

Digital Divides

The New Challenges and
Opportunities of e-Inclusion

Edited by Kim Andreasson



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Foreword

Access to Information and Communication Technologies (ICTs) is more critical than ever as countries are increasingly seizing the opportunities of a digital society. It is estimated that every 10-percent rise in access to broadband leads to a 1.38-percent growth in gross domestic product (GDP) for developing countries, according to a World Bank study.

Tremendous progress also has been made in closing the digital access gap. By the end of 2013, an estimated 2.7 billion people use the Internet and there are 2 billion mobile broadband subscriptions, which corresponds to a global penetration rate of almost 40 and 30 percent, respectively. Fixed- and mobile-broadband prices also are falling, making ICTs more affordable.

Mobile devices are particularly promising in bridging access gaps. In 2013, mobile cellular telephone subscriptions stood at an estimated 96.2 (per 100 inhabitants) globally and about half of the world's population is covered by 3G networks, potentially offering an opportunity for mobile Internet connectivity.

Despite this progress, some 4.4 billion people remain offline. This is particularly concerning as those without access fall farther behind in an increasingly digital society. For instance, those who are online can benefit from ever improved e-government, e-commerce, e-health, e-education, and other e-programs while those without access are excluded from such opportunities, leaving the full potential of a digital society unfulfilled.

In order to meet the United Nations Millennium Development Goals (MDGs), the International Telecommunication Union (ITU) and the United Nations Educational, Scientific, and Cultural Organization (UNESCO) established the Broadband Commission for Digital Development in May 2010. The Broadband Commission embraces a multistakeholder approach in which the private sector plays a key role in promoting implementation of broadband. Yet, global progress remains patchy, in particular in rural areas and in regard to greater speeds that can benefit a range of areas, such as e-health and e-education programs, that often require faster connections.

By 2015, the Broadband Commission aims to make every country have a policy for universal broadband while making broadband affordable. Specific targets also

include household connectivity of 40 percent in developing countries and reaching a global Internet user penetration rate of 60 percent.

However, in the process of enhancing access and improving speeds, new divides have emerged. They include the gender divide. In 2013, ITU estimated that there were 200 million more men than women online. As a result, the Broadband Commission endorsed a fifth policy target, calling for gender equality to broadband accessibility by 2020.

In the process of replacing the MDGs, which expire in 2015, with the post-2015 Sustainable Development Goals (SDGs), it's increasingly important that females have equitable access to ICTs. Looking forward, our position in the post-2015 debate also is to recognize ICTs as a cross-cutting enabler for all three pillars of sustainable development: economic growth, social inclusion, and an environmental balance.

With the global rise of a digital society, realizing the right of all people to access and use ICTs can help achieve the full potential of sustainable development. In this effort, broadband emerges as a basic human right because it is a catalyst for sustainable development across all dimensions.

To achieve this goal requires not only infrastructure but also human capacity building in order for people to take advantage of the services available to them. This necessitates a need for greater affordability of ICTs, enhanced education as well as availability of local—and relevant—content.

I'm pleased to note that these themes are all part of this edited book and I hope the analysis contained within these pages will raise awareness of them and help the public, private, and civil society sectors to come to a mutual understanding of how to best work together toward an inclusive digital society for sustainable development.

Dr. Hamadoun I. Touré

*Secretary-General
International Telecommunication Union*

Acknowledgments

This edited volume would not have been possible without a number of people and events.

In 2012, Denis McCauley and Jason Sumner, my former colleagues at The Economist Intelligence Unit (EIU), asked me to author a paper on “Smart Policies to Close the Digital Divide: Best Practices from Around the World.”

Given that the digital divide is part of the United Nations global e-government survey for which I have been an adviser for some time, I was aware of the developments in this area. However, after interviewing 20 experts around the world, I discovered that few people had documented the shift from “the” digital divide in terms of access for certain population groups to redefining it as “digital divides” and their underpinnings. I decided the time was ripe to capture these efforts in a book.

My initial response was overwhelmingly positive and I’m grateful to those who encouraged me at the beginning and along the way, including Laurel West at the EIU in Hong Kong, who asked me to write another paper on the topic in 2013.

Besides my former colleagues, I’m grateful to my publisher Rich O’Hanley at CRC Press who took a chance on me in 2010 when I proposed my book on *Cybersecurity: Public Sector Threats and Responses*. It turns out to have been a timely topic. I’m equally grateful to Rich for taking on this edited volume with Lara Zoble, who embraced the topic from the outset, and made my life as editor as pleasant as it can be.

I’ve interviewed some 50 experts—from the private, public, and civil society sectors—around the world regarding their views on digital divides. I’m grateful to all of them for contributing their knowledge on the topic and am pleased that some have joined this book by authoring a chapter. As an editor, I couldn’t be happier with the contributors who are participating and can’t thank them enough. I am also grateful to Dr. Hamadoun I. Touré, Secretary-General at the International Telecommunication Union, for his support and for taking the time to provide the foreword.

Personally, I’m thankful to my wife, Diane, for giving me the support I needed to edit yet another book, and for providing suggestions on my introduction and conclusion. My parents, Kenth and Gullvi, were helpful as ever in offering their general assistance, which freed up my time to work on this volume.

And, then, there are those to whom I dedicate this volume. My grandmother Vera never had the opportunity to enter the digital society. At 88, she could use it more than ever to schedule appointments and receive reminders, but does not know how. Conversely, my friend Trâm is essentially a digital native who has great knowledge of ICTs, but never seemingly uses them to her advantage in terms of “useful usage,” a term to describe the difference between using ICTs generally and for their productive purposes. In 2012, Trâm was a source of encouragement and she reinforced my notion that those without a complete understanding of the digital society will miss out on many opportunities.

We must bridge these gaps to help people seize the benefits of the information society, whether it is in Việt Nam, Sweden, or in between. My hope is that this book can make a contribution toward that aim.

Kim Andreasson

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and Varberg, Sweden*

Contributors

(In order of appearance)

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Introduction

Gaps in access and usage have been present since the invention of information and communications technologies (ICT) and, without question, digital divides will always exist. However, the rapid development of the information society, spurred by the growth of the Internet, has now accentuated their importance. Old challenges, such as differences in adoption, remain key hurdles to greater participation in the digital economy. At the same time, new divides also are emerging about as quickly as the development of technology.

This is a challenge to all levels of society—from the international community and individual countries to the public, private, and civil society sectors within them. The 2014 United Nations e-Government Survey also highlights that digital divides are omnipresent and affect developed and developing countries alike.¹

This book, therefore, defines digital divides broadly as the access, skills, and capacity to take advantage of ICTs in order to reap the full benefits of the information society. Today, digital inclusiveness (e-inclusion) is not only important from a social perspective, but also makes financial sense as countries move toward greater cyber dependency. More than ever, tackling current—and future—digital divides is paramount toward an inclusive society and to reap the economic benefits thereof.

The Benefits of e-Inclusion

Enhancing digital access and usage rates allows countries (and their constituents) to save time, money, and effort while enhancing productivity. For instance, a commonly cited World Bank report on Information and Communication for Development in 2009, noted that low- and middle-income countries could raise economic growth by 1.4 percent for every 10-percent increase in broadband penetration.²

More recently, a study by the McKinsey Global Institute, a consultancy research arm, found that the Internet's contribution to GDP (gross domestic product), on average, accounted for 3.4 percent in the G8 countries (Canada, France, Germany, Italy, Japan, Russia, the United Kingdom, and the United States) and South Korea, Sweden, Brazil, China, and India.³ The gap between the lowest share (in Russia

at 0.8 percent) and the highest (in Sweden at 6.3 percent) shows that emerging markets not only need to improve their information society, but that there are great potential opportunities if this is possible. Specifically, among the mature economies, the Internet's contribution to GDP growth between 2004 and 2009 averaged 21 percent while it was only 3 percent in the BRIC (Brazil, Russia, India, China) countries.

Because of the benefits of an information society, governments are encouraging private sector ICT investment and are also moving public sector services online (e-government). In the United Kingdom, service delivery is now “digital by default,” which means it is conducted digitally in the first instance, and sometimes only so. Compared with an “offline” interaction, the move to digital will save between £3.30 (British pound sterling) and £12 per transaction, according to a U.K. government study conducted by PwC, a consultancy.⁴

The private sector is similarly keen to move customers to digital channels as evidenced by the rise of online banking and commerce. In fact, companies compete on making their services accessible to a wider audience. In an interview for a report from The Economist Intelligence Unit, Axel Leblois, founder and executive director of the Global Initiative for Inclusive Technologies, an advocacy initiative of the United Nations Global Alliance for ICT and Development, says NTT DoCoMo, a Japanese mobile carrier, actively targets senior citizens through improved accessibility in order to gain market share in an increasingly competitive environment, benefitting consumers, the company itself, as well as society at large.⁵

Digital Divides

As the opportunities of the information society rise, so do the consequences for those who are not able to take advantage of them. This is a global problem as 60 percent of the world's population remain offline, but also a challenge to developed countries.⁶ In the United States, where information and services are increasingly digital, one-fifth of the population is not using the Internet.

Access, affordability, and awareness remain fundamental barriers toward e-inclusion. At the same time, connectivity rates continue to improve, in large part thanks to ubiquitous and cheap mobile devices.⁷ However, once connected, new questions emerge as to whether people have the ability to take advantage of their access and if they want to. The supply of relevant and useful content is only one aspect as the demand for it is equally crucial. Even in South Korea, the country that leads the world in the supply of online public sector services, according to the most recent UN e-government survey, constituents do not utilize them to a large extent, thereby limiting inclusiveness and public sector efficiency.⁸ A report shows that while 73 percent of South Korean citizens are aware of e-government, only 47 percent actually use it.⁹

Using ICTs for their productive purposes—useful usage—remains a challenge. Despite having about 9 in 10 people online, Olli-Pekka Rissanen, a special adviser for public sector ICT to the Ministry of Finance in Finland and chairman of the governing board of the Information Society Development Centre, voiced concern in an interview for a report from The Economist Intelligence Unit regarding the country's usage pattern in which interest in office software often lags more popular social media activities among youth.¹⁰

Even when Internet adoption and demand for useful services is high, there are new questions regarding web accessibility, speed, and quality. For instance, people with disabilities may face disproportionate challenges in using online services if they are not designed appropriately, while insufficient bandwidth and network capacity to transmit data can limit their usefulness.

Thus, digital divides can be classified into three simple stages: (1) access, in providing ICTs in the first instance; (2) usage, in the ability and interest to use them; and (3) useful usage, from which users can reap the potential benefits of the information society.

A Connected Future

The world has a long history of dealing with social inequalities offline; it is obvious that we face the same challenge online. However, bridging those gaps also will be increasingly important as the two are often conflated. By 2015, the European Commission (EC) reckons that 90 percent of all jobs in Europe will require some level of digital literacy.¹¹ Although unsurprising as the information society continues to develop rapidly, it also illustrates the challenges of a connected future in which the public, private, and civil society sectors must find ways to work together to meet existing—and emerging—digital divides.

As some gaps are narrowing, such as basic access to mobile phones, which are near saturation level in many countries, others are widening, such as the speed and quality of those devices. Digital divides are a multifaceted global challenge, but also a local problem. The notion that there was “a” digital divide, either between those who have access and those who don't or between developed economies and emerging markets is an understatement of the complexities underpinning the challenges ahead. In essence, countries face the same digital divide challenges, yet prioritize them differently depending on context and local variations. Figure I.1 illustrates a variety of today's digital divides.

The path toward greater e-inclusion must be dealt with at all levels, from the international community to the national and local levels, particularly as countries move up the information society development curve in different ways and at various speeds. Consequently, that is how the book is organized: from global problems (and some potential solutions) to the prospects for greater e-inclusion.

Divide	Description
Access	It starts with access or the lack thereof. Although Internet penetration has increased, it continues to be a key barrier as more people globally remain offline rather than online.
Age	Older people are generally using ICTs to a lesser extent than younger populations, despite the notion that they could benefit from online social and health services.
Bandwidth	International bandwidth and the capacity to transmit and receive information over networks vary greatly between countries, but also within them, limiting potential useful endeavors.
Content	The creation and consumption of local content are important as useful usage can depend on context and language.
Disability	Those with disabilities face additional hurdles to use ICTs, although this can also be turned into a potential e-inclusion opportunity by increasing digital accessibility.
Education	Like social divides, education and literacy rates are fundamental challenges to bridge digital divides.
Gender	There is a small but persistent difference in online usage between men and women.
Immigration	Migrants may not possess the same levels of digital skills as the population in their new country and, if they do, may be subject to content and language divides.
Income	The gap between rich and poor affects affordability of ICTs, but also usage patterns and is as important within countries as much as between them.
Location	Rural and remote areas are often at a disadvantage in terms of speed and quality of services as compared to their urban counterparts.
Measurement	There is a divide in measuring progress between countries, within them, and also in the evaluation of specific development projects.
Mobile	Mobile devices provide opportunities to bridge the access gap, but can also introduce new forms of divides in terms of technology, speed, and usage.
Speed	The gap between basic and broadband access is creating a new divide as speed is important to reap the full benefits of a digital society.
Useful usage	What people do with their access or “useful usage” is a key divide in using ICTs productively according to their abilities.

Note: Intended to be illustrative, not exhaustive.

Figure I.1 A selection of digital divides, from access to useful usage.

Section I: Digital Divide Challenges

The first part of the book illustrates global challenges and provides examples from emerging markets and developed countries alike. Although some cases are context-specific, there are also a number of reoccurring themes surrounding access and usage.

In Chapter 1, *The Digital Divide and the Global Post-2015 Development Debate*, Jeremy Millard, at Third Millennium Governance, Brunel University, and the Danish Technological Institute, provides a global overview to put digital divides into perspective with a view toward the future. He argues that ICTs have a critical role to play in the proposed Sustainable Development Goals (SDGs), which will replace the Millennium Development Goals (MDGs) after they expire in 2015, but that stark digital divides, both between and within countries, could limit their potential effect.

In Chapter 2, *The Digital Broadband and Gender Divides*, Gary Fowlie and Phillippa Biggs at the International Telecommunications Union (ITU), show that women lag men in terms of connectivity, in part because of the social barriers they face. Yet, female participation in the information society is both socially and economically beneficial. In 2013, the ITU/UNESCO Broadband Commission for Digital Development also endorsed gender equality in access by 2020 as an advocacy target. To achieve this goal, the authors call for better policies and measurement as well as improved affordability and content.

Johanna Ekua Awotwi at the Centre for e-Governance in Ghana, discusses the country's digital divide challenges, especially for women, and the strategies for bridging them in Chapter 3, *Challenging the Digital Divide in a Developing Country: Ghana Case Study*. The chapter outlines Ghana's overall information society development before providing an analysis of its ICT environment and usage levels. As in many developing countries, affordability and bandwidth remain key challenges, hence the high use of mobile devices for access.

In Chapter 4, *China's Digital Divides and Their Countermeasures*, Yuanfu Jian, at the e-Government Research Center at the Chinese Academy of Governance, illustrates the broad range of divides facing a large and populous country. Basing the analysis on three underlying factors—technical, content, and personal—the chapter concludes by providing suggestions for overcoming current deficiencies, including, but not limited to, increasing education and improving public information literacy, cutting telecommunications charges, and enhancing e-government and public service for vulnerable groups.

In Russia, the development of the information society has resulted in new kinds of geographical and social divides, as shown by Tatiana Ershova, Yuri Hohlov, and Sergei Shaposhnik, all at the Institute of the Information Society in Russia. In Chapter 5, *Spatial and Social Aspects of the Digital Divide in Russia*, the authors compare the extent of the digital divide in Russia with the European Union (EU) before delving deeper into their underlying reasons. Using the Russian Regions e-Readiness Index to highlight domestic challenges, they find that economic premises are a necessary (but not sufficient) condition for purposeful ICT usage.

In Australia, about 86 percent of the population has home access to the Internet. However, as Scott Ewing, Ellie Rennie, and Julian Thomas, all at the Swinburne Institute for Social Research, discuss in Chapter 6 (Broadband Policy and Rural and Cultural Divides in Australia), the access divide may be narrowing, but it is deepening as well. Detailing the history of the country's ambitious National Broadband Network to connect all households to high-speed access, the authors use the example of broadband adoption amongst Australia's Indigenous households to demonstrate cultural challenges to Internet usage.

To conclude the first part, Ellen Johanna Helsper, at the London School of Economics and Political Science, and Alexander J.A.M. Van Deursen, at the University of Twente, move beyond access to look at what people actually do with it in Chapter 7 (Digital Skills in Europe: Research and Policy). Using a broad definition of digital literacy as the sum of access, skills, and engagement, they find that measurement of digital skills is insufficient, evidenced by its lack of inclusion in large-scale European surveys, thereby leading to ineffective policy formulation in this area.

Section II: Digital Inclusion Opportunities

Although there is some overlap in terms of challenges and solutions, the second part focuses on e-inclusion and describes recent efforts to bridge digital divides through a number of initiatives. Yet, the success (or lack thereof) is not always easy to determine and this part concludes with an assessment of evaluation mechanisms and some thoughts concerning future divides.

Singapore consistently ranks among the top countries in the world in numerous ICT reports. Chapter 8 examines the history and current state of the digital divide in the country, in particular, how its public, social, and private sectors help citizens use ICT in relevant ways that improve learning and foster the skills necessary for meaningful participation in a digital economy. In *Digital Inclusion: The Singapore Perspective*, Lim Swee Cheang and Guo Lei, at the National University of Singapore, illustrate the city-state's experience while highlighting remaining challenges.

In Chapter 9 (Leveraging Mobile Revolution for Turning Digital Divide into Digital Dividend: Examples from India, Bangladesh, and Sri Lanka), Vikas Kanungo, at mGovWorld, The Society for Promotion of e-Governance in India, and a consultant with the World Bank, offers insight into the opportunity to leapfrog traditional infrastructure via mobile devices, particularly phones, which have helped establish a new way to access information. The chapter focuses on how innovative uses of these devices are enabling more inclusive participation and access to service delivery in South Asia, a region that is home to 44 percent of the global poor.

In addition to access, questions linger about whether technology provides an educational benefit. In Chapter 10 (e-Inclusion in Education: Lessons from Five Countries), Soobin Yim, Melissa Niiya, and Mark Warschauer, all at the University

of California, Irvine, examine five countries, all of which have implemented some kind of program to provide individual computers to children: Romania, China, Peru, Uruguay, and the United States. Drawing on these examples, the chapter shows which efforts were effective in increasing social inclusion and academic outcomes.

In Chapter 11 (e-Education at the Local Level: Challenges and Pitfalls of Public Policies in Rio de Janeiro), Bernardo Sorj, currently at the Institute for Advanced Studies at the University of São Paulo, and Denise Vaillant, at the Institute of Education, University ORT-Uruguay, discuss the challenges of implementation. The authors use Brazil and Rio de Janeiro, its second-largest city, as a practical example and find that the introduction of computers is simply one element in the e-education chain, and usually the least difficult to put in place, indicating that the move toward a computer-centered environment is going to be a long process.

Nongovernment organizations (NGOs) are often instrumental in improving access rates in a local context. In Chapter 12 (Local + Digital + Scale: A Mass Movement for Digital Inclusion), Helen Milner, at the Tinder Foundation, describes what makes its digital inclusion model different from others because it is both highly targeted and delivered at scale. The chapter shows how the Tinder Foundation has accomplished its goals and provides blueprints for success in the hopes that other organizations around the world can learn from this approach.

In Chapter 13 (Beyond Failure: Rethinking Research and Evaluation in ICT4D), Paula Uimonen, at Stockholm University, argues that ICT for development (ICT4D) continues to be perceived as a risky endeavor with high failure rates, despite the fact that it has a significant effect on development. The chapter investigates the practical complexity of assessment and uses two recent scholarly works in Latin America and East Africa to argue for an alternative evaluation model using a combination of research and practice, which is also exemplified by Spider, one of the world's leading ICT4D centers.

To end the volume, your editor takes a stab at recent trends and upcoming challenges in Chapter 14 (In Conclusion: Tackling Future Digital Divides). The first part of the chapter outlines current obstacles to greater access, usage, and useful usage, such as affordability and data capacity. The second part introduces the cyber dependency matrix to illustrate where countries are in their journey toward an information society and what happens as they reach higher levels. Emerging concerns include a global information divide, courtesy of cyber security and data policies.

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Chapter 1

**The Digital Divide
and the Global Post-2015
Development Debate**

Jeremy Millard

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1.1 Introduction and Context

In September 2000, world leaders adopted the United Nations Millennium Declaration, committing their nations to a new global partnership to reduce extreme poverty and setting out a series of targets known as the Millennium Development Goals (MDGs).¹ The eight MDGs (Figure 1.1), which range from halving extreme poverty rates to halting the spread of HIV/AIDS and providing universal primary education, are time-bound to the target date of 2015.

Although impressive gains have already been achieved in some MDGs, such as the reduction of extreme poverty, access to safe drinking water, gender parity in primary schools, and improvement in lives for at least 100 million slum dwellers, targets were only partially met for many goals (Figure 1.2). Serious shortfalls are

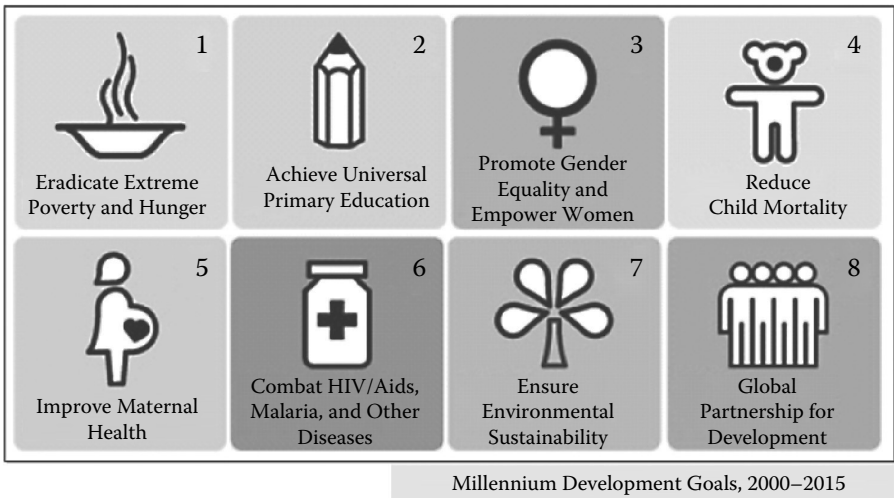


Figure 1.1 2015 MDGs. (From <http://www.un.org/millenniumgoals/>. With permission.)

expected in targets like access to basic sanitation, deaths from tuberculosis, and maternal mortality. In addition, hunger remains a global challenge, illiteracy still holds back more than 120 million young people, progress on primary school enrollment has slowed, and one in five children under age five in the developing world are still underweight.²

As 2015 approaches, the United Nations (UN), in partnership with many other international bodies, institutions, and private and civil actors at all levels, is engaged in wide global consultations on the framework for a post-2015 sustainable development agenda. For example, in order to address the 2015 shortfalls, it is increasingly realized that institutions and governance generally need to be considerably strengthened as the role of the public sector is critical, and this must include changing its forms of cooperation with both private and civil sectors. Moreover, it is accepted that new technologies, such as Information and Communication Technology (ICT), have a critical role to play, and although some important achievements have already been made in using ICT to achieve development impact, stark digital divides, both between more and less developed countries as well as within countries themselves, are having a limited effect on the potential which could be achieved.³

The UN High Level Panel report proposed that the post-2015 development goals, which are likely to be termed the Sustainable Development Goals (SDGs) should ensure that everyone ought to have access to modern infrastructure: drinking water, sanitation, roads, transport, and ICT.⁵ However, this report and others recognize that a serious barrier to the potential development impacts that ICT and other infrastructures and tools might have is inequality of access and use.⁶ This

<i>Target</i>	<i>Base</i>	<i>Latest</i>
Poverty: halve the proportion of people living in extreme poverty	1990 46.7%	2010 22%
Hunger: halve the proportion of hungry people	1990 18.6%	2010–2013 12.0%
Education: ensure all children can complete primary school	1990 82.1%	2012 91.1%
Gender equality: end gender disparities in schools ^a	1990 0.89	2012 0.97
Child mortality: cut under-5 mortality rate (per 1,000 live births) by two thirds	1990 90	2012 50
Maternal mortality: cut maternal mortality rate (per 100,000 live births) by three quarters	1990 380	2013 210
HIV and AIDS: halt and begin to reverse the spread of HIV and AIDS ^b	2001 0.09	2012 0.05
Water: halve the proportion of people without access to safe drinking water	1990 24%	2012 11%
Sanitation: halve the proportion of people without access to basic sanitation	1990 51%	2012 36%

Source: Data from United Nations (2014) “Millennium Development Goals Indicators: world and regional trends—Statistical Annex: Millennium Development Goals, Targets and Indicators, 2014”: <http://mdgs.un.org/unsd/mdg/Host.aspx?Content=Data/Trends.htm>

^a Gender parity index (ratio of girls to boys)

^b Incidence of new cases (per 100 people)

Figure 1.2 MDG 2015 status, 2014.

is strongly linked to other aspects of inequality, such as income and education. According to a UN Task Team Report, “We are deeply aware of the hunger, vulnerability, and deprivation that still shape the daily lives of more than a billion people in the world today. At the same time we are struck by the level of inequality in the world, both among and within countries. Of all the goods and services consumed in the world each year, the 1.2 billion people living in extreme poverty only account for 1 percent, while the richest 1 billion people consume 72 percent.”⁷ Moreover,



Figure 1.3 Proposed post-2015 SDGs. (From the United Nations, http://www.un.org/en/development/desa/policy/untaskteam_undf/report.shtml. With permission.)

there is increasing evidence that inequality directly damages economic growth, so that countries with high levels of inequality suffered lower growth than nations that distributed incomes more evenly.⁸ Thus, regardless of any social or ethical objections to large and increasing inequality, strong evidence is now available that it also damages the economy and, thereby, prospects for development.

Given this background, the UN’s 2013 High Level Report, amongst others, concludes that the post-2015 development agenda needs to be driven by a number of big, transformational shifts, the first of which is to “leave no one behind.” It emphasizes that “the new agenda must tackle the causes of poverty, exclusion, and inequality” in the context of a proposed set of 11 post-2015 SDGs (Figure 1.3).

Among the proposed new SDGs, most if not all can be enabled or strongly supported by ICT, for example, good governance and effective institutions underpinned by freedom of speech, civic participation, and anticorruption measures, health, education, jobs, resource management, and, not least, ending poverty. In addition, the High Level Report also states “we also call for a data revolution for sustainable development, with a new international initiative to improve the quality of statistics and information available to citizens. We should actively take advantage of new technology, crowd sourcing, and improved connectivity to empower people with information on the progress towards the targets.”⁹

1.2 ICT for Sustainable Development

There is strong and burgeoning evidence of the positive impact of ICT on sustainable development. According to the World Bank, as the leading global institution

investing heavily in ICT for development, this technology is no longer a luxury for developing countries.¹⁰ In fact, many ICT innovations are emerging from developing countries. They are creating new ways of communicating, doing business, and delivering services. Through extending access to ICT and encouraging the use of ICT, the World Bank aims to stimulate sustainable economic growth, improve service delivery, and promote good governance and social accountability, according to its infoDev website.¹¹

In a 2012 report, the World Bank suggested a number of so-called pillars by which ICT positively impacts development:¹²

- Transform pillar: Making development more open and accountable and improving service delivery, for example, through mobile and social networks and by governments using ICT to transform public service delivery across sectors (health, education, social protection, justice, agriculture, water, energy, and transport) both central and local.
- Innovate pillar: Developing competitive IT-based service industries and fostering ICT innovation across the economy, for example, through government action as well as by incentivizing and providing tools for entrepreneurs.
- Connect pillar: Scaling up affordable access to broadband, given that this is a key driver of national competitiveness and economic growth, supported, for example, through appropriate broadband policies and selective public financing.

Taking specific examples, the World Bank also has demonstrated the real impact of ICT on development, for example, in Africa. The eTransform Africa report shows that ICT innovations are delivering home-grown solutions in Africa, transforming businesses and driving entrepreneurship and economic growth.¹³ For example, with some 650 million subscribers, Africa's mobile phone market has eclipsed that of the European Union (EU) or the United States (Figure 1.4).

At the same time as the mobile revolution, in the five years previous to 2010 Internet bandwidth grew 20-fold as hundreds of thousands of kilometers of new cables were laid across the continent to serve an increasing number of its 1 billion citizens. Much of Africa is finally getting high-speed Internet. Two new underwater cables running down the west coast of Africa were inaugurated in 2013, and the expectation is that they will soon have the potential to replicate the success that some of Africa's east coast countries, like Kenya, have already shown in benefitting from higher speed Internet. For example, a study on the use of mobile devices in Kenya found that 25 percent of users could get more work and earn money because they were more "reachable."¹⁴

According to the eTransform Africa report, easier access via mobile and broadband "is quickly changing lives, driving entrepreneurship fuelled in part by collaborative technology hubs, and delivering innovation and home-grown solutions for Africa." The report focuses on eight key areas: agriculture, climate change, education, financial services, government, health, ICT competitiveness, and trade

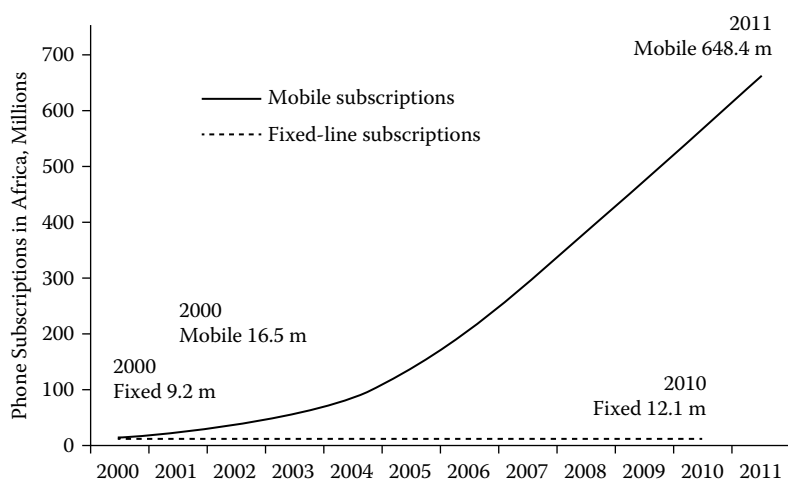


Figure 1.4 Africa's mobile revolution. (From the World Bank, <http://www.eTransformAfrica.org>)

facilitation and regional integration, and emphasizes the need to build a competitive ICT industry to promote innovation, job creation, and boost the export potential of African companies. The report highlights how countries, such as Kenya and Senegal, are implementing ICT-enabled trade facilitation initiatives and outlines the key role that Africa's regional economic communities can play in supporting greater regional integration for boosting economic growth and reducing costs. Part of this is the flowering of technology hubs across Africa, such as iHub and NaiLab in Kenya, Hive CoLab and AppLab in Uganda, Activspaces in Cameroon, BantaLabs in Senegal, Kinu in Tanzania, or infoDev's mLabs in Kenya and South Africa. These hubs are creating new spaces for collaboration, innovation, training, applications and content development, and for preincubation of African firms. "Africa is rapidly becoming an ICT leader. Innovations that began in Africa, such as dual SIM card mobile phones, or using mobile phones for remittance payments, are now spreading across the continent and beyond," says Tim Kelly, lead ICT policy specialist at the World Bank and an author of the report. "The challenge going forward is to ensure that ICT innovations benefit all Africans, including the poor and vulnerable, and those living in remote areas," he adds.

The World Bank Institute is also supporting the Information and Communication Technologies for governance (ICT4Gov) network dedicated to the idea that increased civic participation can lead to better governance.¹⁵ For example, if citizens can provide feedback to government about service delivery using the increasingly ubiquitous mobile channel, even in places with little infrastructure, and even rate the quality of specific programs, then government will have more information to prioritize services and should be more accountable to citizens. A prominent

example of this approach is participatory decision making and budgeting, processes that allow citizens to discuss and vote on how some parts of a government's budget should be used. The archetypal example at Porto Alegre in Brazil is recognized internationally as a groundbreaking initiative at the local level where the state government has engaged over 1 million residents in its multichannel (online and offline) participatory decision making.¹⁶ There are also examples of participatory decision making using mobile technology in Cameroon and in South Kivu in the Democratic Republic of the Congo, a country known more for conflict than innovative governance.¹⁷ In the latter example, communities were given the chance to voice their development needs, and the government has responded. Apparently, tax collection rates in South Kivu have gone up as people have come to believe that their government can actually deliver valuable services, and this may demonstrate one way to increase tax collection in developing countries, where such rates are notably low.

An example outside Africa comes from urban India that uses mobile technology to track how citizens experience water service delivery.¹⁸ It collects and analyzes citizen feedback using innovative mobile applications, thereby providing a “reality check” on service levels from the citizens’ standpoint. It gives city managers more granular data at the subcity level (ward/zone) that can facilitate improved monitoring and problem solving, and provides input into project planning processes for service providers. Most importantly, the project provides a suitable platform to engage citizens in performance monitoring processes and encourages them to demand better services. Given the large urban populations living in informal settlements in Indian cities, and the service inequities commonly prevalent in service provision, the project enables explicit tracking of service delivery in slum areas including public facilities, such as public stand posts and community toilets. The project was implemented in two cities of India during 2013 and is now being replicated in 20 more.

One challenge is the constant march of technology innovation and its deployment possibilities, and, although ICT is far from being a panacea and can have negative effects (see below), new possibilities for ICT for development (ICT4D) continue to appear. A number of trends in this area have recently been identified by a group of experts for 2014 and beyond to address the digital divide and maximize beneficial development impacts, according to *The Guardian*:¹⁹

- **Innovative business models are replacing ad-driven campaigns in emerging markets:** Given the lower incomes of consumers in emerging markets, traditional ad-driven businesses will falter. Creative business models will emerge. Success will require a deep understanding of “base of the pyramid” consumers and nontraditional partnerships will form between the private sector and those working to reach last mile consumers.²⁰ (David Edelstein, director of the Grameen Foundation Technology Center, Grameen Foundation.)

- **Improved quality of mobile apps:** There will be an increase in the quality and quantity of mobile applications being developed within Africa, to improve social outcomes. With technology innovation hubs springing up across the continent, technology communities within many African countries are gaining access to state-of-the-art facilities, events, mentorship, and training, making it more likely that they will devise impactful solutions. These hubs also provide the opportunity for collaboration with civil society and each other, which maximizes the chance of success for new projects. (Dr. Loren Treisman, executive, The Indigo Trust.)
- **The girl effect:** With more mobile phones than people on the planet in 2014, it may seem like there is no new frontier left for the market. However, the most visionary mobile operators will take on the final and most potent growth market of all: the 750 million girls and women around the world who don't have phones, but can afford one designed for them and at the right price. When those girls and women get the power of a phone in their hands, they will use it to change not only their lives, but those of their family, community, and nation. (Maria Eitel, president & CEO, Nike Foundation.)
- **ICT to improve government accountability:** We are encountering a dramatic increase in the planning and discussion of applications and advocacy for transparency that confronts basic questions of government accountability. Civic ICT project designers are becoming increasingly networked internationally (through communities, such as OpeningParliament.org), and are seeking collaboration around issues of political and state power. Early ICT successes that relied on service delivery and civic mapping are creating an appetite among developers and civil society organizations to confront power through public information, and practitioners are becoming more sophisticated in their approaches to these questions. (John Wonderlich, policy director, Sunlight Foundation.)
- **Rise of machine-to-machine (M2M) technology:** M2M technology is becoming increasingly important for ICT for development as it reaches critical mass. The biggest benefit will be its ability to address social and economic needs, fundamentally transforming every aspect of society and industry. Enabling complete control over every aspect of the supply chain, it will reduce inefficiencies. At the same time, M2M technology can help with the shift to a more sustainable economy, from reducing food wastage to dramatically curbing energy consumption. It will allow the world to do more with less. (Matthew Key, chief executive, Telefónica Digital.)
- **Harnessing mobile phone data:** As noted in *The Economist*, "... poverty used to be about scarcity, now it is about targeting and distribution."²¹ Given that fact, one of the most impactful trends in technology that will lead to global poverty alleviation will be governments and development partners using data collected from ubiquitous mobile phones to focus their

efforts to provide better services to the most vulnerable citizens. We will see improved food security and increased agricultural yields, rural education transformed, disease outbreaks detected, mothers sent vital information, and all of this done by sophisticated systems that take advantage of a basic mobile phone. (Chris Vein, chief innovation officer for global information and communications technology development, World Bank.)

1.3 The Global Digital Divide Challenge to Sustainable Development

Notwithstanding the great potential of ICT for sustainable development and the fact that many successes have already been achieved, there are significant global digital divide challenges that will continue to be serious barriers against successful development, especially in the countries that need it most. The most recent data and analysis come from the latest United Nations eGovernment Survey.²² “The digital divide is omnipresent. In its multifaceted form, it is present in developed and developing countries in the form of a global divide; between upper and lower income groups within a country; between men and women as a gender divide; between highly skilled and nonskilled individuals; and between affluent and disenfranchised and vulnerable populations within an area.”

There also is no doubt that the digital divide is closely linked to and often reflects other technology, socioeconomic, cultural, and political divides, as well as having an in-country geographic dimension between, for example, urban and rural areas or between core economic centers and remote locations.²³ The UN survey concludes: “... as such the digital divide in one form or another affects the majority of the populations of the world.”

Some of the major digital divides highlighted by the United Nations include national differences in the use of the Internet as shown in Figure 1.5. Despite the progress noted above even in some of the world’s least developed countries, the past 10 years have seen the leading countries increase Internet use at a steeper gradient than most others. There also has been a bifurcation within the least connected group of countries since 2000 resulting in a number of largely so-called emerging economies pulling away from the least developed nations, which thereby risk falling even further behind.

This pattern is reinforced by data on global functional digital literacy, using households with a computer as a surrogate measure, as shown in Figure 1.6. Again, Africa is lagging and also growing at a less steep gradient than most other global regions.

Using data from the International Telecommunication Union (ITU), Figure 1.7 illustrates a significant gender gap where there is a 16 percent difference in online access between men and women in the developing world compared with only a

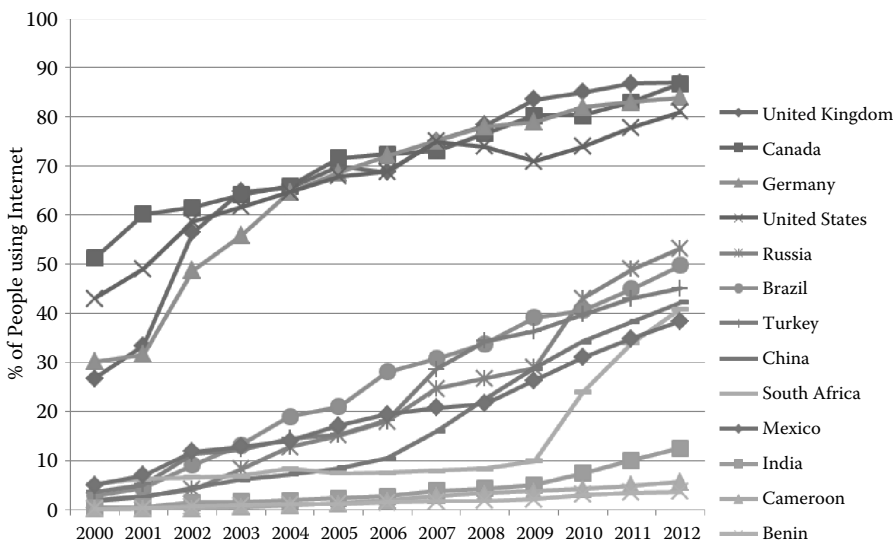


Figure 1.5 Global digital divide. (From the ITU World Telecommunication/ICT Indicators database: <http://www.itu.int/en/ITU-D/Statistics/Pages/publications/mis2013.aspx>).

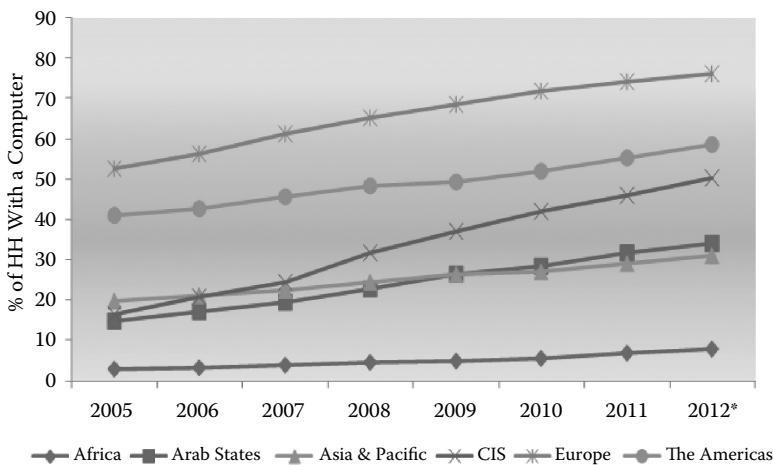


Figure 1.6 Global functional digital literacy. (From the ITU World Telecommunication/ICT Indicators database: <http://www.itu.int/en/ITU-D/Statistics/Pages/publications/mis2013.aspx>.²⁵)

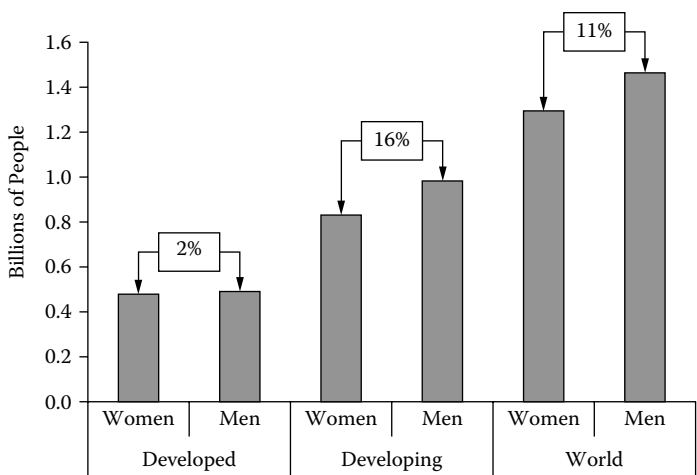


Figure 1.7 Online gender differences. (From ITU.²⁷)

2 percent gap in developed countries. This is largely due to gender differences in terms of education, access to resources, income levels, and social attitudes. It also likely reflects lack of content relevant to women’s needs. According to the United Nations, this ultimately leads to poorer life chances and opportunities for the social and economic empowerment of women, and has potential implications for the post-2015 development agenda where gender issues are being highlighted.²⁶ Empowering women, especially in poorer countries, has been demonstrated to be a powerful tool for development purposes.

Other data from the United Nations 2014 report shows a very strong correlation between national income per capita and the provision of services for vulnerable groups (Figure 1.8). This highlights a difference in focus between groups of countries in using ICT to support vulnerable groups, and to some extent reflects the recognition of the needs of such groups and the ability to be able to prioritize resources to address them.

Also important are factors such as the cost and quality of ICT connection and related services available to users. Using fixed broadband prices as an example, Figure 1.9 shows that, despite the huge drop in ICT prices in developing countries since 2008, there remains a large disparity with the developed world. Almost one-third of average incomes are needed to subscribe to fixed broadband in the former compared to much less than 2 percent in the latter, signifying that much progress in addressing the affordability issue is still needed.

Comparable data on the availability and use of ICT within developing countries is difficult to find. However, relevant 2012 data from the United States that, because of its relatively high levels of income and socioeconomic inequalities, illustrates the likely digital divide challenges seen more widely, show that:²⁹

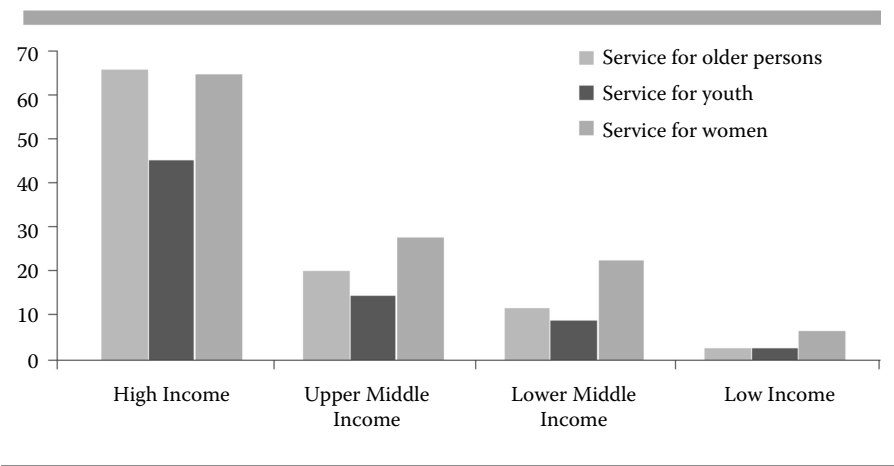


Figure 1.8 Online services for the vulnerable by country income. (From the United Nations. *e-Government survey 2014–e-Government for the future we want*. (2014). With permission.)

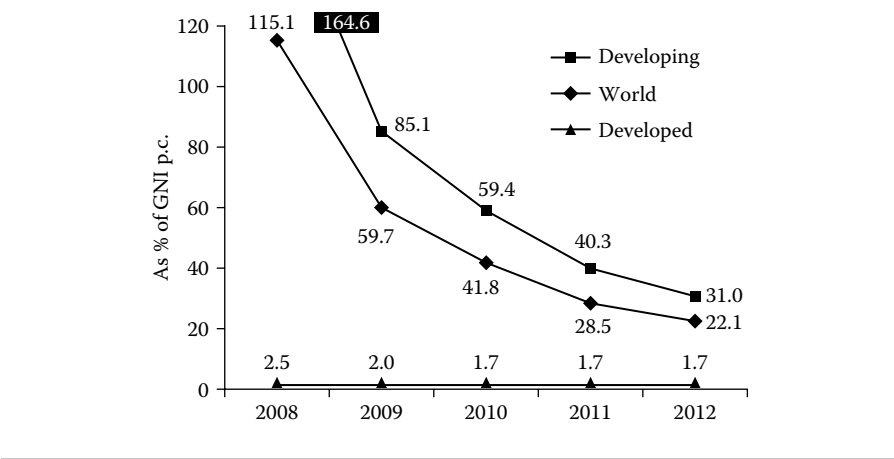


Figure 1.9 Fixed broadband prices as a percentage of gross national income (GNI) per capita. (From ITU.²⁸)

- 87 percent of households in the United States still lack high-speed Internet access.
- Almost half of the poorest households in the United States do not own a computer.
- Only 4 percent of the richest households in the United States do not own a computer.

- Minorities in the United States have significantly lower rates of Internet access than whites.
- Rural households are two times more likely to have dial-up Internet than urban households.

Finally, smartphone compared with “dumb” phone penetration 2011 data can perhaps be used as a surrogate for ICT service quality. Although Figure 1.4 dramatically shows Africa’s mobile phone revolution, data from the Vision Mobile website (<http://thenextweb.com/mobile/2011/11/29/report-smartphones-account-for-just-27-of-all-mobile-phones-worldwide/#!A80Ed>) puts this into perspective by showing that, despite this remarkable growth, well over 80 percent of mobile sales in 2011 consisted of feature or “dumb” phones rather than smartphones, a long way behind the main developed countries in North America and Europe. This, of course, has a lot to do with price, but also illustrates developing countries’ reduced access to sophisticated services and more advanced features and usage opportunities, including to smartphone apps.

The evidence presented above clearly highlights the fact that the least developed countries, despite the promise and real impact of ICT to date, still lag considerably in terms of usage, the digital literacy necessary to exploit that usage, gender differences, the focus they have so far been able to give to using ICT to support vulnerable groups, as well as price and service quality constraints. Moreover, there is little evidence that they are catching up in absolute terms with the more developed countries, although in relative terms their growth may sometimes be stronger given they are starting from a low base. It is probably safe to argue that the digital divide is deepest between developed and developing nations, and given the direct impact of ICT on development exemplified in this section, this raises serious issues for the post-2015 development agenda.

1.4 The Five Levels of the Digital Divide

From 2004 to 2009, the Internet alone contributed on average 21 percent to gross domestic product (GDP) growth in mature economies.³¹ However, this potential will not be realized in the least developed countries unless access to and effective use of the Internet can become widespread, and this means mitigating as far as possible the drag effects of the global digital divide described above. In addressing this issue, it is important to recognize more systematically the different types of the digital divide and how these are related.

In 2006, the author recognized four levels of ICT usage and exploitation, whilst in 2012 he added a fifth level related to the active participation by users in developing ICT products, services, and content.³² Each level cumulatively increases ICT’s

importance for development purposes and, thereby, is also subject to potentially greater digital divide constraints.³³

1. Access to ICT, such as Internet, broadband, computers, mobile devices, relevant online services including social media, ICT content, etc. This is a supply side issue, so reflects the level of development of the country, government policy, and private investment in ICT infrastructure and services, and also includes the cost and quality of ICT.
2. Socioeconomic characteristics of the user, i.e., education, occupation, labor market status and income, plus demographics like gender and age.
3. Skills, motivation, opportunities, and needs of the user if he/she is to use available ICT products and services.
4. Beneficial use of ICT, i.e., whether and how the supplied ICT products, services, and content are appropriately used to provide benefits for the user.
5. Participation and co-creation of ICT, i.e., whether and how the user is actively engaged in contributing to or developing ICT products, services, and content, for example, using Web 2.0 tools that typically “have an ‘architecture of participation’ that encourages users to add value to the application as they use it; for example, using social media applications.”³⁴

Levels 2 to 5 basically represent demand side issues, and, like level 1, are subject to intervention initiatives. Figure 1.10 illustrates the cumulative nature of these levels, each one typically building on the level before, and, through the size of the oval, emphasizes that each level potentially has progressively greater development impact.

Unpicking each of the above levels will throw some light on how the digital divide can be mitigated and thereby achieve greater development outcomes. In this context, some European experience also is drawn upon given the relatively

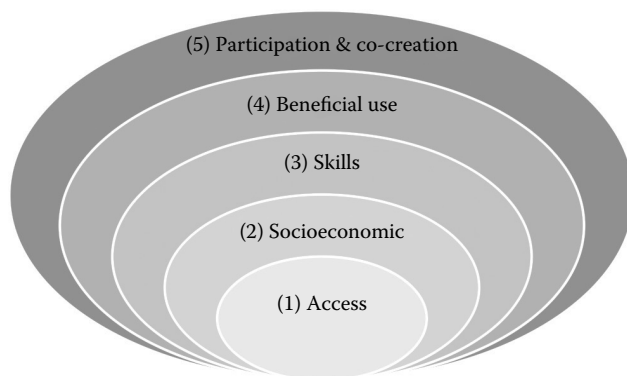


Figure 1.10 Levels of ICT usage and exploitation. (From Millard, 2006.³⁵)

successful efforts in that continent to increase e-Inclusion since the Lisbon Strategy in 2000.³⁶

In terms of Level 1 access to ICT, the author showed that the two most important determinants of ICT use tend to be related to technology availability and user skills, and these are independently somewhat more important than the socioeconomic characteristics of the user.³⁷ This observation can provide a strong basis for policy design. Such nonsocioeconomic factors are, in principle, easier to tackle through policy intervention, at least over a relatively short time horizon. Thus, policies related to ICT supply in a country and individual skills can typically be designed and implemented over the short to medium term, whilst socioeconomic characteristics, such as educational level, occupation, income, and labor market status typically require much longer time scales and cooperation with a larger number of stakeholders, although both types of factors are important.

Level 2 socioeconomic characteristics, although largely only amenable to long-term policy interventions, are nevertheless important. In 2012, the author, using the 2006 data, showed that ICT users compared to individuals not using ICT are significantly more likely to:³⁸

- be in employment
- be well educated
- have medium to high income
- be aged 25 to 34
- be male

These characteristics in themselves demonstrate the digital divide that tends to permeate all ICT-related usage, as also documented, for example, by the United Nations and Pew, an American research institution.³⁹ Further, looking at some of these individual characteristics in Europe, income emerges as the most important factor for using ICT, assuming it is available, whilst educational level is the most important for beneficial use and the intensity of use. This is a general conclusion also reached by the United Nations on a global scale.⁴⁰ According to a study quoted by the United Nations, the probability of an individual using the Internet every day increases by 2.4 times in Europe and by 3.6 times in South Korea if he/she has a university degree or above.

At Level 3, user skills, as mentioned above, are, alongside technology availability, the most important determinant of ICT use. For example, user skills can be learnt and developed relatively quickly given motivation, opportunity, and technology availability, and, as such, are only weakly correlated to socioeconomic characteristics.⁴¹ The rapid take up and beneficial use of mobile phones in most countries around the world, regardless of such characteristics, tends to exemplify this.

An additional dimension of ICT skills is that there is strong evidence that, if an individual does not him/herself have the requisite skills nor indeed access, they might still benefit through an intermediary who uses ICT on their behalf. For

example, intermediaries can be family members, friends, neighbors, the community, as well as more formal organizations, like NGOs or telecenters.

It was accepted in Europe in the mid to late 2000s that, given that still 20 to 30 percent of people would not be online at least for the next 10 years, that they could still benefit from ICT through such strategies, which also might include better use of ICT in back offices of governments and companies in order to better target services. In other words, not everybody needs to use ICT themselves straight-away to get the benefits of it, though, of course, there is a need to move toward that in the medium-to-longer term. Indeed, European data from 2006 showed that, in relation to e-government, only 53 percent of users use ICT for their own purpose, 51 percent as part of their job, and 42 percent on behalf of family or friends, the latter thus being termed “social intermediaries.”⁴²

Moreover, each social intermediary on average assists 2.6 other individuals who are not themselves direct ICT users, thereby dramatically extending the actual impact of ICT. Interestingly, the profile of social intermediaries also differs from that of ICT users generally who tend to be younger and/or in employment, in that they tend to be older and perhaps retired, often unemployed and living in a country with poor or expensive ICT availability. This seems to be because this group as a whole is generally less ICT literate, but that the small subset of them that are ICT literate are better able to relate to their peers and assist in ICT use.

The profile of individuals receiving assistance from social intermediaries also strongly mirrors that of non-ICT users generally, i.e., having low e-skills and e-attitudes, unemployed or in unskilled occupations, lower income and educational levels, in higher age groups including retired, and also living in countries with undeveloped ICT. Overall, it is clear that social intermediaries considerably extend the benefits of ICT to individuals who otherwise are not being reached.⁴³

Level 4 is where ICT use starts to have developmental impacts. ICT is not a magic bullet. It is not the technology itself that provides benefits nor the user characteristics or skills, but if these are brought together and used in the right contexts it becomes a powerful tool for achieving developmental goals, as outlined in the earlier section. At Level 4, impacts are made through the beneficial use of ICT; simply having access to ICT and the skills and resources to use it, does not in itself guarantee benefits. In other words, in a developmental context, is ICT being successfully used to improve the quality of life, provide jobs and income, better services, better information, etc.?

The beneficial impacts of ICT typically require new mindsets, the ability to act innovatively, to create new business and financial models, etc., within a conducive framework of regulation, incentives, and open markets that allow local innovators to earn money, perhaps through developing micropayment reward systems as in Kenya. In particular, there is a need to think about how these contextual conditions will impact beneficial outcomes. It is often important as well to include a broad range of stakeholders, not only from government, but also from the ecosystem of commercial companies and especially small- and medium-sized enterprises (SMEs),

civil society organizations, hacker communities, and interest groups, where there is huge potential for generating innovations using ICT.

Building on Levels 1, 2, and 3 to achieve impacts at Level 4 is the critical transition, not traditionally addressed by digital divide analyses. This shift has been more or less successfully achieved in Europe by political priority, adequate funding, and appropriate frameworks both at the EU as well as Member State levels.⁴⁴ This has been documented, for example, by the author in the context of e-government who showed the decisive shift over just three years between 2007 and 2009 between a preoccupation with access initiatives, to first an emphasis on skills training and then to a focus on beneficial service use for socioeconomic impact.⁴⁵ This resulted not in the neglect of access initiatives, but in a synergistic balance between all three aspects, as illustrated in Figure 1.11.

Level 5 in terms of participation and co-creation is an important step up from Level 4. It focuses on the proactive contribution by users to ICT products, services, and content, rather than their more passive use at Level 4. This can be, for example, in the form of adding/editing content, developing apps/widgets and even programming, and co-creating or creating new or enhanced products and services. This is very much a Web 2.0 phenomenon and one which builds on rapidly emerging technologies to develop innovation opportunities, such as mobile; social media and networks replacing other forms of web interaction; cloud computing and the advantages it can bring of agility, scalability, cost effectiveness, and security; big

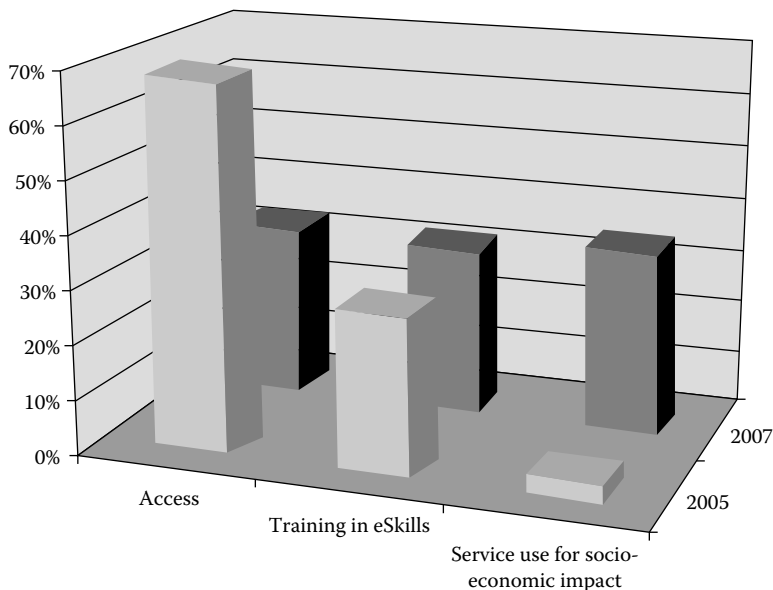


Figure 1.11 The shifting focus of inclusive e-government activities in Europe, 2005–2007. (From Millard, 2012.⁴⁶)

data, data mining, and analytics, and the potential this has for smarter products, services, and governance; as well as the growing need for cyber security to address the rapid increase in threats to identity and cybercrime.

Reaching Level 5 is where the greatest development “bang” for the proverbial “buck” is likely to be found. Of the many digital divide impediments described, most examples are from developed countries and the emerging economies. However, there also are outstanding instances from the developing world that, for example, capture citizen experiences through crowdsourcing and social media analytics techniques, such as sentiment analysis, opinion, and data mining. High impact initiatives include the low-cost, video-based, traffic congestion monitoring system using phones as sensors in Kampala in Uganda. There also are very successful “stop stock out” campaigns for pharmaceuticals where retailers and/or customers and other actors can, through crowdsourcing, provide data showing when a pharmacy or medical store temporarily has no medicine on the shelf, preferably in advance, in order to inform the supply chain when this is likely to happen. Access to this data by patients through mobile or a website also can prevent unnecessary journeys and point them to alternative sources in real time as well as providing enhanced transparency. Some current examples are in Kenya and Uganda.

In an African context, Kenya is often the leading example given that many of its home-grown ICT innovations are world beaters being used or copied globally. An early example is MPESA, the mobile money app and service enabling for the first time the vast majority of the population without a traditional bank account to transfer money by ordinary mobile phone both easily and safely. MPESA also acts as a microfinancing service for Safaricom and Vodacom, the largest mobile network operators in Kenya and Tanzania. As currently the most developed mobile payment system in the world, MPESA allows users with a national ID card or passport to deposit, withdraw, and transfer money easily with a mobile device. It is an outstanding example of partnerships between the nonprofit and profit sectors. Kenya has also developed many world-beating crowdsourcing applications like Ushahidi as a tool to easily crowdsource information using multiple channels, including SMS, email, Twitter, and the web, and is now being used in many countries globally. Social media analytics also have been slow to take off in the developing world, but examples are now appearing, such as the citizen sensor data mining and social media analytics initiative in Hyderabad, India.

Social media tools and analytics are being used and are altering the political process globally through enabling multisource, real-time coordination, and monitoring in civil society. In Brazil, Rio+ (<http://riomais.benfeitoria.com/>) is a platform where any citizen can create a project for Rio de Janeiro, to any scope provided it will improve the city. Presently, it has a huge range of ideas listed, from mobile apps to tunnels connecting areas of the city. Rio+ is easy to use, with projects split into categories and not too many details required for each listing. Just enter the idea and go! Once listed, *Benfeitoria*, along with partner organizations, will initiate a feasibility study, selecting the best ideas and identify resources and partners needed

to make it happen. The remaining projects then go to the jury (i.e., they will be voted for online and by the city of Rio) where people can decide on the best design in each category. Once the winners are chosen, the city is responsible for realizing each of the projects, after which they will be monitored so that the impact can be measured, and in the future some may become public policy and be expanded.⁴⁷

Moving back to Kenya, Kibera in Nairobi is one of the largest slums in Africa. Independent of the city authorities, a team of social activists started to develop the Map Kibera community information project in October 2009 as an interactive grassroots map. This appears to be the first ever comprehensive multifunctional interactive community map (ICM), and it took place in a developing country, perhaps because acute need drives the people involved to innovate in entirely new ways. Although many civil and international development organizations had been present and active in Kibera for many years, it had largely remained a blank spot on the map. This lack of openly available geospatial data and other public sources of information about the slum led a group of social activists to create Map Kibera. The underlying idea is that without basic geospatial knowledge, it is impossible to conduct an informed discussion on how life conditions in Kibera can be improved. The Map Kibera team found that the provision of such information would rapidly facilitate better coordination, planning, and advocacy efforts within the community, and between the community and the government.

In the first stage of its operation, the Map Kibera team recruited volunteer community mappers who reside in Kibera to map “points of interest” in the slum, using simple GPS devices and uploading the collected data to OpenStreetMap (OSM). The mappers collected data about the location of clinics, toilets, water points, places of worship, and more. On top of this basic geospatial information, the mappers added a “storytelling” layer, capturing personal accounts, stories, and news of Kibera residents. As part of the second stage, Map Kibera deepened its coverage of life conditions in the community, and collected more contextualized information in the areas of health, security, education, and water/sanitation. At this stage the city authorities saw the importance of what was happening and started to use the map itself and to cooperate with further enhancement. The Map Kibera team also introduced the Voice of Kibera website, an online news and information-sharing platform for the Kibera community.⁴⁸

1.5 Implications and Recommendations

On top of the specific relationships between ICT use and access, socioeconomics, skills and benefits outlined above, there are also important interrelationships between them. For example, the higher the level of Internet and broadband coverage, the higher Internet use becomes even for lower educated and skilled individuals. In addition, analysis has shown that the likelihood of household Internet take-up increases the higher the educational attainment level of individual occupants, even

if Internet coverage and GNI (gross national income) per capita in a given area is relatively low. It is also the case that economically more developed regions have on average higher ICT take-up than less well-endowed regions, regardless of other characters.⁴⁹ All this implies the need for comprehensive and coordinated, rather than piecemeal and separately focused policies.

There is a strong trend in Europe to move away from specially designed ICT purely for specific typically disadvantaged groups, except where absolutely necessary, toward “inclusion by design.”⁵⁰ This means that all ICT is designed so anyone can personalize it for their own very specific purposes, given that literally everyone has some “special needs” at any of the digital divide levels, at least at some point in their life. This has two main advantages. First, it pushes ICT toward personalization, which, because this basically means only presenting content and functions that the individual user actually needs, leads directly to user friendliness with concomitant higher usage and satisfaction. Second, it broadens the market making it much more attractive to invest in R&D, rollout, and marketing than it does in comparison with a myriad niche products and services. This approach also recognizes that any digital divide disadvantage is multifaceted and that everybody is “disabled” in some way.

Thus, for example, all services should be designed to be easy and delightful to use, with plain short text, help features, etc., and users should be able, for example, to switch on or off such things as font enlargement, color adjustment, additional explanatory text, screen readers, etc. In other words, we should not design separate touch points in any service for disadvantaged groups, however defined, as everything should be embedded for personalization by the user whoever they are, by the intermediary, or by the provider in consultation with the user.

Experiences in developed countries suggest that strong economic growth helps to both maximize ICT use and the beneficial impacts it has. Part of this is to provide the right enabling conditions for open markets to develop ICT products, services, and content that both increase the variety and quality of home-grown competition, but also help to decrease the costs of technical infrastructure and bandwidth. Many developing country markets are relatively ripe for growth and should prove very attractive both for foreign and domestic providers, thereby helping to realize the “fortune at the bottom of the pyramid.”⁵¹

At the political level, it is essential to promote awareness of the benefits of ICT and the importance of tackling the digital divide blockers that mitigate high impacts. Favorable conditions for so doing include a proactive national policy emphasizing broadband infrastructure rollout, as well as adequate funding for more general information society initiatives including the promotion of digital literacy. However, although ensuring Internet, mobile, and broadband infrastructure availability is a necessity, it is not a sufficient condition for higher take-up and beneficial use of ICT. Nor can it be concluded that lack of monetary, physical factors, and good socioeconomic conditions are the only barriers to Internet take-up and use. Creating appropriate incentives, awareness, reward systems, and provider and user

ecosystems, with high levels of cooperation and co-creation in addition to competition, as outlined in Levels 4 and 5 in Section 1.4, are also required.

However, and as also mentioned above, ICT is not a magic bullet, and although it clearly delivers growth, jobs, better services, and more transparency if used well; how this takes place can be highly context dependent. According to Bevir, “... it is the mix that matters,” i.e., the Indigenous mix of policy and program approaches related to a country’s unique level of development, as well as to socioeconomic context and history, are precursors to good use of ICT for development.⁵² And, ICT also can be badly or misused and damage development goals if, for example, governments use it to control and centralize power, if developing countries come too much under the sway of large multinational ICT corporations to purchase solutions they may not need or are not appropriate for them.

ICT for development works best when the above mentioned conditions are in place, when technology is not allowed to simply “blaze a trail” luring policy and procedure to try to play catch-up for its own sake. In this sense, technology’s role in fighting poverty is still ripe for discussion. However, many observers do sense “a better understanding and appreciation of appropriate technology in the ICT4D field. People are beginning to make the right noises—local ownership of technologies and tools, local content, and projects where end users drive the process among them” is the way forward.⁵³

At the same time and despite many exceptions, there remain many countries, localities, and people in danger of being left behind. As is the case with all forms of exclusion, the digital divide not only wastes the lives of those on the wrong side of it (the individual perspective), it also wastes assets and resources that can enrich us all rather than being a drag on us all (the societal perspective).

According to the eTransform Africa report, and drawing on the discussion above, experiences in the use of ICT for development offer many useful lessons for policy makers to overcome the global digital divide, for example:⁵⁴

- The deployment of ICT and the development of applications must be rooted in the realities of local circumstance and diversity.
- The private sector will need to drive investment, but this may not be enough to ensure competitive markets or to reach rural areas. Public private partnerships (PPPs), such as the Burundi Backbone System consortium, can help.
- Governments have an important part to play in creating the enabling environment in which innovations and investments can flourish while serving as a lead client in adopting new innovations and technologies.
- The effective use of ICT will require cross-sectional collaboration and a multistakeholder approach, based on open data and open innovation.
- Most innovative ICT applications in Africa, as in other developing country contexts, have been the result of pilot programs. Now is the time for rigorous evaluation, replication, and scaling up of best practices.

This chapter has reviewed the undoubtedly large benefits that well-used ICT can bring to development. It also has shown that there are significant challenges involved in doing this, not least of which is a digital divide in which individuals, groups, organizations, sectors, or localities are more or less excluded from these benefits through no fault of their own. These challenges have been analyzed using the latest data and findings from both developing and developed countries. Designs for the post-2015 development agenda, being put together under the auspices of the United Nations, but to which many actors are contributing, are taking these issues, challenges, and opportunities very seriously. Well-used ICT is transforming the way our societies and economies are structured and function. Everybody needs to benefit and be included, or we will all be the poorer for it.

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