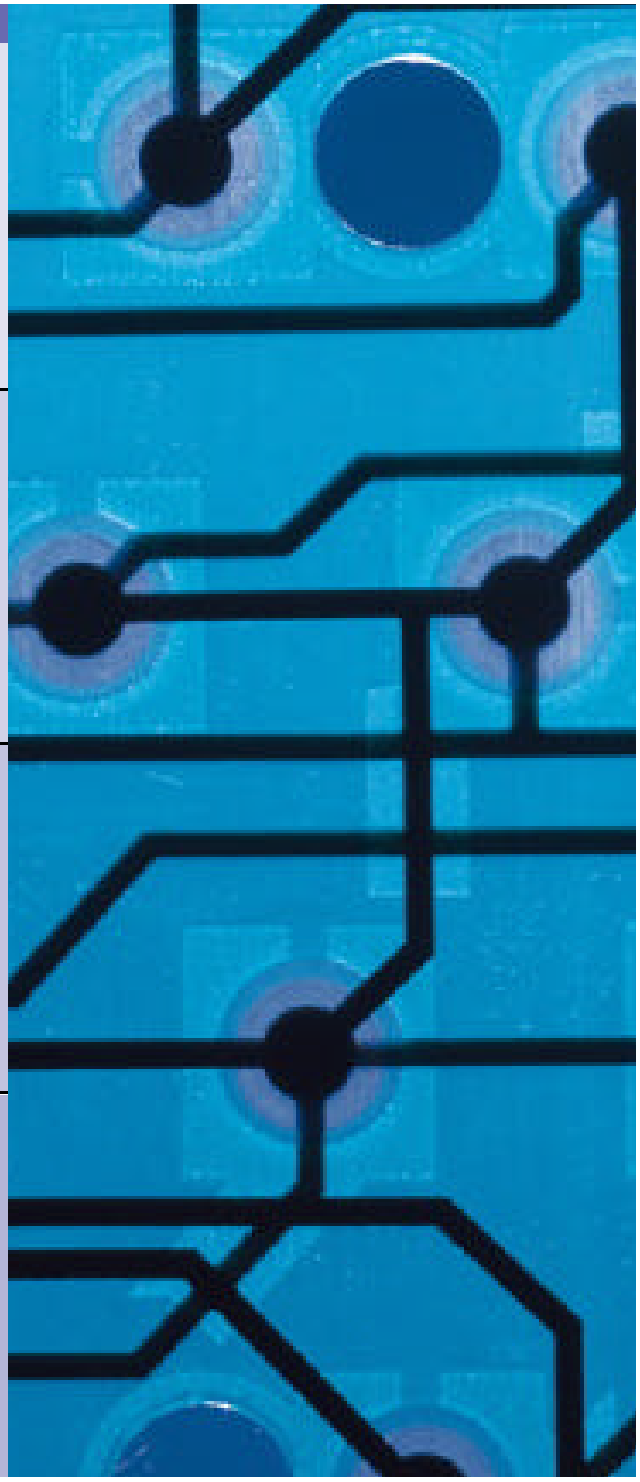
In general, policies which ensure legal certainty, security and consumer protection for online transactions and interactions should be enacted. These include the resolution of issues such as transactional security, electronic contract enforceability and the authentication of individuals and documents.

In dealing with issues such as Internet taxation, online privacy and intellectual property rights, the following guidelines should be followed:

- Internet tax policy should neither penalize the online trade of goods and services vis-à-vis traditional commerce nor inhibit the growth of electronic commerce.
- Measures should exist that safeguard the privacy of end-users in the community.
- The question of how to address intellectual property rights in a policy framework must be carefully addressed. Words as speech, property and contract should be appropriately considered in any legal framework.

To resolve all of these issues, an appropriate mix of government regulation, market-based solutions and industry self-regulation should be put in place which considers both consumer and business interests.

Telecommunications Regulation	ICT Trade Policy	
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.	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 ICTuse. There is little or no foreign direct investment.	Stage 1
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.	Trade barriers for ICTequipment have been reduced, but are still relatively high. There has been some opening in service sectors related to electronic commerce and ICTnetworks. Foreign direct investment is allowed in network sectors under certain conditions.	Stage 2
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.	Trade in ICTequipment 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 ICTsector is encouraged with some restrictions.	Stage 3
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.	If tariffs exist on ICTgoods, 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 ICTsector is encouraged and subject to few or no restrictions.	Stage 4



what NEXT?

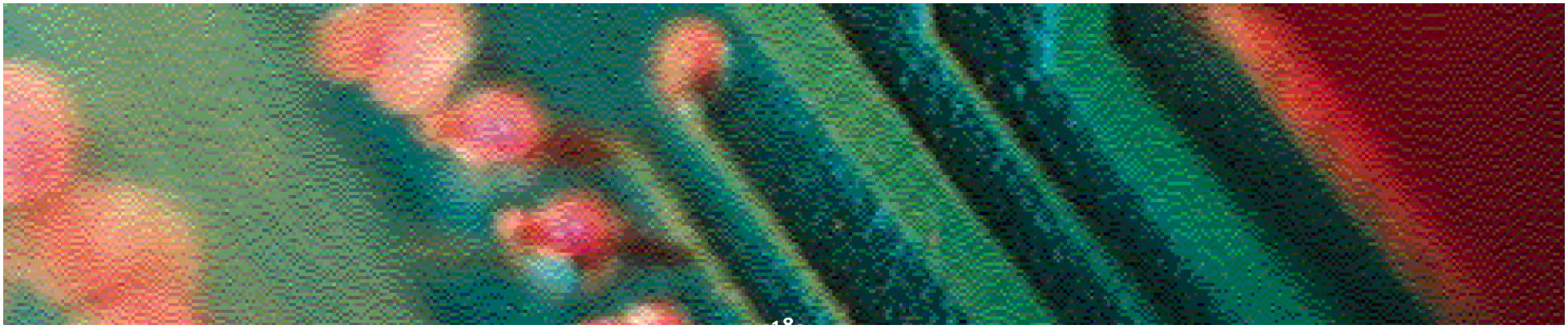
The results from the Readiness assessment act as the starting point in a participatory planning dialogue. They should heighten awareness of the opportunities and challenges of joining the Networked World.

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 ICTdevelopment within a particular community may present unique opportunities for rapid ICTadoption 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.



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http://www.readinessguide.org

The online *Guide* contains further resources to aid in assessing Readiness.