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EXECUTIVE SUMMARY

BUILDING DIGITAL BRIDGES

world summit on the information society
Geneva 2003 - Tunis 2005

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BUILDING DIGITAL BRIDGES

Approaches and Best Practices

Summary

November 2005

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1 BUILDING DIGITAL BRIDGES

The Information Society is characterized by the profound impact of information and communication technologies (ICTs) across the socio-economic, political and cultural areas of society. Economic activities at the supply and demand levels are transformed, giving emphasis to the transmission of information and knowledge. Vast amounts of information are disseminated through ICTs worldwide and those who have no access to these technologies are left at a disadvantage, being unable to participate and share fully in the benefits of the information society. Access to ICTs is seen as an essential factor for development and the improvement of the well-being of society. The World Summit on the Information Society's (WSIS) Declaration of Principles underscores the importance of ICT infrastructure for the establishment of an inclusive information society. In paragraph 21, it states that:

"Connectivity is a central enabling agent in building the Information Society. Universal, ubiquitous, equitable and affordable access to ICT infrastructure and services constitutes one of the challenges of the Information Society and should be an objective of all stakeholders involved in building it[1]*."*

To contribute to this goal and inspired by the spirit of collaboration encouraged by WSIS, the Ministry of Information and Communication (MIC) of Korea and the Korea Agency for Digital Opportunity and Promotion (KADO) joined forces with the International Telecommunication Union (ITU) to promote activities that advance the measurement of and help identify solutions to the digital divide. To this end, MIC, KADO and ITU launched the Digital Bridges Initiative in June 2004 as an ongoing project to promote the achievement of goals set at the First Phase of the WSIS and in the WSIS Plan of Action. Its aim is to provide the necessary new tools to measure the digital divide, as well as policy and technical expertise to help reduce inequalities.

The Digital Bridges Initiative intends to develop a worldwide, authoritative digital opportunity index and support the discussion of technological solutions and best practices for bridging the digital divide. Following these aims, the partnership promoted discussion of a composite Digital Opportunity Index (DOI) and developed a straw-man

methodology for it, which measures a subset of the core set of ICT indicators agreed upon by the international community in 40 leading economies.[2] The proposed methodology, included in Chapter 2, was presented at the WSIS Thematic Meeting on Multi-Stakeholder Partnerships for Bridging the Digital Divide, held in Seoul, 23-24 June 2005, and has been subsequently revised to incorporate comments from KADO and other parties.

The partnership also organized two seminars in the Republic of Korea in September 2004 and June 2005 that addressed the digital divide, its measurement, and the role of new technologies and multi-stakeholder partnerships in closing the gap. The Building Digital Bridges report summarizes the major findings of the two seminars and compiles background papers and case studies prepared for them.

Following the structure of the chapters, this extended summary looks first at the problem of the digital divide and the challenges that it creates for developed and developing countries. As an ever-evolving problem, the digital divide brings forward three key issues that need to be addressed: first, the need to measure the magnitude of the divide; second, the type of instruments available to measure it; and third, different approaches available for bridging the divide. This summary looks at efforts made at the national and international levels to measure the digital divide and discusses at length the proposed methodology for the Digital Opportunity Index. It then focuses on possible solutions to address the problem of the digital divide, in particular, to the use of multi-stakeholder partnerships and emerging wireless technologies.

2 DEFINING THE DIGITAL DIVIDE

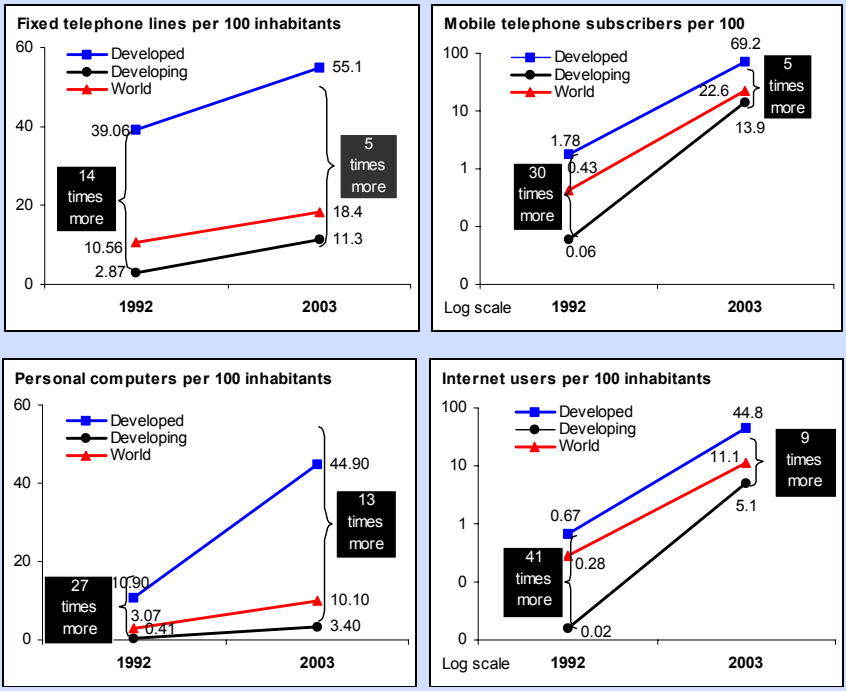
Although multiple definitions of the digital divide exist, they all highlight the uneven distribution, differences or gaps that exist in opportunities to access and use ICTs amongst diverse population groups, be they individuals, households, businesses or geographical areas. Some experts envision the digital divide as an evolving concept that refers in its initial stage to differences between ICT users and non-users (the vertical divide) and later progresses to a second stage characterized by differences in the quality and intensity of use among ICT users (the horizontal divide)[3].

Factors contributing to the digital divide include lack of economic resources, limited investment in communications and information infrastructure, adverse geographical conditions, regulatory barriers, low levels of literacy and ICT skills, as well as lack of access to electrical power. Progress has been made in reducing the digital divide, but the pace of reduction varies across technologies (Figure 2.1). Evidence suggests that this reduction is mostly due to the efforts of middle-income countries to close the gap. In the meantime, least developed countries (LDCs) are falling further behind. Although progress has been slow, the level of penetration of mobile and fixed telephony per 100 inhabitants has substantially increased, from a global average teledensity of seven in 1985 to 50 in mid-2005[4].

As noted by Larry Press, Chair of the ITU/KADO Symposium on Building Digital Bridges, measuring and reducing the digital divide represents a great challenge. In the 1990s, ICTs and computer networks were seen as a tool for improving the quality of life in developing nations at relatively low cost, and although penetration of these technologies in developing countries has increased, the digital divide still persists a decade later. Moreover, once the digital divide begins closing for existing technologies, emergent ones open new divisions in different areas, establishing a never-ending cycle (Box 2.1). In general, as technologies become older and more popular, they increase their diffusion and their relative influence over the digital divide decreases[5].

Figure 2.1 – The digital divide is narrowing, but faster for some than for others

Pace of reduction in the digital divide between developed and developing countries for fixed lines, mobile telephones, personal computers and Internet users per 100 inhabitants (1992 - 2002).



Note: A logarithmic scale is used in the right-hand charts. "Developed" includes Western Europe, Australia, Canada, Japan, New Zealand and the United States. "Developing" refers to all other economies.
Source: ITU World Telecommunication Development Report 2003: Access Indicators for the Information Society. From T. Kelly and L. Perez-Chavolla, *Multi-stakeholder partnerships for bridging the digital divide*, June 2005.

Box 2.1 – The never-ending catch-up cycle for developing economies

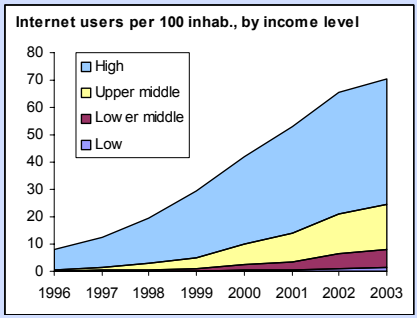
Just as developing economies start making progress bridging the digital divide in one technology, new technologies appear and the cycle repeats.

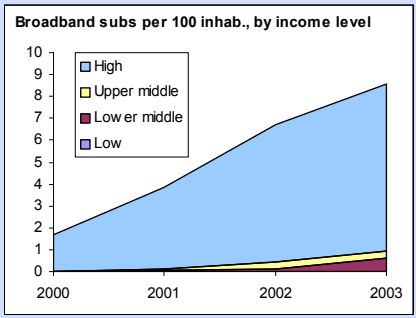
In the mid-1990's, the Internet was a new communication medium whose benefits were touted as the ultimate information tool for users. The Internet was supposed to open libraries' worth of materials to users at the click of a mouse. Early excitement soon gave way, however, to new fears about how people in developing economies would be able to make use of this new, incredible information tool. This was the emergence of the "digital divide" and policy-makers went to great lengths to determine how to prevent new classes of "haves" and "have-nots" in their economies and between nations.

The attention given to the digital divide has been successful in increasing awareness of what the Internet can do for people. There is still much work to be done, but initiatives such as community access centres and ICT training are helping increase the number of people with Internet access in the developing world.

However, just as the numbers are starting to look more promising throughout the developing world for basic Internet access (left figure), a new technology, broadband, has appeared in markets around the world and is allowing users much "*better*" access than simple dial-up connections (right figure).

This puts policy-makers and operators in a difficult position. They must decide if their goals to provide universal access to data continue to focus on dial-up connections or if efforts should be shifted to build networks more suited to broadband access.





Source: ITU World Telecommunication Indicators Database. From T. Reynolds, *Building digital bridges with emerging technologies*, September 2004.

3 MEASURING THE DIVIDE

The assessment of the magnitude of the digital divide requires reliable statistical data on ICT indicators that are relevant to the dimensions of the divide. Statistics and analytical studies of these data facilitate the identification of weaknesses and strengths, comparative evaluations of performance and the tracking of trends over time. The background paper and case studies in Chapter 3 provide insights on current national and international efforts to measure the digital divide and to establish benchmarks for the information society. In his background paper, George Sciadas examines a number of recent methodological approaches to measure the divide within and across countries, and presents the challenges towards achieving harmonization in ICT data collection. He points out that a complete vision of the digital divide requires understanding of the role of at least two important dimensions: the specific ICTs considered in the analysis and the variables of interest that help determining specific groupings of people to be studied, such as income, education, gender, geographical location (rural versus urban), etc.

Sciadas states that although national requirements for ICT statistical data may vary according to the stage of ICT penetration of a country, consistent monitoring of a core set of indicators using robust statistical methods and high-quality data would facilitate international comparisons and assessments of the evolution of the digital divide, that is, whether it is diminishing and, if so, at what speed. National efforts to measure internal divides have focused on determining differences in the level of ICT penetration across income groups and among specific groups across time, requiring very detailed data collection to provide useful policy guidelines.

The case of the Korean Personal Informatization Index (PII), discussed in Chapter 3, is an example of this type of national evaluation. In his case study, Cheung Moon Cho (KADO) highlights that the digital divide is not only an issue of access, but also of ability and the use of traditional and new information and communication technologies. As such, he proposes the development of a composite measure of the digital divide that looks at the level of "informatization" of individuals within a country.

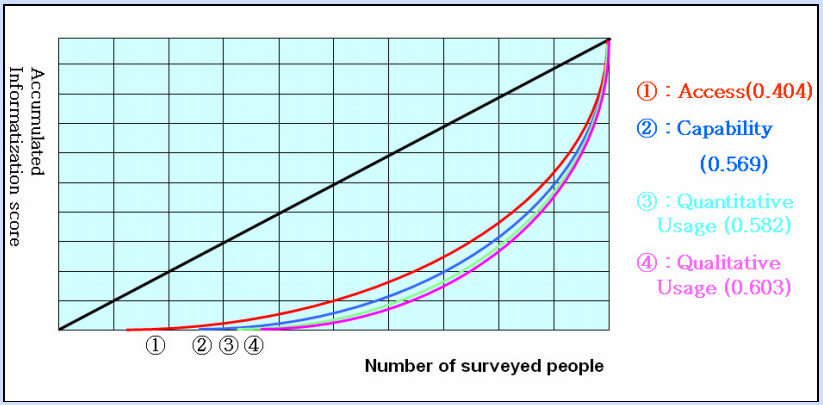
Current methodologies measure the digital divide by tracking either the difference in scores between extreme groups (e.g. access by low and high income groups), the ratio of penetration rates between certain groups or the rate of progress of a particular group over time. In contrast, the methodology introduced by KADO goes beyond an exclusive focus on access indicators to encompass three dimensions of digital opportunity: *access to ICTs, capacity*, defined as the ability to use ICTs, and *ICT utilization*, measured both in terms of quality and quantity. Each of these dimensions is composed of multiple factors that are weighted to calculate a final score called the Personal Informatization Score. Based on the opinion of experts, each dimension was assigned a weight: Access was given 30 per cent of the total value of the Personal Informatization Score; capacity was given a weight of 20 per cent and utilization had the highest weighting with 50 per cent of the total. The methodology was tested in the Republic of Korea through a survey conducted in 2004; the results were evaluated using a Gini coefficient, which is a summary measure of the degree of inequality of a distribution. Based on the survey results (Figure 3.1), access was the category most equally distributed in the Republic of Korea, while qualitative usage was the most unequally distributed category in this country.

International efforts to monitor the evolution of the digital divide across countries include those of the World Economic Forum, Orbicom, ITU, the United Nations Conference on Trade and Development (UNCTAD), the Mosaic Group, the Economist Index, and the United Nations Development Program (UNDP), among others. These indices vary not only on the methodology applied, but also on the number of countries studied (from 10 to 200), the number of indicators (8 to 48), and the data period collected (single year or time series).

These studies identify important gaps between population sub-groups, particularly when grouped by income, education, age, gender and geographical location. At the international level, the connectivity gap between developed and developing countries has been shown to be substantial and more pronounced for newer ICTs. Mongi Hamdi, from UNCTAD, stressed in this respect at his presentation in Seoul that despite some progress made in the diffusion of older ICTs, the current levels of technological inequality remain high and progress in reducing such inequalities has been slow, except in mobile technologies.

The introduction of prepaid systems has prompted many developing countries to "leapfrog" and adopt mobile technology at a faster pace, as a substitute for fixed telephony. As a result, mobile telephony is more equally diffused and has experienced the fastest reduction in inequality between countries, as represented by its Gini coefficients (Figure 3.2). Mr. Hamdi underscored the need for policy action to increase Internet access across and within countries, and proposed expanding the definition of access and of the digital divide to include other measures of usage.

Figure 3.1: Moving towards equality
Digital *Gini ratio in Korea (2004)*

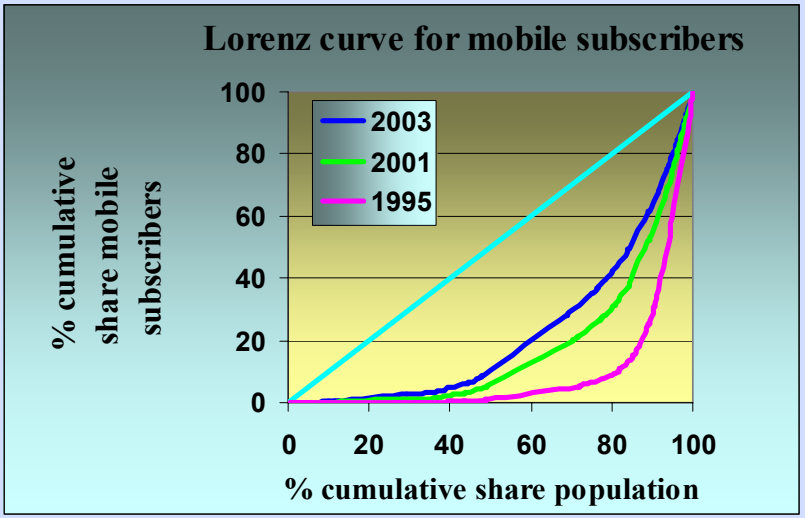


Source: KADO, *Survey for the measurement of the digital divide in 2004*.

George Sciadas emphasized in his background paper the need for raw data and capacity training in developing countries; this should increase the data collected from regions, like Africa, that currently have a number of missing data. He noted that current international efforts to promote harmonization of definitions and agreement on a core set of indicators should be complemented by the development of appropriate frameworks that help identify data gaps and trade-offs between quantity of data and costs. He stated that "establishing a logic […] for what is measured is paramount. It provides a foundation for subsequent

clustering of indicators, as well as linkages to the context that matters for interpretation of the findings"[6].

Figure 3.2: Lorenz curves for mobile phones
The diffusion of mobile telephony is reaching equality faster than other technologies



Source: UNCTAD.

Similarly, Vanessa Gray pointed out in her case study of Australia (Chapter 3) that "to appropriately tackle the digital divide, it is crucial to overcome the statistical divide by harmonizing data, monitoring progress and taking an inventory of who has access and who does not"[7]. Several factors contribute to this statistical divide, including: the lack of political support for national ICT data collection activities; limited coordination among government entities collecting national ICT data; and inadequate diffusion of the data collected. The difference in ICT indicators collected among nations also makes international comparisons difficult.

The case studies of Australia and Hong Kong were chosen to illustrate practices in the collection, dissemination and policy application

of ICT statistics that have been successful in overcoming some of the problems of the statistical divide. The Australian Bureau of Statistic (ABS), for instance, is ranked among the top statistical offices in the world, due to its high standards in collecting statistical data. Likewise, Hong Kong is a leader in the adoption of ICTs and in the regular collection and diffusion of ICT data, including household and business use of ICTs.

Even given the significant differences between Australia and Hong Kong in geographic dimensions and population, similarities in their strategies in ICT statistics suggest successful practices that could be replicated elsewhere. Among these practices are:

- **Providing a strong mandate and legal foundation to entities in charge of collecting national statistics and those of the ICT sector**. The ABS in Australia and the Census and Statistics Department (C&SD) in Hong Kong are independent authorities with a strong mandate. ABS has the right to compel individuals and businesses alike to provide information. Similarly, the legal foundations of the Australian Competition and Consumer Commission (ACCC) and the Office of Telecommunications Authority (OFTA) in Hong Kong give them the right to require telecommunication operators to provide information periodically on their businesses, including revenue data and use.
- **Providing sufficient funding for the regular collection of data**. ABS' activities are supported through a user-funding arrangement based on contributions from other government agencies and departments. In Hong Kong, the Office of the Government Chief Information Officer (OGCIO) provides funding for ICT surveys.
- **Collecting a wide range of data (on individuals, households, business, government) through different instruments to satisfy the information requirements of different stakeholders**. In Australia, ICT data collection is not restricted to traditional supply-side indicators, but also includes information on ICT demand and use by individuals, households and businesses. National and international organizations cooperate in collecting ICT data through different instruments, including by national census, customer surveys, other related surveys, etc.

- **Using a transparent and consistent methodology for data collection and analysis**. ICT data collection in both countries is based on a transparent methodology and the instruments are modeled on surveys and questionnaires used by the Organization for Economic Co-operation and Development (OECD). The surveys conducted by the Australian statistical agency include detailed information on the methodology used to conduct the survey and determine data comparability over time.
- **Promoting good coordination among all stakeholders involved in the provision and collection of ICT data**. Australia established a coordinating entity, the ICT Reference Group, to promote cooperation and discussion on ICT statistics between representatives of the ICT industry, operators, the policy body for ICT and telecommunications, academia, and the treasury portfolio. ABS also established other formal and informal mechanisms to receive inputs from users of ICT statistics. Meanwhile, in Hong Kong, C&SD and OGCIO cooperate in the formulation of ICT Surveys, their analysis and in the dissemination of results. OFTA formulates its policy for data collection based on the information requests of diverse stakeholders, including international and regional organizations. This coordination enhances the relevance of the data collected, avoids duplication of efforts, reduces expenses and increases efficiency.
- **Supporting the participation of the private sector in the collection of statistics**. In Australia, studies conducted by the private sector have provided timely information on current issues, such as e-commerce and cybersecurity, filling data gaps left by larger and more complex government surveys.
- **Establishing strong connections between policy-making and statistical data collection**. Australian authorities realized the need of maintaining a "statistics-knowledge-policy" cycle. The collection of data reflects the needs of the country for specific information used to track trends in ICT deployment and use, advances in closing the digital divide and progress towards establishing an information society. Both Australia and Hong Kong conduct periodical revisions of the list of ICT indicators for which data are collected, based on the policy needs of particular stakeholders or national ICT policy goals. By the same token, the

ICT statistics collected are analyzed to identify problem areas and define future policies.

- **Monitoring results**. Australia conducts surveys to evaluate the appropriateness and efficacy of subsidies and funding mechanisms created to support specific services or technologies.
- **Diffusing the information collected timely to enhance relevance**. Perhaps the main drawback of ABS' survey program is the timeliness of the data compiled. The Bureau takes between a year and a year and a half to conduct a survey and release its results. In contrast, OFTA in Hong Kong is a world leader in the dissemination of timely and relevant data. It publishes administrative telecom data regularly on its website and other ICT survey results are released within six months of the survey period. C&SD has also facilitated the retrieval of statistics on the ICT sector and other sectors using ICTs by developing a central portal on its website including official statistics produced by all government departments.
- **Comparing national ICT performance to international benchmarks**. Australia and Hong Kong take advantage of international indices and studies, such as those of ITU and the OECD, to identify weaknesses, promote strengths and attract investment. It also follows the types of indicators used in international indices to improve the future comparability of statistics.

As part of the WSIS mandate to promote collection of ICT indicators, regional and international organizations joined to create the "Partnership on Measuring ICT for Development". The partnership brings together the expertise of ITU, Eurostat, UNCTAD, United Nations ICT Task Force, World Bank, OECD, UNESCO Institute for Statistics (UIS) and the four regional UN Commissions (ESCAP, ECLAC, ESCWA, ECA) to coordinate work on ICT indicators, promote capacity-building in this area and develop an ICT database in close collaboration with national statistical centers. The cooperative efforts of the partnership have already been fruitful. In February of 2005, the partnership, in consultation with ITU member states, was able to agree on a core set of ICT indicators[8]. These internationally agreed-upon indicators are the basis for ITU's work on the Digital Opportunity Index, discussed below.

4 THE DIGITAL OPPORTUNITY INDEX (DOI)

The World Summit on the Information Society sets out the basis for harmonization in the measurement of the digital divide. In its Plan of Action (para. 28a), WSIS calls for the development of: "*A realistic international performance evaluation and benchmarking (both qualitative and quantitative), through comparable statistical indicators and research results […] to follow up the implementation of the objectives, goals and targets in the Plan of Action, taking into account different national circumstances*."(para. 28).

To this end, the Plan asks for the creation of a composite ICT Development (Digital Opportunity) Index to help evaluate the magnitude of the divide and track global progress in fulfilling development goals at the national and international levels. The Digital Opportunity Index (DOI) would also provide a solid basis for policy analysis and policy-making on ICTs for development. An important first step towards the development of the DOI was the agreement by the Partnership on Measuring ICT for Development on a core set of ICT indicators for measuring and tracking progress in ICT deployment and use by individuals, households and businesses, during a WSIS Thematic Meeting on 7-9 February 2005.

Based on this selected core list of ICT indicators, ITU, in collaboration with the Korea Agency for Digital Opportunity and Promotion (KADO) and the Ministry of Information and Communication (MIC) of the Republic of Korea, developed a "straw-man" document on a possible methodology for the DOI. This methodology has been applied to 40 leading economies and the results were presented at the WSIS Thematic Meeting on Multi-Stakeholder Partnerships for Measuring the Digital Divide in Seoul.

The proposed methodology–presented in Michael Minges' background paper Measuring Digital Opportunity in Chapter 2–sets itself apart from existing e-indices, such as those from Orbicom, the World Economic Forum, UNCTAD, and even ITU's Digital Access Index (DAI), because it is the first composite ICT index to be based on internationally agreed indicators. Although the "straw-man" report currently includes only a subset of the agreed indicators, it is intended to increase in geographical coverage and number of indicators, once a

greater number of countries begin collecting data for the endorsed indicators. Based on the indicators included so far, the DOI has the most complete coverage in types of indicators it includes, when compared to other e-indices (Table 4.1).

The DOI groups the selected indicators into three categories: Opportunity, Infrastructure and Utilization. Opportunity refers to two aspects affecting consumers' opportunity to participate in the information society: accessibility to ICT service and affordability. Infrastructure refers to network coverage for fixed line, mobile telephony and Internet at the individual and household levels. Finally, Utilization shows the extent of ICT use. Each of these categories has a fixed and mobile component, which allows for comparisons of the relative importance of these technologies in countries' paths towards the information society.

Each of the indicators composing the DOI was assigned a goalpost and a percentage of the total weight of the specific category. The goalposts were based either on best practices or ideal goals (e.g. 100 per cent of households with a fixed line). Similarly, each category was assigned one third of the weight of the whole basket of indicators to derive the final DOI value. Table 4.2 shows the distribution of weights and goalposts for all indicators.

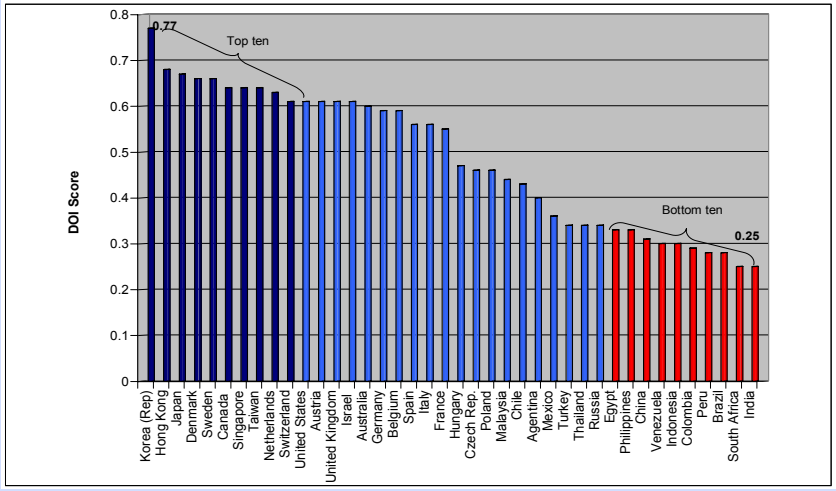
The results of the DOI show an interesting clustering of countries, with the Asian Tigers and the Nordic countries included in the sample ranking in the top ten; a number of Western European countries ranked in the teens, followed by Central and Eastern European countries in the low twenties and some Latin American economies in the high twenties. Of the 40 leading economies analyzed, developed economies from different regions ranked among the top ten countries, while the bottom ten were all developing countries, also geographically dispersed (Figure 4.1). The DOI scores show a difference of 52 percentage points between the top and last places (Republic of Korea and India, respectively), which illustrates the magnitude of the digital divide that exists even among leading economies.

With respect to the results on specific categories, Opportunity was the bundle where most countries tended to do well, mainly due to widespread coverage of mobile networks (although not necessarily

corresponding high levels of penetration). Mobile tariffs tended to be affordable among most of the sample countries, with pricing exceeding 10 per cent of income in only one country. However, Internet pricing was less affordable. Based on these results, most countries should now focus on policies that promote Infrastructure and Utilization. The DOI also provides information on the progress done in accessing the information society through mobile and fixed telephony technologies. In this area, the Republic of Korea and Japan lead in the mobile DOI. Yet, the overall impact of mobile communications on the DOI scores tended to be higher for developing countries.

Figure 4.1 – DOI Ranking

Top and bottom ten countries



Source: ITU

The main advantages of the DOI are:

- It uses the core set of indicators endorsed by the international community of international organizations and statistical centers. As such, it contributes to the efforts of the Partnership on Measuring ICT for Development to promote the collection of ICT data among countries.

- It has a modular design that allows for the inclusion of other internationally agreed indicators at a later stage, once more countries have collected data for them. By the same token, the selected indicators could be complemented by other variables (gender, income, education) and other indices, such as UNDP's Human Development Index.
- The use of standardized indicators is expected to increase the availability and quality of collected data over time.
- DOI uses a transparent methodology that can be replicated for national and regional ICT indices.
- Its mobile component allows for comparisons of trends in countries' adoption of fixed and mobile paths towards the information society. Due to its flexibility, it can also be adapted to different analytical uses at the national or regional level, or used for comparisons across categories.
- It is a development-oriented index. Its capability to track trends in mobile penetration is particularly useful, as many developing countries are leapfrogging to this technology. Its modular structure also supports the inclusion of variables of interest to developing countries, such as those of the Human Development Index.

Michael Minges concludes that enhancing the DOI through the inclusion of new indicators to the core set and to the DOI "requires an on-going procedure to be established among the international community and countries concerned".

Dr. Cheung Moon Cho, from the Korea Agency for Digital Opportunity and Promotion (KADO), emphasized the value of the DOI for policy development and suggested the incorporation of indicators that take into account levels of ICT access available to people with disabilities, as well as the ratio of digital literacy per 100 inhabitants, as indicators of the quality of use. His presentation included issues about the DOI that need to be considered in the future, including the distribution of weights among subcategories of the DOI and the use of household data for Internet and computer access, rather than individual measures, as in many cases, Internet connections and computers are shared by many members of a household.

Table 4.1 – Comparison of the DOI to other e-Indices

Inclusion of the infrastructure, access and use of ICTs by household and individual core indicators in different e-indices

	DAI	NRI	ISI	Orbicom	DOI
A-2 Mobile cellular subscribers per 100 inhabitants	●		●	●	●
A-4 Internet subscribers per 100 inhabitants					●
A-5 Broadband Internet subscribers per 100 inhabitants	●				●
A-7 Percentage of population covered by mobile cellular telephony					●
A-8 Internet access tariffs (20 hours per month), in USD, and as a percentage of per capita income	●	●			●
A-9 Mobile cellular tariffs (100 minutes of use per month), in USD, and as a percentage of per capita income					●
HH-3 Proportion of households with a fixed line telephone					●
HH-5 Proportion of households with a computer			●		●
HH-7 Proportion of households with Internet access at home		●			●
HH-8 Proportion of individuals that used the Internet	●		●	●	●

Note: DAI = Digital Access Index (ITU), NRI = Network Readiness Index (World Economic Forum), ISI = Information Society Index (IDC), DOI = Digital Opportunity Index (ITU).
Source: Adapted from information on the indices shown above.

Table 4.2 – DOI Indicators

Categories, goalposts and weights.

Category and indicators	Goalpost (%)	Indicator weight (%)	Category weight (%)
Opportunity			**33**
Percentage of population covered by mobile cellular telephony	100	33	
Mobile cellular tariffs, as a percentage of per capita income (100 minutes of use per month in USD)	16	33	
Internet access tariffs, as a percentage of per capita income (20 hours per month in USD)	20	33	
Infrastructure			**33**
Proportion of households with a fixed line telephone	100	20	
Mobile cellular subscribers per 100 inhabitants	100	20	
Proportion of households with Internet access at home	100	20	
(Mobile) Internet subscribers per 100 inhabitants	100	20	
Proportion of households with a computer	100	20	
Utilization			**33**
Internet users per 100 inhabitants	100	33	
Ratio of (fixed) broadband Internet subscribers to total Internet subscribers	100	33	
Ratio of (mobile) broadband Internet subscribers to total Internet subscribers	100	33	

Source: ITU/UNCTAD/KADO, Digital Opportunity Index.

5 THE ROLE OF MULTI-STAKEHOLDER PARTNERSHIPS

The WSIS Thematic Meeting on Multi-stakeholder Partnerships for Bridging the Digital Divide, held in Seoul, Republic of Korea on 23-24 June 2005, focused on the value of partnership to promote the participation of different stakeholders in the efforts to reduce the digital gap. The event opened with an introductory session in which stakeholders from government, the private sector, civil society and international organizations presented their perspectives on the benefits of partnerships and the challenges faced by those who participate in them. The principles of successful partnerships were fleshed out with the experiences of projects from 15 countries in Asia, Africa and America that are using multi-stakeholder partnerships to close the digital gap. These projects focused on developing national ICT policies, establishing telecenters, promoting capacity-building and the use of ICT applications. In the final session, panelists from civil society and international organizations, including ITU, the United Nations ICT Task Force and the United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP) introduced the different initiatives being undertaken to overcome the present barriers faced by partnerships and to strengthen the connections among diverse stakeholders.

5.1 The value of partnership

WSIS commitment to reduce the digital divide is expressed in its support for the use of multi-stakeholder partnerships as mechanisms to achieve an inclusive information society. Its Declaration of Principles (para. 17) includes the following realization:

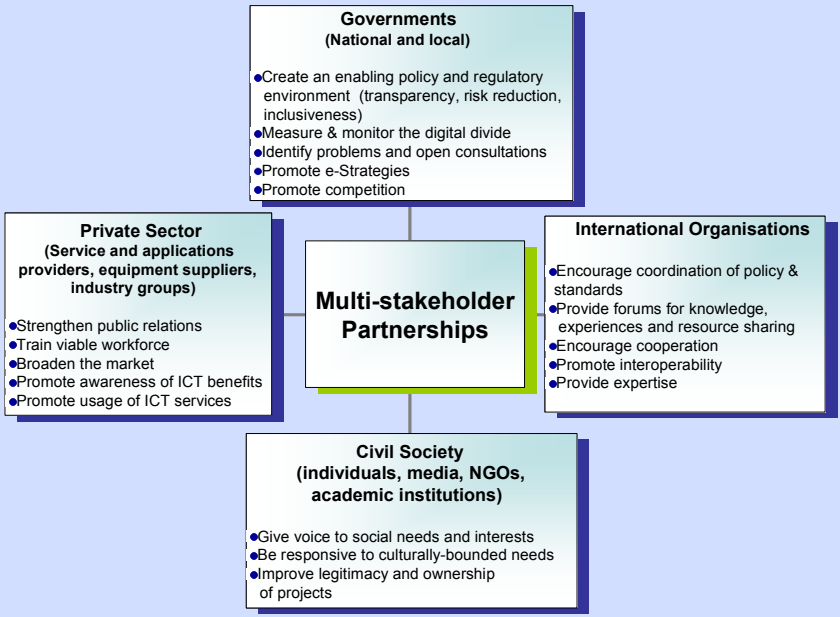
"*We recognize that building an inclusive Information Society requires new forms of solidarity, partnership and cooperation among governments and other stakeholders, i.e. the private sector, civil society and international organizations. Realizing that the ambitious goal of this Declaration—bridging the digital divide and ensuring harmonious, fair and equitable development for all—will require strong commitment by all stakeholders, we call for digital solidarity, both at national and international levels.*[9]"

In response to this call for digital solidarity, the WSIS Plan of Action, in its section C.8.b, encourages each country to "establish at least one Public/Private Partnership (PPP) or Multi-Sector Partnership (MSP) by 2005 as a showcase for future action.[10]" Partnerships are thus considered an essential mechanism to promote the inclusion of different stakeholders in the WSIS process and to ensure the fulfillment of sustainable development goals based on community needs. As such, they are a means to an end and not an end in themselves. The background paper on multi-stakeholder partnerships included in Chapter 4 points out that well-structured partnerships bring together members of different sectors, such as government, private sector, civil society and international organizations so that they can:

- Draw upon the distinctive, and in some cases, unique strengths and capabilities of partners, including specific competencies and resources that complement those of the other partners;
- Share otherwise scarce resources, improving efficiency and reducing costs;
- Share risks, responsibilities and benefits among partners;
- Accelerate the pace in which the benefits of the Information Society are brought to communities around the world.
- Reach consensus in and solve disputes in an environment of trust and equality.

Each stakeholder depends on the others for the successful implementation of their partnerships and projects (Figure 5.1). Growing demands on public resources have increased government reliance on the financial resources, expertise and administrative capabilities of the private sector to extend the network and provide advanced services to rural and underserved urban areas. Moreover, the participation of governments in international organizations facilitates collaboration amongst countries and with international organizations in the pursuit of common goals. Finally, the inclusion of civil society in national e-strategy initiatives ensures the legitimacy of government projects and the representation of different voices in the policy-making process.

Figure 5.1 – Working together
The complementary roles of stakeholders



Source: ITU, adapted from T. Kelly & L. Perez-Chavolla, *Multi-stakeholder partnerships for bridging the digital divide*, June 2005.

Similarly, the operations of the private sector are affected by the regulatory environment and the ability of governments to promote principles of transparency, non-discrimination and neutrality. Transparent and equitable rules reduce the risk of regulatory capture and promote investment in the ICT sector. Local and national governments can also benefit businesses and communities through actor tenancy models for broadband deployment that stimulate demand and attract supply of ICT services in rural areas. In the United States, for example, these types of projects are being used increasingly by municipal governments to promote the deployment of advanced services in their areas.

For small businesses and civil society, the commitment of government entities and international organizations to participate in partnerships effectively amounts to a de facto endorsement of their programmes, which facilitates their search for alternative sources of funding and their long-term sustainability by encouraging the participation of other private sector entities. The collaboration of different types of partners will be necessary to achieve the goal of bridging the digital divide by 2015.

Many multi-stakeholder activities are already under way worldwide. The WSIS stocktaking database created by the WSIS Executive Secretariat, assisted by ITU, is an inventory of projects conducted by diverse stakeholders in different countries to implement the Geneva Declaration of Principles, including the bridging of the digital divide. By 5 October 2005, the database had more than 2 394 WSIS-related activities and just over half of these projects were being undertaken by multi-stakeholder partnerships. The partnership projects presented at the Thematic Meeting in Seoul are examples of three typical types of projects currently being implemented around the globe, including: national e-strategies, such as the e-Mexico National System project or the Brazilian government initiative to promote the use of open source software; projects that promote connectivity through community access centers or similar approaches, which are being implemented successfully in diverse socio-economic regions; and finally, capacity-building and application projects, such as Thailand's e-local government website scorecard and the Sri Lankan Govi Gnana service to provide farmers access to market prices and other relevant information.

5.2 Facing challenges

The creation and maintenance of multi-stakeholder partnerships needs several challenges to be overcome. Ensuring financial support and the long-term sustainability of the partnership and its projects is perhaps the most crucial issue that partners need to deal with. The success of telecenter projects such as the Public call offices in India discussed in section 6 below, indicates that providing local entrepreneurs with access to private or public funding to start ICT businesses in rural areas can be an useful strategy, as long as in the long-term these telecenters become self-sufficient.

Many different funding mechanisms are being used by governments to finance connectivity projects in areas underserved by market forces. These strategies include, among others, the creation of Universal Service Funds supported by telecom operators or telephone subscribers; targeted price discounts for specific social groups, such as people with disabilities, low income or low consumption users; pre-paid cards for mobile telephony; and more recently, the creation of digital solidarity funds. The latter are innovative funding mechanisms based on voluntary contributions from interested stakeholders. The Digital Solidarity Fund was launched in Geneva in March 2005, with the financial support of the cities of Geneva, Lyon and Turin, as well as incoming funds from a tax on public contracts for the provision of ICT services and networks, which is paid by the seller on its profit margin. In the case of the city of Geneva, the tax levied was of one per cent, and the condition is clearly stated in stated in the public calls for bids, so as to ensure transparency. Voluntary mechanisms such as the Digital Solidarity Fund are innovative because they mobilize new partners, such as local governments, which are more knowledgeable of the specific needs and concerns of their citizens. The projects financed by the fund promote South-South cooperation and are targeted to specific groups, such as women's organizations and community projects.

Another important challenge for partnerships is gathering political support for their activities. The participation, in kind or financial, of governments, national and international organizations in partnership projects helps partnerships gather momentum and provides them enough notoriety to attract new partners and ensure sustainability. Participants at the thematic meeting pointed out that in order for multi-stakeholder partnerships to rally political support from national and international entities, it is essential that partnerships follow best practices, such as the articulation of clear goals; the elaboration of strategies and plans that take into account the strengths of the different partners; as well as an efficient and transparent management of the partnership and its projects. Other factors that attract support from outside entities are the degree of scalability and reproducibility of the project, the level of funding required and the knowledgeability of the partners.

Finally, the long-term sustainability of a partnership depends in part on the relationship among the partners themselves. Dealing with conflict and maintaining an environment of trust and transparency in a partnership needs its members to establish mechanisms that facilitate the process of negotiation and information-sharing among them. Clear and open communication among partners is essential for conflict resolution processes to yield positive results. Successful partnerships also need to be flexible enough to adapt to differences in the culture, resources and interests of different stakeholders. Many longstanding partnerships, such as the Global Knowledge Partnership (GKP), can provide insights on how partnership challenges can be overcome successfully.

6 TECHNICAL SOLUTIONS

Technologies are at the heart of the digital divide: differences in access to ICTs create the gap among haves and have-nots and, appropriately, these technologies can also bring about opportunities to those countries and communities that have been left behind. The discussion on technical solutions held at the 2004 Symposium in Busan, Korea underscored the positive impact that emerging wireless technologies such as WiMAX and Wi-Fi have had in helping many developing countries advance in their efforts to provide access to their population. The background paper and the case studies on Malaysia and India describe experiences in the adaptation and deployment of different mixes of wireless technologies that have extended the reach of existing fixed networks and provide connectivity to rural and geographically dispersed populations in developing countries.

Dr. Larry Press stressed that the goal of providing high-speed Internet links to the 3 million villages in low and lower-middle income nations that remain out of reach seems an overwhelming challenge. In his opinion, the strategy applied in the United States to deploy the NSFNet during the 1980s represents a best practice that could be applied in developing countries. The National Science Foundation (NSF) created a government wide-area network linking universities and research centers following a meshed network design that began with the establishment of a backbone and promoting connectivity through interconnections with regional clients and agency peer networks. Correspondingly, each of the peer networks would connect to their respective clients, thus extending the network's reach. One advantage of the NSF strategy was the level of control it provided to its users, allowing universities to determine the design and funding mechanisms for their Local Area Networks (LANs) and making them responsible for capacity-building and the development of applications.

Dr Press recommended extending the fiber network wherever possible, and then expanding the area of coverage by interconnecting the backbone to wireless technologies, such as VSAT, WiMAX and high altitude platforms. This deployment model has been proposed for "FiberAfrica", an open-access project that interconnects optical fiber and broadband wireless hubs to reach over large areas. The project intends to

connect 400 million Africans to within walking or cycling distanced Internet access for an investment of USD 1 billion. The business model for FiberAfrica also uses a public-private partnership approach.

Taylor Reynolds points out in his background paper on emerging technologies (Chapter 5) that although the deployment of fiber networks entails large investments and high risks, particularly in developing countries with other basic priorities to consider, in the long-run they provide an advanced infrastructural foundation upon which to build. Fiber networks are also useful for their capacity to deliver a vast array of services to a community, thus supporting the fulfillment of short-term basic needs in areas such as education and health, among others. Taylor states that "pushing backbone infrastructure as deep as [is] economically possible is one of the best ways to ensure that emerging technologies can reach as many potential users as possible"[11].

Reynolds stresses, however, that access to ICT infrastructure has to be complemented with the development of local content. Currently, the information accessed in many developing countries comes from international sites, requiring the provision of international Internet connectivity in order to bridge the information divide. Thus, he notes, affordable international connectivity is vital for developing economies. African countries are already addressing this problem by developing national and regional exchanges that avoid routing traffic through a third region such as Europe.

The cost of connectivity is an important barrier for access in developing countries. According to Reynolds, Internet service providers in developing countries, on a whole, pay more per megabit of bandwidth than developing economies because of the use of high-cost technologies to provide service, such as satellites. Burundi is a case in point. ISPs in Burundi provide access through a VSAT system with bandwidth of 6 Mbit/s for upload and 10 Mbit/s for download. The cost to download one Gigabyte of data is about USD 60, while the costs of Internet subscription varies from USD 250 for 16 Kbit/s to USD 1 800 for a bandwidth of 128 Kbit/s. In this context, telecenters are an affordable alternative and provide a viable solution to high costs for low-end users, with an average cost of USD 1 for 1 hour of connection to the Internet[12].

Of the different emerging technologies reviewed by Reynolds, WiMAX and Wi-Fi solutions seem to show the most promise for developing countries. WiMAX (Worldwide Interoperability for Microwave Access) is a new fixed wireless technology that can use a point-to-point or point-to-multipoint architecture, facilitating interconnections between high-speed wireless hubs and the edges of the fiber backbone. The reach of this technology is 50 Km for transmissions up to70 Mbit/s. Higher frequencies allow for higher data loads but require line of sight conditions. The initial WiMAX version (IEEE 802.16) meets the requirements for broadband wireless access systems in the 10 and 66 GHz, while a more recent version operates between 2 and 11 GHz. WiMAX can maximize the amount of data transmitted at one time by dividing the signal into multiple sub-signals that are sent simultaneously using different frequencies; these sub-signals are recompiled at the receiver's end. This type of frequency modulation is called Orthogonal Frequency Division Multiplexing (OFDM). Because of its ability to provide point-to-point wireless connection over longer distances, WiMAX is becoming a popular solution for rural areas. The advantage of Wi-Fi technologies (802.11b) is that they use the 2.4 GHz frequency band, which has been set aside for unlicensed used of the spectrum in many countries. This standard has a shorter ranger than WiMAX (100 meters in line-of-sight scenarios and between 20 and 45 meters inside buildings). Its throughput is 11 Mbit/s, but has been improved in more recent variations of the technology. Wi-Fi is widely used for hot-spot access.

As in the case of the collection of ICT statistics and the establishment of multi-stakeholder partnerships, coordination and cooperation among different stakeholders have had a positive effect on the efficient implementation of technical projects in developing countries. In Malaysia, the coordination of responsibilities and plans among different government institutions involved in ICT initiatives has prevented operational overlaps. Eric Lie noted that the government has played a leadership role in ICT deployment strategies in Malaysia. Becoming a developed country through the establishment of a knowledge-based economy is a national goal of the Malaysian government that depends on widespread access to ICTs. To achieve this goal, it introduced a Universal Service Provision (USP) in 1998 that set out clear priorities and a transparent framework for funding universal

service initiatives and selecting among bidders. This framework gave private investors greater flexibility to propose different mixes of technologies, suitable frameworks for deployment and target sites. According to Lie, the wide scope of discretion given to the industry providers contributed largely to the success of the USP programme. The technological solutions deployed in Malaysia include terrestrial wireless technologies using CDMA 2000 1x networks and some upgrades to CDMA 2000 1x EVDO, satellite-VSAT systems, and wireless LANs (WLAN) in urban areas.

Beyond the USP fund, the Malaysian government has funded many other ICT initiatives to extend Internet access to schools, libraries, health centers and underserved areas; it has also promoted access to low cost computers and facilitated capacity building. As stated above, the private sector has been a key partner in the implementation of universal service initiatives and has demonstrated interest in participating in other digital divide initiatives, as a form of corporate responsibility. Private sector entities can also become anchor tenants and attract private ICT investment in underserved areas.

The lessons from India followed a similar trend. Ashok Jhunjhunwala points out the essential role of coordination among all constituents to bridge the rural divide and create a united front incorporating government, private sector, academic institutions, non-governmental organizations and other entities to establish a critical mass that will attract rural investment at a faster pace. As in Malaysia, the Indian government has taken important steps to develop a transparent regulatory environment that promotes competition, while maintaining universal service programmes and funds that are distributed in a non-discriminatory and equitable fashion. India provides a good example of the possibilities of implementing profitable business models for the deployment of affordable Internet and telephony services in rural areas.

As many other developing countries, India has applied demand aggregation strategies to provide access to ICTs in public call offices (PCOs). The kiosks are owned and operated by local entrepreneurs to encourage links to the community. Moreover, it is expected that knowledge of the particular needs of the local population should assist the development of local content or at least the provision of services relevant to the population. Due to the low initial investment required for

the kiosk, this business model envisages the rapid spread of PCOs, so that inhabitants have convenient access to nearby kiosks; the initial costs should be low enough to be recovered within six months. Kiosk owners are required to provide indiscriminate service to all, regardless of gender, caste or economic status.

The case study of India also stresses the importance of deploying technology and providing applications and service that respond to the particular needs and resources of a community. In this sense, the introduction of e-education, e-health, e-governance and e-commerce projects that support agricultural activities can rapidly improve the livelihood of rural communities. The technical infrastructure deployed should be scalable. In this sense, the use of a fiber optic backbone running into each community (taluka) and combined with increasingly enhanced wireless technologies has proved once again to be a successful mix for a cost-effective provision of access to rural areas. Due to the large number of people living in rural communities in India (740 million in 2004), it is essential to use scalable technologies and business models to reach the greatest possible number of villages.

7 CONCLUSION

The background papers and case studies included in the *Building Digital Bridges* report shed light on different strategies to bridge the digital divide. Whether through the collection and analysis of ICT data, the use of partnership mechanisms or the deployment of emerging technologies, governments in developed and developing countries have made inroads in closing the gap between the have and have-nots, but much still remains to be done. Difficulties in coordinating efforts among stakeholders involved in these three areas highlight the importance of communication processes in bridging the digital divide.

The coordination of interests, goals and responsibilities among stakeholders improves efficiency in the collection of ICT statistics, in partnerships and in the deployment of technical solutions. When all stakeholders are able to express their needs openly through official channels, ICT initiatives can respond to those needs and the results become relevant to the communities that benefit. The role of governments and international organizations in promoting harmonization of practices, cooperation and information sharing at the national and international levels can not be emphasized enough. As stated in the WSIS Declaration of Principles, creating an inclusive information society can only be the result of digital solidarity including all stakeholders.

Notes

[1] World Summit on the Information Society (WSIS) *Declaration of Principles* (WSIS-03/GENEVA/DOC/0004). Available at: http://web/wsis/documents/doc_multi.asp?lang=en&id=1161|1160

[2] The core set of indicators was discussed at the WSIS Thematic Meeting on Measuring the Information Society in Geneva, Switzerland, in February 2005.

[3] C. M. Cho, *How to measure the Digital Divide?*, ITU/KADO Symposium on Building Digital Bridges, Busan, Rep. of Korea, 10-11 September 2004. Available at http://www.itu.int/digitalbridges/docs/presentations/02-Cho-Background.pdf.

[4] T. Kelly & L. Perez-Chavolla, *Multi-Stakeholder Partnerships for Bridging the Digital Divide*, June 2005, p.24. See also Chapter 4.

[5] T. Kelly & L. Perez-Chavolla, June 2005, p.5. See also Chapter 4.

[6] G. Sciadas, *International benchmarking for the information society*, September 2004, p. 30. See also Chapter 3.

[7] V. Gray, *Australia ICT Data Collection Case Study*, July 2005, p. 1. See also Chapter 3.

[8] For the list of core indicators selected, see E. Magpantay, *Hong Kong, China ICT data collection case study* in Chapter 3.

[9] World Summit on the Information Society (WSIS) *Declaration of Principles* (WSIS-03/GENEVA/DOC/0004). Available at: http://web/wsis/documents/doc_multi.asp?lang=en&id=1161|1160

[10] World Summit on the Information Society (WSIS) *Plan of Action* (WSIS-03/GENEVA/DOC/0005), 2003. Available at: http://web/dms_pub/itu-s/md/03/wsis/doc/S03-WSIS-DOC-0005!!PDF-E.pdf

[11] T. Reynolds, *Building digital bridges with emerging technologies*, August 2004, p. 8. See Chapter 5.

[12] J. P. Nkurunziza, *Actions of BYTC and its partners in fighting digital divide in Burundi,* June 2005. Available at: http://www.itu.int/wsisbridges.

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Printed in Switzerland
Geneva, 2005