



World Telecommunication/ICT Development Report 2010

MONITORING THE WSIS TARGETS

A mid-term review



World Summit Geneva 2003
Tunis 2005
on the Information Society
Turning targets into action



International Telecommunication Union



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Foreword

The ninth edition of the World Telecommunication/ICT Development Report is being published at the half-way point between the World Summit on the Information Society (WSIS) in 2005 and the target date for the Millennium Development Goals (MDGs) in 2015. This gives us a unique opportunity for a mid-term review — so this report focuses on the WSIS targets, and shows us that while we have achieved much in some areas we still have far to go in others.

This is of critical importance in an era where Information and Communication Technologies (ICTs) underpin almost every single activity undertaken in the modern world, and affect everyone on the planet — even those who do not themselves have first-hand access to ICTs. Good examples include food distribution, power networks, water supplies or mass transportation, all of which are controlled and managed today by ICT networks and applications.

As this report shows, tremendous progress has been made over the past decade, with close to five billion mobile cellular subscriptions worldwide at the end of 2010, and almost two billion people throughout the world now having access to the Internet.

But there is still a vast amount of work to be done. In particular, we need to bring affordable fast broadband access within reach of the great majority of the world's people — noting today that three quarters of the world's inhabitants still have no access to the Internet at all. So what we need is to see a rapid and equitable spread of broadband networks matching the extraordinary growth of mobile cellular networks over the past decade.

The key — as this report acknowledges — will be in recognizing that broadband networks deliver benefits right across society, and can quickly pay for themselves in terms of the savings gained through the more efficient provision of essential services such as healthcare, education, power, water, transportation and e-government.

Personally I have tremendous faith that the public and private sectors will work together — as they did in the creation of mobile cellular networks — to roll out the necessary infrastructure and create the necessary services to bring broadband to all the world's people. For this to happen, we also need to recognize, as this report explains, the vital importance of making sure that people are well-equipped to take advantage of all this new technology (through human capacity building) and that enough attention is paid to the need to create and share far more local-language content across the Internet. And we need to continue to monitor and attain the WSIS targets by 2015, in line with the MDGs.

I am absolutely certain that the next decade will be the decade of broadband. This is why ITU is working with UNESCO in establishing the Broadband Commission for Digital Development. The commission will be chaired by President Paul Kagame of Rwanda and Carlos Slim Helú, Honorary Lifetime Chairman of *Grupo Carso*, with Irina Bokova, Director-General of UNESCO, and myself, as vice-chairs. The Broadband Commission has the full support of the UN Secretary-General, Ban Ki-moon, and will report to the 2010 MDG Summit in September.

The commission complements ITU's own "Build on Broadband" campaign, which is designed to increase awareness of the vital role broadband will play in the 21st century in every country in the world. I therefore expect broadband to be high on the agenda at the World Telecommunication Development Conference 2010, which is taking place in Hyderabad, India, from 24 May to 4 June, and I look forward to seeing you there and to sharing in the debates which will shape global ICT development over the next four years — and beyond.



Dr Hamadoun I. Touré
Secretary-General
International Telecommunication Union

Preface

I am pleased to present the World Telecommunication/ICT Development Report (WTDR) 2010, which focuses on *Monitoring the WSIS targets*. This ninth edition of the WTDR, which contains a mid-term review of the achievements of the World Summit on the Information Society (WSIS), is a contribution to the World Telecommunication Development Conference (WTDC) to take place in Hyderabad, India, from 24 May to 4 June, 2010.

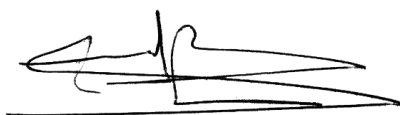
ITU has a long history of measuring developments in the area of telecommunications and ICTs, both in terms of infrastructure and — more recently — in terms of use. At the international level, the Union has taken on a lead role not only in measuring and analysing ICT trends, but also in identifying indicators and definitions. Together with other international and regional organizations, and within the framework of the *Partnership on Measuring ICT for Development*, we have also been working towards a set of internationally comparable and harmonized data. Through this report, ITU is reaffirming its leading role in measuring the information society.

The year 2010 marks the midpoint between the Tunis phase of WSIS (2005) and the deadline for achieving the ten targets that governments agreed upon at the Summit (2015). These targets range from connecting villages, schools, health centres, libraries and government agencies, to developing content, and providing ICT services to people. The main objective of the report is to provide policy-makers with a comprehensive assessment of what has been achieved so far, and what remains to be done. Besides highlighting actual progress and trends since WSIS, the report also proposes quantitative indicators to measure the ten WSIS targets. This is the first time a full-scale global monitoring process and assessment of the targets is being put in place.

The report highlights the major achievements that have been accomplished in connecting people via mobile technologies. Today, mobile cellular networks already cover close to 90 per cent of the world population, and we expect coverage to reach 100 per cent by 2015. We are also confident that by 2015 more than half of the world population will be using a mobile telephone. At the same time, the report shows that, in a number of areas, substantial efforts need to be made to achieve the targets. Too many schools in developing countries continue to be deprived of access to the Internet, and three-quarters of people in the world are not yet online. Only a very small proportion of the information hosted by libraries and archives has been digitized, and even less is available online. The report also points to the persistent broadband divide, which policy-makers need to tackle urgently. Whereas, by the end of 2009, most people in the developed countries enjoyed Internet access with a high-speed connection, broadband penetration rates in the developing world stood at a meagre 3.5 per cent.

The WTDR is the fruit of a joint effort by several international organizations, led by ITU, and includes contributions from UNESCO, WHO and UNDESA, as well as from representatives of civil society. This collaborative effort not only reflects the broad range of subjects covered by WSIS, but also underlines the cross-cutting nature of the information society, and the recognition that ICTs are truly a development enabler and hence of tremendous importance for any development debate.

I am convinced that this report will prove useful in evaluating progress on the WSIS outcomes and the development of the global information society. Its findings and recommendations will provide a valuable input to the debate at WTDC.



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Contents

Foreword	iii
Preface	v
Acknowledgements	vi
List of abbreviations	xv
Executive summary	xxi
Introduction	1
WSIS follow-up and implementation	2
WSIS monitoring and evaluation	3
Methodology for preparing the report	5
Ten targets, ten chapters	5
References	8
Target 1: Connect villages with ICTs and establish community access points	9
Introduction	9
Measuring Target 1 — Proposed indicators	10
Status of Target 1	13
Conclusions and recommendations	23
References	28
Target 2: Connect universities, colleges, secondary schools and primary schools with ICTs... 29	
Introduction	29
Measuring Target 2 — Proposed indicators	31
Status of Target 2	33
Conclusions and recommendations	40
References	44
Annex 2.1: ICTs in schools (ISCED levels 1-3), 2009	45
Target 3: Connect scientific and research centres with ICTs	47
Introduction	47
Measuring Target 3 — Proposed indicators	50
Status of the target	51
Conclusions and recommendations	60
References	63

Annex 3.1: List of national research and education networks (NRENs)	64
Annex 3.2: Extract from the TERENA Compendium 2009 questionnaire	67
Annex 3.3: Status of NRENs in Latin America, 2007	68

Target 4: Connect public libraries, cultural centres, museums, post offices and archives with ICTs..... 69

Introduction.....	69
Public libraries	70
Cultural centres	76
Museums	79
Post offices	86
Archives	89
Conclusions and recommendations	92
References.....	98

Target 5: Connect health centres and hospitals with ICTs 99

Introduction.....	99
Measuring Target 5 — Proposed indicators	101
Status of Target 5	104
Conclusions and recommendations	113
References.....	116
Annex 5.1: Breakdown of responding countries in the 2009 GOe global survey on e-health, by World Bank income group 1-4	117

Target 6: Connect all local and central government departments and establish websites and e-mail addresses 119

Introduction.....	119
Measuring Target 6 — Proposed indicators	121
Status of Target 6	122
Conclusions and recommendations	132
References.....	135

Target 7: Adapt all primary and secondary school curricula to meet the challenges of the information society, taking into account national circumstances 137

Introduction.....	137
Measuring Target 7 — Proposed indicators	139
Status of Target 7	142
Conclusions and recommendations	147
References.....	150
Annex 7.1: ICTs in education (ISCED levels 1-3).....	151

Target 8: Ensure that all of the world’s population have access to television and radio services	153
Introduction.....	153
Measuring Target 8 — Proposed indicators.....	154
Status of Target 8	157
Conclusions and recommendations	169
References.....	173
Target 9: Encourage the development of content and put in place technical conditions in order to facilitate the presence and use of all world languages on the Internet	175
Introduction.....	175
Measuring Target 9 — Proposed indicators.....	178
Status of Target 9	179
Conclusions and recommendations	186
References.....	192
Target 10: Ensure that more than half the world’s inhabitants have access to ICTs within their reach.....	193
Introduction	193
Measuring Target 10 — Proposed indicators.....	194
Status of Target 10	197
Conclusion and recommendations.....	206
References.....	210
Conclusions and the way forward.....	211
Monitoring progress: towards 2015.....	212
WSIS mid-term review table: Targets, action lines, proposed indicators and overall status	214
Annex table 1. List of countries that responded to the ITU questionnaire on WSIS targets...	217

Charts

1.1	Rural population covered by a mobile signal, 2000-2008, by region.....	14
1.2	Proportion of rural households with telephone by type, 2007-08	15
1.3	Proportion of rural households with only a fixed or only a mobile telephone, 2007-08.....	17
1.4	Proportion of rural and urban households with Internet access, 2007-08.....	18
1.5	Proportion of rural and urban households with broadband Internet access, 2007-08	19
1.6	Proportion of localities with public Internet access centres (PIACs), 2007-08	20
1.7	Proportion of rural Internet users who use the Internet at public access facilities, 2007-08.....	21
2.1	Proportion of schools with a television or radio used for educational purposes (for ISCED levels 1-3), 2008-09	34
2.2	Learner-to-computers ratio (for ISCED levels 1-3), 2008-09.....	36
2.3	Proportion of computers available by intended use (for ISCED levels 1-3), 2008-09	36
2.4	Proportion of schools with Internet access (for ISCED levels 1-3), 2008-09	39
2.5	Proportion of schools with broadband Internet access (for ISCED levels 1-3), 2008-09.....	39
3.1	Countries with a national research and education network (NREN), by region, 2010	49
3.2	Selected characteristics of NRENs in Europe, 2001-2008	54
4.1	Proportion of post offices providing public Internet access, selected countries, 2008	86
4.2	Availability of online postal services, 2008	87
4.3	Percentage of archives with access to the Internet and with a website, by country, 2009.....	90
5.1	Proportion of local healthcare facilities using paper, electronic and electronic plus transmissible patient information, by level of use, 2009	106
5.2	Proportion of local healthcare facilities using paper, electronic and electronic plus transmissible patient information, by level of use, by World Bank income group, 2009.....	107
5.3	Countries reporting at least one m-health initiative, by World Bank income group, 2009	111
5.4	Percentage of countries with a national telemedicine policy, by World Bank income group, 2009	111
5.5	Most important barriers to implementing m-health solutions, by World Bank income group	112
6.1	Government ministries and departments with a website, 2008	126
6.2	Selected e-government transactional services, 2008 and 2009	128
7.1	Proportion of ICT-qualified teachers in primary and secondary schools, 2008-09	144
7.2	Proportion of teachers who teach basic computer skills compared to the proportion of ICT-qualified teachers (in public primary and secondary schools), 2008.....	144
7.3	Proportion of primary and secondary school teachers trained to teach subject(s) using ICTs, (for ISCED levels 1-3), 2008-09.....	145
7.4	Proportion of (public and private) schools with Internet-assisted instruction (for ISCED levels 1-3), 2008-09	146
7.5	Proportion of schools with computer-assisted instruction (for ISCED levels 1-3), 2008-09	146
8.1	Proportion of households with a radio, 2007-08	158
8.2	Proportion of households with a TV, 2002-2009	159
8.3	Proportion of households with a TV, by region, 2009.....	159
8.4	Proportion of LDC households with a radio and a TV, 2007-08 or latest available year.....	160
8.5	Proportion of LDC households with a TV compared to GDP per capita (USD), 2008 (or latest available year) ..	161

8.6	Proportion of LDC households with electricity, compared to households with a TV, 2008 (or latest available year)	161
8.7	Gap between LDC households with electricity and households with television, %, latest available year	162
8.8	Households with cable TV, satellite TV, and IPTV, millions, world	163
9.1	Regional distribution of languages, 2009	180
9.2	Top ten languages on the Internet, 2009	182
9.3	Internet users and ccTLD registrations per 100 inhabitants, 2009*	186
10.1	Global ICT development, 1998-2009	195
10.2	Global mobile cellular subscriptions, 2000-2009	198
10.3	Global mobile cellular penetration, by region, 2009	198
10.4	Mobile cellular users versus mobile cellular subscriptions in Europe and countries where data are available, 2008	200
10.5	Global number of Internet users, 2000-2009	201
10.6	Internet user penetration by region, 2009	202
10.7	Internet users by gender	202
10.8	Proportion of households with Internet access, by region, 2008	204
10.9	Proportion of households with Internet access by level of development, 2008	204
10.10	Proportion of households with access to the Internet by type of access, 2008	205

Figures

2.1	Information needs at different levels of ICT penetration in educational systems	32
5.6	Barriers to implementing telemedicine solutions, by World Bank income group	112
8.1	Television coverage and percentage of households with electricity and television, South Africa, 2007	154
9.1	Key figures for languages on the Internet, 2010	181

Boxes

1	What are the WSIS targets?	2
2	The <i>Partnership on Measuring ICT for Development</i> and WSIS	4
3	ITU Survey on the WSIS targets	5
1.1	The spread of mobile telephony in rural areas: an example from Paraguay and Jordan	16
1.2	More broadband, please: Malaysia adapts universal service regulation	18
1.3	Connect and inform every Colombian	21
1.4	Public Internet access in Peru	22
1.5	More bandwidth for rural areas in East Africa	23
1.6	Grameenphone in Bangladesh: From (just) mobile to mobile broadband	23
2.1	The benefits of connecting educational institutions for learners and teachers	30
2.2	Setting targets: Examples from the Americas, Africa and Australia	32

2.3	Measuring progress — Case of Belarus	37
2.4	Electricity before broadband?.....	40
2.5	The Chilean model — Partnering to connect schools	41
2.6	Uruguay closes the digital gap	41
3.1	What is a national research and education network (NREN)?.....	49
3.2	Data collected by the Trans-European Research and Education Networking Association (TERENA)	51
3.3	GÉANT 2	59
3.4	A look to the future: the Worldwide LHC Computing Grid (WLCG) at CERN	60
4.1	Digital libraries	71
4.2	Examples of initiatives to connect libraries	76
4.3	Examples of initiatives to connect cultural centres	79
4.4	Virtual museum visits.....	85
4.5	Examples of initiatives to connect post offices	88
4.6	The importance of digital archives.....	91
5.1	M-health	101
5.2	HINARI (<i>Health InterNetwork Access to Research Initiative</i>) — When content drives connectivity	102
5.3	The Global Observatory for eHealth	105
5.4	Belize — an example of a model national e-health programme in a developing country setting	109
6.1	The benefits of e-government	120
6.2	The level of e-government services in the EU.....	129
6.3	Use of e-government services by citizens and businesses.....	130
7.1	The six Education for All (EFA) goals	138
7.2	Estonia’s tiger leap from prerequisites to action.....	139
7.3	The use of ICT in curricula — A review of selected comparative assessments.....	140
7.4	How is ICT-assisted instruction defined?	141
7.5	Integrating ICTs in the curricula — A priority in Jordan	143
8.1	Broadcasting and the Internet	155
8.2	Community radio	158
8.3	TV in .tv (Tuvalu)	160
8.4	More multichannel, more content, more demand: examples from South Asia	164
8.5	Pan-regional direct-to-home (DTH) systems targeted at developing regions	166
9.1	Understanding digital concepts	177
9.2	Requirements for the presence of languages on the Internet.....	178
9.3	Measuring the number of webpages by language.....	179
9.4	Active policies to boost content creation: The case of Catalan	186
10.1	Examples of non-voice mobile phone applications for development in Africa.....	196
10.2	Mobile success factors	199
10.3	Government support crucial for Internet uptake: examples from Morocco and Viet Nam	203

Tables

1.1	Indicators for measuring Target 1.....	10
1.2	Rural population covered by a mobile cellular signal, 2008	14
1.3	Population covered by a mobile signal in 2008 across the United Kingdom and nations	15
3.1	Public scientific and research centres with access to the Internet, 2009	52
3.2	NRENs, 2009.....	53
3.3	Types of institutions for which connection to the NREN is allowed (%), selected countries, 2008	55
3.4	Bandwidth of NRENs, Mbit/s, 2001-2008, and expected change for 2010.....	57
4.1	Public libraries with access to the Internet, by type of access, and with a website, by country, 2009	74
4.2	Percentage of public libraries offering Internet access, by region, 2007.....	75
4.3	Percentage of public libraries with Internet access for users, and websites, 2006 or latest, Latin America and the Caribbean.....	75
4.4	Cultural centres with Internet access, by country, by type of access, 2009	78
4.5	Museums with access to the Internet by type of connection, and with a website, selected countries, 2009	81
4.6	Museums with a website, European countries, latest year available.....	82
4.7	Selected museums with a website, Africa, 2007.....	83
4.8	Museums in selected countries in the Americas	83
4.9	Websites of some of the world's major museums.....	84
4.10	Digitization of archived information, 2009	90
5.1	Proposed indicators for monitoring Target 5.....	103
5.2	Prime sources of health and ICT-related data.....	104
5.3	Percentage of health institutions with access to the Internet, 2009	106
5.4	Foundation actions	108
5.5	Enabling actions for ICT for health	110
5.6	Preliminary WHO GOe survey results 2009	110
6.1	Percentage of government entities with Internet access, 2009	123
6.2	The use of ICT in government, New Zealand, 2008	124
6.3	Countries with government websites, 2003 and 2009	125
6.4	Government ministries connected to the national homepage, 2009.....	126
6.5	Online services related to citizen participation, 2009.....	128
8.1	Indicators (and definitions) to monitor access to TV and radio services	156
8.2	Mobile TV deployments, selected developing countries, status as of 2009	168
9.1	Distribution of languages by number of first-language speakers, 2009	180
9.2	Growth of social networking sites, by region, June 2007-June 2008.....	182
9.3	Production of webpages in French, by region and by country, 2007 (percentage of pages — productivity)	183
9.4	Production of webpages in other languages, by country, 2007 (percentage of pages — productivity).....	183
9.5	Twenty ccTLDs with the strongest average annual growth of registrations, 2005-2009.....	184
9.6	The twenty countries with the largest increase in ccTLD registrations per 100 inhabitants, 2005-2009	185

List of abbreviations

3G	Third-generation (mobile technology)
4G	Fourth-generation (mobile technology)
ADSL	Asymmetric digital subscriber line
ALICE	<i>America Latina Interconectada Con Europa</i>
AM	Amplitude modulation
APAN	Asia-Pacific Advanced Network
ARCEP	<i>Autorité de régulation des communications électroniques et des postes</i>
ARNES	Academic and Research Network of Slovenia
ATM	Automated teller machine
BDT	Bangladesh Taka (currency)
kLBHIS	Belize Health Information System
BioGRID	Biological General Repository for Interaction Datasets
BLSS	Bhutan Living Standard Survey
CAGR	Compound annual growth rate
CAI	Computer-assisted instruction
CAREN	Central Asian Research and Education Network
CASBAA	Cable & Satellite Broadcasting Association of Asia
CATV	Cable television
ccTLDs	Country code top-level domains
CD/DVD	Compact disc/Digital versatile (or video) disc
CDMA	Code Division Multiple Access
cdmaOne	Code Division Multiple Access One
CDMA2000 1X	Code Division Multiple Access 1 times Radio Transmission Technology
CDMA2000 1xEV-DO	(Evolution-Data Optimized) Code Division Multiple Access 1x Evolution-Data Optimized
CERN	European Organization for Nuclear Research
CERNET	China Education and Research Network
CIC	Community information centre
CIS	Commonwealth of Independent States
CLARA	<i>Cooperación Latino Americana de Redes Avanzadas</i>
COSINE	Co-operation for Open Systems Interconnection in Europe
CSTNET	China Science and Technology Network
CyNet	Cyprus' National Research and Education Network
DANTE	Delivery of Advanced Network Technology to Europe
DBCDE	Department of Broadband, Communications and the Digital Economy (Australia)
DHS	Demographic and Health Survey

DICE	DANTE-Internet2-CANARIE-Esnet
DTH	Direct-to-home
DTT	Digital terrestrial television
DVB-H	Digital video broadcasting — Handheld
DVD	Digital versatile (or video) disc
DVG-H	Digital video broadcast — Handheld
ECA	See UNECA
ECLAC	See UNECLAC
ECOSOC	United Nations Economic and Social Council
EFA	Education for All
EFTA	European Free Trade Association
EGMUS	European Group on Museum Statistics
EHR/EMR	Electronic health records/Electronic medical records
eLAC	Strategy for the Information Society in Latin America and the Caribbean
ERNET	Education and Research Network
ESCAP	See UNESCAP
ESCWA	See UNESCWA
ESnet	Energy Sciences Network
EU	European Union
FAIFE	Free Access to Information and Freedom of Expression
FCC	Federal Communications Commission
FM	Frequency modulation
FTTH	Fibre-to-the-home
FUNREDES	<i>Fundación Redes y Desarrollo</i>
Gbit/s	Gigabits per second
GDP	Gross domestic product
GOe	Global Observatory for eHealth
GPRS	General Packet Radio Service
GPS	Global Positioning System
GSM	Global System for Mobile Communications
gTLD	Generic top-level domains
HIMSS	Healthcare Information and Management Systems Society
HINARI	Health InterNetwork Access to Research Initiative
HIV/AIDS	Human immunodeficiency virus/Acquired immune deficiency syndrome
HSPA	High Speed Packet Access
IAI	Internet-assisted instruction
ICA	International Council on Archives
ICANN	Internet Corporation for Assigned Names and Numbers
ICC	Israeli Cultural Centre

ICCROM	International Centre for the Study of the Preservation and Restoration of Cultural Property
ICOM	International Council of Museums
ICT	Information and communication technology
ICTs	Information and communication technologies
ICT4D	ICT for development
ICT4E	ICT for education
iDEN	Integrated Digital Enhanced Network
IDN	Internationalized domain names
IDRC	International Development Research Centre
IFLA	International Federation of Library Associations
IGF	Internet Governance Forum
IMF	International Monetary Fund
INEI	<i>Instituto Nacional de Estadística e Informática</i>
INR	Indian Rupee (currency)
IP	Internet Protocol
IPTV	Internet Protocol television
IPv6	Internet Protocol version 6
IQD	Iraqi dinar (currency)
ISCED	UNESCO's International Standard Classification of Education
ISDB-T	Integrated services digital broadcasting — Terrestrial
ISP	Internet service provider
IT	Information technology
ITU	International Telecommunication Union
JPEG	Joint Photographic Experts Group
KES	Kenya shilling (currency)
LAN	Local area network
LHC	Large Hadron Collider
LDC	Least developed country
LKR	Sri Lanka rupee (currency)
LOP	Language Observatory Project
LW	Longwave
MAAYA	World Network for Linguistic Diversity
MAN	Metropolitan access network
Mbit/s	Megabits per second
MCIT	Ministry of Communication and Information Technology in Egypt
MCMC	Malaysian Communications and Multimedia Commission
MDGs	Millennium Development Goals
MMDS	Multichannel multipoint distribution service
MUR	Mauritius rupee (currency)

MVNO	Mobile virtual network operator
NALIS	National Library and Information System Authority
NASA	National Aeronautics and Space Administration
NEPAD	New Partnership for Africa's Development
NGN	Nigerian naira (currency)
NGO	Non-governmental organization
NLB	National Library Board
NREN	National research and education network
NSO	National statistical office
OECD	Organisation for Economic Co-operation and Development
Ofcom	Office of Communications
OIF	<i>Organisation internationale de la francophonie</i>
OSILAC	<i>Observatorio para la Sociedad de la Información en Latinoamérica y el Caribe</i>
PC	Personal computer
PDA	Personal digital assistant
PDC	Personal Digital Cellular
PHP	Philippine peso (currency)
PIA	Public Internet access
PIAC	Public Internet access centre
PIAP	Public Internet access point
PISA	Programme for International Student Assessment
PoP	Point of presence
PPP	Public-private partnership
RAN	Radio access network
RARE	<i>Réseaux associés pour la recherche européenne</i>
RCP	<i>Red Científica Peruana</i>
RENATER	<i>Réseau national de télécommunications pour la technologie, l'enseignement et la recherche</i>
R&D	Research and development
RIA	Research ICT Africa
SABC	South African Broadcasting Corporation
SCA-ECLAC	ECLAC Statistical Conference of the Americas
SKMM	Suruhanjaya Komunikasi and Multimedia Malaysia
SMATV	Satellite master antenna television
SW	Shortwave
T-DMB	Terrestrial digital multimedia broadcasting
TD-SCDMA	Time Division Synchronous Code Division Multiple Access
TDMA	Time Division Multiple Access
TEIN	Trans-Eurasia Information Network
TERENA	Trans-European Research and Education Networking Association

TGEG	Task Force on E-government Indicators
TLD	Top-level domain
TOEFEL	Test of English as a Foreign Language
TV	Television
UIS	UNESCO Institute for Statistics
UN	United Nations
UNCSTD	United Nations Commission on Science and Technology for Development
UNCTAD	United Nations Conference on Trade and Development
UNDESA	United Nations Department of Economic and Social Affairs
UNDP	United Nations Development Programme
UNECA	United Nations Economic Commission for Africa
UNECLAC	United Nations Economic Commission for Latin America and the Caribbean
UNESCAP	United Nations Economic and Social Commission for Asia and the Pacific
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNESCWA	United Nations Economic and Social Commission for Western Asia
UNGIS	United Nations Group on the Information Society
UNHCR	United Nations High Commissioner for Refugees
UNSC	United Nations Statistical Commission
UPU	Universal Postal Union
USB	Universal serial bus
USD	United States dollar (currency)
VPN	Virtual private network
VSAT	Very small aperture terminal
WAN	Wide area network
WAP	Wireless Application Protocol
WCDMA	Wideband Code Division Multiple Access
WDL	World Digital Library
WHO	World Health Organization
Wi-Fi	Wireless fidelity
WiMax	Worldwide interoperability for microwave access
WISE	Working Group for ICT Statistics in Education
WLCG	Worldwide LHC Computing Grid
WSIS	World Summit on the Information Society
WTDR	World Telecommunication/ICT Development Report

Executive summary

The World Summit on the Information Society (WSIS) held in Geneva (2003) and Tunis (2005) brought together governments, civil society and the business sector to discuss a broad range of subjects related to ICT for development. In the end, governments agreed on a set of commitments and actions to foster the establishment of an inclusive information society. In particular, ten targets were identified in the Geneva Plan of Action, along with numerous recommendations based on different action lines (Action Lines C1 — C11). The targets, to be achieved by 2015, are:

1. To connect villages with ICTs and establish community access points
2. To connect universities, colleges, secondary schools and primary schools with ICTs
3. To connect scientific and research centres with ICTs
4. To connect public libraries, cultural centres, museums, post offices and archives with ICTs
5. To connect health centres and hospitals with ICTs
6. To connect all local and central government departments and establish websites and e-mail addresses
7. To adapt all primary and secondary school curricula to meet the challenges of the information society, taking into account national circumstances
8. To ensure that all of the world's population have access to television and radio services
9. To encourage the development of content and put in place technical conditions in order to facilitate the presence and use of all world languages on the Internet
10. To ensure that more than half the world's inhabitants have access to ICTs within their reach

At the midpoint between 2005 and 2015, WTDR 2010 reviews progress towards the WSIS targets

The year 2010 marks the midpoint between the Tunis phase of WSIS (2005) and the deadline for achieving the WSIS targets (2015), in line with the target date of the Millennium Development Goals (MDGs). This World Telecommunication/ICT Development Report presents a mid-term review of the progress made towards achieving the ten WSIS targets. The overall objective of the report is to provide policy-makers with a comprehensive assessment of the WSIS targets to date and, based on the findings, make suggestions on the types of policy measures required to meet them. The report also highlights the need for formal monitoring of progress towards achieving the WSIS targets. Currently, there are no agreed indicators for the targets which countries could use for monitoring purposes.

The WSIS outcome documents make reference to quantitative review, monitoring and evaluation of progress. The Geneva Plan of Action calls for the establishment of compa-

rable indicators, and the Tunis Agenda for the Information Society provides suggestions related to the “periodic evaluation” of the WSIS outcomes. In particular, it acknowledges the efforts of the *Partnership on Measuring ICT for Development* (hereinafter referred to as the *Partnership*) to develop a core list of ICT indicators and to build statistical capability in developing countries in order to monitor their evolution towards becoming information societies. It also requests the United Nations General Assembly to make an overall review of the implementation of the WSIS outcomes in 2015.

Important developments have occurred since WSIS, and the Internet has become a general-purpose technology like electricity

Although some stakeholders, notably the members of the *Partnership*, have addressed the important task of monitoring progress, the WSIS targets are very broad and cover areas which go beyond the *Partnership’s* core list and which are particularly challenging to measure and compare internationally. The report reviews these challenges and proposes quantitative indicators for monitoring the targets, along the lines of the internationally agreed indicators used for tracking the MDGs.

The report also takes into consideration important ICT developments that have occurred since the Geneva phase of the Summit, which were not anticipated at the time of WSIS. The most striking example is the rise of mobile telephony and related applications. On the technology side, the launch of new standards in the mobile sector, the convergence of technologies and the steady increase in high-speed communication infrastructure have significantly altered the way ICTs are accessed and used. The emergence of Web 2.0 and user-created content on the Internet are shaping today’s information society developments.

It is widely recognized that ICTs are increasingly important for economic and social development. Indeed, today the Internet is considered as a general-purpose technology and access to broadband is regarded as a basic infrastructure, in the same way as electricity or roads. In some countries, such as Estonia, Finland and France, access to the Internet is a fundamental human right for their citizens. Such developments need to be taken into consideration when reviewing the WSIS targets and their achievement, and appropriate adjustments to the targets need to be made, especially to include broadband Internet.

WTDR 2010 is a collaborative effort among UN agencies

In view of the broad range of subjects covered by the WSIS outcome documents and the targets, the report has been drafted in close collaboration with other UN agencies and stakeholders, in particular the UNESCO Institute for Statistics (Targets 2 and 7), the UN Department of Social and Economic Affairs (Target 6) and the World Health Organization (Target 5). Representatives from civil society provided substantive inputs to the chapter covering Target 9.

The report is based on the latest available data. While some data are collected at the international level, notably by ITU, UNESCO and UNDESA, overall data availability relating to the WSIS targets is poor. To complement these data sources, a survey was carried out by ITU among its Member States, between September and November 2009. The information provided by countries is featured throughout the report.

The following sections summarize the main findings and conclusions for each of the ten targets.

Target 1: Connect villages with ICTs and establish community access points

With no internationally agreed definition of what constitutes a “village,” and given the lack of data on the number of villages by country, Target 1 measures ICTs in *rural and remote areas*. This is consistent with the fundamental intent of Target 1, which was formulated to ensure that people living in rural areas are not excluded from the information society. Rural areas stand to benefit from connectivity even more than others, on account of their geographical situation and because ICTs have the potential to deliver health, education and other services that might otherwise be less widely available. The target further recognizes the need to ensure the availability of public Internet access.

Mobile technology is currently the most widely diffused ICT, and available data suggest that by the end of 2008 almost three-quarters of the world’s rural inhabitants were covered by a mobile cellular signal, up from 40 per cent in 2003. The lowest coverage is in Africa, where just over 50 per cent of the rural population is within reach of a mobile cellular network. This still represents a significant improvement from 2003, however, when coverage stood at only 20 per cent. Complete mobile coverage of all rural areas worldwide by 2015, or even earlier, should become a clear policy target and would appear achievable with the right policy emphasis. Countries also need to take advantage of wireless technologies to deliver high-speed Internet access and launch 3G networks, where they are not yet available. To this end, policy-makers also need to monitor the percentage of the population within reach of a 3G mobile cellular signal.

Data on the proportion of households with a fixed and/or mobile telephone show that rural households in developing countries rely predominantly on mobile telephony. The proportion of rural households with a mobile telephone has reached, or now exceeds, 50 per cent in many developing countries. In comparison, fixed (wired) telephone penetration in rural households is much lower, and even non-existent in some areas.

In contrast to the diffusion of mobile technologies, the report finds that many rural households are still deprived of basic access to the Internet. A lack of electricity and the high price of computers and Internet are major barriers in developing countries. Unsurprisingly, broadband Internet penetration levels in rural households are even lower.

Where rural household Internet access is very low, community access points are critical for bringing people online. Indeed, a growing number of developing countries are moving ahead with the installation of public Internet access facilities in rural areas, often financed through universal access contributions or licence conditions. Existing data suggest that, in many developing countries, people in rural areas use the Internet in public locations. This is especially true in Latin America, where considerable policy emphasis has been placed on setting up public Internet access centres. Nevertheless, the low proportion of Internet users in developing countries (even lower in rural areas) suggests that much remains to be done to bring Internet to rural communities.

There are a number of strategies and policies that governments should pursue so as to increase Internet and broadband access and usage in rural areas. These include intensifying competition in all ICT markets, adapting universal access and service policies in order to integrate the delivery of ICTs to rural areas, and fostering wireless broadband access. Given the low number of Internet users in many developing countries, governments need to adopt the appropriate policies and provide the necessary resources to encourage the establishment of sufficient public Internet access points, preferably equipped with broadband technology, especially in rural areas. With increasing incomes — and the availability of electricity — people will opt for the convenience of using ICTs at home. Therefore, as household Internet access goes up, community access is likely to go down. Policy-makers need to keep this relationship in mind and policies to promote

Seventy-five per cent of the world’s rural population is covered by a mobile cellular signal

In many developing countries, more than half of rural households have a mobile telephone, but very few have Internet access

More public Internet access facilities are necessary in order to bring more people online

public access need to move in tandem with facilitating home ICT access. As incomes rise, the emphasis should shift from public towards household access.

Target 2: Connect universities, colleges, secondary schools and primary schools with ICTs

Too many schools in developing countries have no Internet access

Target 2 recognizes the multiple benefits of providing access to ICT infrastructure within education systems. ICT connectivity in schools provides students with new resources and pedagogical tools, allows them to acquire the skills required for the information society, improves administrative processes and supports teacher training. Outside school hours, connected schools can provide access to ICTs for the community, including marginalized groups.

The target must address newer and older ICTs, both of which hold effective potential for delivering educational content. Older (broadcasting) technologies, such as radio and TV, may complement newer technologies, including the Internet and computers. For some schools, they are the only relevant alternative if newer ICTs are not available, or affordable. Since it is assumed that higher-education institutions are largely connected to basic ICTs, and Internet access in universities is covered by Target 3, the report proposes that Target 2 focus solely on monitoring ICT connectivity in primary and secondary schools.

Students in developed countries have access to more computers

In terms of e-education technologies, Internet access in schools is the most widely tracked indicator and often the subject of policy discussion and goals, suggesting that policy-makers attach great importance to it. In the main, in 2010 schools in developed countries are connected to the Internet, and usually through high-speed broadband networks, which offer the greatest potential for delivering innovative and useful applications and services. A number of developing countries have initiated projects to bring ICTs to schools, have set clear targets and have achieved high levels of Internet and even broadband penetration. Overall, though, Internet penetration levels in developing countries are still low, and many schools remain deprived of any form of Internet access. Unless many more governments take far-reaching policy decisions soon, it is unlikely that all schools will be connected to the Internet by 2015, let alone through high-speed networks.

Existing data on the learner-to-computer ratio show that there are important variations across countries, with relatively more computers for fewer students in most developed economies and less favourable ratios in the developing world. Many students today do not have access to a computer at all.

Governments need to set clear targets and ensure that in the long term schools are online, at high speed

In view of the very limited availability of newer ICTs in many developing countries, older ICTs represent an important alternative. The availability and use of TVs and radios for educational purposes in schools vary between developed and developing countries, but also within each group, suggesting that policies and objectives depend very much on national circumstances and priorities. Whereas in some countries, especially developing countries, all schools use radios and TVs for educational purposes, penetration levels are very low in others. Although penetration levels for TV and radio are fairly similar, TV-assisted instruction tends to dominate in a number of countries.

Data further suggest that, for a number of countries, broadcasting technologies are a relevant alternative only if newer technologies are not available or affordable. Bringing radios and TVs into schools could therefore be considered as a short- to medium-term target that should ultimately be complemented by Internet access.

Besides identifying the most appropriate strategies to equip schools with ICTs, policy-makers need to set clear targets and implement the necessary policies to ensure that,

in the long term, all primary and secondary schools are online, at high speed, and that students have access to computers at schools.

Target 3: Connect scientific and research centres with ICTs

Universities and research centres have been closely related to the Internet since its inception. In some developing countries, the major universities or the academic network even acted as the first Internet service provider (ISP). Today, they continue to pioneer advances in ICTs in network infrastructure, services and applications, including the latest developments in grid and cloud computing. Most research centres and universities are connected to the Internet, often with a broadband connection.

Most research institutes and universities have access to the Internet, often through a broadband connection

It is also important to connect scientific and research centres and universities to *national research and educational networks* (NRENs), defined as specialized ISPs dedicated to supporting the needs of the research and education community. These NRENs not only help to further knowledge and facilitate scientific discoveries — they can also help build human capital and promote economic development. Many universities and research institutes are connected to the NREN, where one exists. By early 2010, around 62 per cent of countries had an NREN, ranging from 100 and 88 per cent of countries in the CIS and Europe, respectively, to 33 per cent of countries in Africa.

When connected to international research networks, NRENs can also contribute to promoting international collaboration and enabling positive research and development spillovers. NRENs can also facilitate the expansion of Internet access to local populations, for example by providing Internet access to students.

By 2010, around 62 per cent of countries had a national research and educational network

Besides providing access to the Internet, NRENs administer and support high-speed backbone networks employed by research projects. Data for European NRENs show significant growth in the bandwidth available to research networks, and between 2002 and 2008 the bandwidth of NRENs in 44 countries increased from less than 20 000 to close to 200 000 Mbit/s. Over the same period, the number of countries with NRENs with more than 10 Gigabits of bandwidth increased from just one to 14. While an increasing number of NRENs are operating at Gigabit capacity, existing data suggest that the available network bandwidth varies greatly between countries, and NRENs in a number of developing countries, in particular, are still restricted to only a few Megabits of capacity.

NRENs are increasingly interconnected and the number of international research networks is growing. While all regions enjoy at least some of the benefits of these advanced research and education networks, there is a need to interconnect regional networks of NRENs still further and to establish these networks in countries where they do not yet exist. It is important to ensure that developing countries, including the least developed countries, can also benefit by participating in and contributing to the pioneering developments in scientific and academic research that characterize the information society.

In order to promote the expansion of the NREN, and to include as many institutions as possible (universities and research centres, but also government departments, schools, hospitals, libraries and archives), governments must work with NRENs to ensure that they are fully embedded within the national innovation system and that they serve the needs of the local research community. Governments could consider conducting consultations with NREN stakeholders in order to review challenges and bottlenecks to boosting network deployment and connectivity. National policies should focus on the roll-out and growth of NRENs in developing countries, and enhance their bandwidth capacities. Governments should also consider prioritizing the research institutes to be connected to the NREN, based on their size and the types of research performed. In addition, NRENs

Today, the bandwidth of countries' national research and educational networks ranges from just a few Megabits to over 10 Gigabits

should explore partnerships with other regional and global networks, and could negotiate public-private partnerships with existing telecommunication operators.

Target 4: Connect public libraries, cultural centres, museums, post offices and archives with ICTs

While the institutions covered by Target 4 are similar to the extent that they are all highly knowledge- and information-intensive, they are also quite different, notably in terms of the specific purpose they serve and the role they can play in providing Internet access or online content. Indeed, the objective of connecting these institutions can be twofold: providing public Internet access (in libraries, cultural centres and post offices), and developing local content in local languages and preserving cultural heritage (notably through libraries, museums and archives).

Internet access in the institutions covered by this target is highest in developed countries. The potential for improvement is greatest in developing countries, where much more needs to be done if all institutions are to have access to the Internet by 2015, especially for those located outside urban areas. At the same time, providing public Internet access is most relevant in developing countries, since in the developed world more people have access to the Internet at home, at work or at school.

Libraries, post offices and — in certain cases — cultural centres are ideal locations for providing public Internet access to the community. They already have an existing infrastructure with a network of branches, and are open to the public, which means they may reach a population that does not have access to the Internet at home or at work.

Libraries, museums and archives share the potential to provide online content. They each host treasures of local content which should be digitized and made available online so as to promote cultural diversity and provide wider access to the world's cultural heritage for researchers and the general public. In most developed countries, these institutions are present on the Internet, although the available online information needs to be expanded. Some of the major institutions in developing countries also have a website, although generally without as much accessible information. Therefore, one of the main challenges is to bring more institutions in developing countries online and to encourage them to use the Internet to offer digitized content. Unfortunately, many developing countries lack the resources for an information technology budget, and a broadband Internet connection is not always available or affordable.

With the right policy focus, Target 4 could be attained by 2015, even if there is still some way to go, especially in developing countries. There are many initiatives under way to connect libraries, museums, post offices, cultural centres and archives, and the cost of connecting them is relatively low, especially relative to the potential benefits. Indeed, there are relatively fewer of these institutions than, for example, households or schools, thus increasing the feasibility of reaching the target. Governments could look to supplementary sources of funding, including the private sector, development agencies and philanthropy organizations. Combining private funds with public resources could help to connect these institutions and enable them to create websites.

In developed countries, most libraries, museums and archives are connected to the Internet, often at broadband speeds, but not yet in developing countries

More should be done to encourage public Internet access through libraries and post offices, especially in areas where household Internet penetration remains low

Target 5: Connect health centres and hospitals with ICTs

The health sector stands to benefit greatly from the use of ICTs and ICT applications, for example through the more efficient delivery of healthcare services and the provision of health information to the general public. The use of ICTs in the health sector also improves the collection, storage, retrieval and transmission of individual patient information. Furthermore, given the soaring use of mobile technologies worldwide, m-health (which refers to medical and public-health practices supported by mobile devices) holds huge promise for improving the delivery of health services to an increasing share of the world's population. Thus, ICTs have the potential to contribute to more effective delivery of health services and to increase the efficiency of health systems.

By the end of 2009, some progress had been made in establishing basic Internet access in health institutions, including in developing countries, but much more needs to be done if all health institutions are to enjoy Internet access by 2015. It is likely that progress will initially be made in the major cities of developing countries, and less so in the remote and isolated regions, even though ICTs can potentially bring even greater benefits in remote geographical areas.

In addition to growing access to the Internet, health institutions are increasingly using ICTs for their own ends, for example through the connection of health institutions to HINARI (an online initiative to provide access to health research). While most countries have introduced some form of electronic patient records, in low-income countries this facility is not yet used intensively, and most patient records are still kept primarily in paper format.

Over 75 per cent of countries report at least one m-health initiative. This is an area which has great potential for further growth, especially in the developing world. M-health or other applications, including telemedicine, can deliver healthcare services at a distance, by providing and exchanging information for diagnosis, treatment and prevention of diseases and injuries. They can also promote research and evaluation, and helping in the education of healthcare providers. Governments in developing countries should therefore ensure the effective implementation of such initiatives.

Governments need to recognize the importance of ICT access and use in the health sector, and the benefits it will bring for the health of citizens, not to mention the potential for cost savings, including through increased efficiencies. Policy-makers need to put in place and implement enabling framework conditions for e-health, which will be critical for increasing ICT in the health sector. Government support needs to be reflected in the policy environment as well as the funding environment. Today, funding constitutes an important barrier to the spread of e-health. Governments can look to alternative funding sources, such as donor or private funds, as well as public-private partnerships, in order to complement public funding used for providing Internet access to health institutions and supporting the use of ICTs for the delivery of health services.

Interministerial cooperation is also crucial in the area of e-health. Any significant ICT initiatives in the e-health domain will need to be agreed on and governed by several ministries, usually those in charge of health, ICTs and finance. The successful development and implementation of e-health projects requires a common understanding by all parties of some of the key issues, including the strategic approach and goals, costs and financing mechanisms.

Besides establishing basic Internet access, health institutions are starting to increase their use of ICTs, for example by introducing electronic patient records

M-health has great potential for growth, and for delivering innovative health applications

Substantial efforts are required if Target 5 is to be achieved by 2015, including interministerial cooperation and adequate funding

Target 6: Connect all local and central government departments and establish websites and e-mail addresses

Today, almost all central governments have a web presence and provide at least basic information to their citizens, including in the developing world

The use of ICT in government — referred to as e-government — can be key to achieving specific social and economic development goals. Governments are increasingly recognizing the role ICTs can play in promoting effective and speedy solutions for development through the delivery of public services. E-government can contribute effectively to creating an enabling environment for development, by enhancing transparency and accountability and promoting good governance in the public sector. As such, e-government is a major tool for public-sector reform towards better governance, which is one of the objectives of the United Nations Millennium Declaration.

Many countries have been reforming and modernizing their public-sector systems. This involves putting in place ICT infrastructure and promoting the use of ICTs to maximize impact and increase public-sector efficiency. Indeed, while investment in infrastructure is necessary for the diffusion of ICTs, the impact will ultimately depend on the use that is being made of them. Therefore, Target 6 also needs to address how governments use ICTs to improve the provision of information and services to their citizens.

Some progress has been made in achieving Target 6. At the end of 2009, no fewer than 189 countries had a central government website and provided at least basic information to their citizens, up from 173 in 2003. Also, in the majority of countries, government ministries and departments had a web presence, suggesting that by 2015 this part of the target will be achieved.

In most developing countries, sophisticated interactive and transactional online services are not yet available

The government sector also plays an important role in making relevant applications and content available online. Some countries, especially developed countries, have started to provide more sophisticated interactive and transactional online services. In most developing countries, however, such services are not yet provided online. By 2009, for example, only 21 (out of 192) countries worldwide offered tracking of (government-provided) permits as an online service to their citizens. Much is therefore left to be done to achieve this aspect of the target.

In developed countries, government institutions tend to have access to the Internet, often through a broadband connection. Much less is known about Internet access for government institutions in developing countries and in local government entities. In developing countries, a lack of resources — financial, human and infrastructure — is a constraint for increasing access to the Internet.

Most central government departments in developed countries now have access to the Internet, but less is known about the situation in developing countries or in local governments

It is also important to obtain more information about the use of ICTs within government institutions, both in developed and developing countries, especially regarding the type and quality of the connectivity, the extent of its diffusion (for example, what percentage of staff in government institutions have access to the Internet), and the actual use to which access to ICTs and the Internet is put. Indeed, little information is available on how ICTs are used, for example, for reforming and restructuring the interdepartmental organization of different levels of government.

In order to achieve the target on e-government by 2015, action needs to be taken at both the national and international levels. Specific recommendations include the formulation of a framework for an integrated e-government development strategy to exploit the synergies of new technologies in government departments and entities. Policy-makers must ensure the deployment of infrastructure, in particular broadband, as well as the effective use of ICTs in government. Governments should also develop appropriate online services which will attract users to utilize the Internet. By encouraging the development of local content through partnerships with the private sector, development agencies, non-governmental organizations and the academic and research sector, governments

can provide even more incentives for citizens to go online to access public services. The dissemination of best practices and lessons learnt from experiences in effective e-government and e-governance worldwide can inform such policies. Further recommendations include the formal adoption of ICT-for-development and e-government plans, continued follow-up on e-government development at the local level, and support for e-government capacity building at the national and local level.

Target 7: Adapt all primary and secondary school curricula to meet the challenges of the information society, taking into account national circumstances

Target 7 recognizes the need for countries to take active steps in investing in people and their skills. It is the second target (besides Target 2) that focuses on schools, highlighting the importance that education institutions have in enabling countries to effect the transition to information societies. It further implies that ICTs can be used to complement conventional delivery mechanisms, so as to ensure quality and equal education opportunities for all, including traditionally underserved or marginalized groups.

Addressing this target effectively means going beyond just connecting schools with ICT infrastructure and providing the human and physical resources necessary to adapt curricula. It needs to measure to what degree teachers are qualified to use and to teach ICTs, since an adequate pool of skilled teachers is a prerequisite for adapting curricula to meet the needs of the information society. The progress in achieving this target is also analysed in terms of the adoption of computer- and Internet-assisted instruction.

The report finds that guaranteeing an adequate supply of trained teachers remains a major challenge confronting many countries throughout both the developing and developed world. A number of developed and developing countries have taken concrete steps to provide teachers with the necessary skills to teach and use ICTs. The percentage of teachers who have ICT qualifications varies from zero to six per cent in countries with available data.

Major discrepancies also exist in terms of the proportion of primary- and secondary-school teachers trained to teach subjects using ICT facilities, with the proportion ranging from zero in some countries to 100 per cent in others.

Similarly, where data are available on the different forms of ICT-assisted instruction, the variation across countries is striking. Whereas in a number of countries an ICT-adapted curriculum is present for all or a majority of primary and secondary schools, in many developing countries only a small proportion of schools have effectively integrated ICTs as part of the curriculum. Countries that have adopted full-scale implementation of computer- and Internet-assisted instruction in their schools also have a relatively higher proportion of trained teachers, whereas other countries show signs that they are still in the early stages of implementation.

The report also finds that, overall, the level of computer-assisted instruction is higher than the level of Internet-assisted instruction, suggesting that access to the Internet, which requires the availability of at least basic telecommunication/ICT infrastructure, may be a barrier.

To adapt school curricula to meet the challenges of the information society, and hence fulfil Target 7, policy imperatives must go beyond capital investments in ICT-related infrastructure. It is essential that initiatives also develop ICT-skills building among the teaching force, so that the knowledge can be passed down to students. While many developing countries must continue to commit resources with a view to connecting edu-

Both developing and developed countries find it challenging to train a sufficient number of teachers

More schools use computers than the Internet to deliver educational content

ational institutions to ICTs, policy-makers must at the same time address the challenges of adapting curricula in primary and secondary schools to meet the demands of an ever-changing society.

Target 8: Ensure that all of the world's population have access to television and radio services

Today, the world's surface is covered by terrestrial and/or satellite radio and TV signals

Target 8 specifically addresses the need to take advantage of broadcasting technologies — often referred to as “older” or traditional ICTs — to help countries move towards the information society. In addition to providing access to information and news, including for illiterate segments of the population and in the case of emergencies, broadcasting services can also be employed for educational purposes. They complement printed media, and are particularly important in those countries and areas where Internet penetration levels are relatively low, or where the availability of online content in local languages is limited.

To monitor basic access to broadcasting services, it is important to go beyond the coverage of broadcasting signals, and to measure the availability of broadcasting devices (TVs and radios). Furthermore, it is useful to track the availability of multichannel television services, since these provide higher-quality services and more content, important factors for increasing demand for and leveraging the benefits of television services.

The report finds that Target 8 has largely been achieved in terms of access to broadcasting signals, the entire world's surface being covered by terrestrial and/or satellite radio and TV. In terms of the devices that allow people to receive radio and TV services, access is also widespread: the target has been achieved in the developed world, where almost all households have access to a radio and TV, while in the developing world, a large proportion of households have access to a TV and/or a radio, although penetration rates vary among countries and regions.

A total of 1.4 billion households — or five billion people — have a TV, half of them with multichannel services

TVs tend to be more popular and available than radios in many developing countries and regions, except Africa. By the end of 2009, there were some 1.4 billion households with a TV around the world, providing some five billion people access to a TV at home. This corresponds to a household TV penetration rate of 79 per cent, up from 73 per cent in 2002. Europe, the Americas and the CIS all have household television penetration rates exceeding 90 per cent, followed by the Arab States and Asia and the Pacific with 82 and 75 per cent, respectively. Africa stands out since, on average, only 28 per cent of households possess a TV.

The delivery of multichannel television, including satellite, cable, IPTV and digital terrestrial TV, has spread rapidly over the last decade and, by 2008, close to 50 per cent of households with a TV had multichannel services, compared to around 40 per cent in 2000.

The lack of electricity and content are major barriers to overcoming the broadcasting divide

Radios continue to play an important role in LDCs and in Africa, particularly in rural areas where incomes tend to be relatively low and where electricity is limited. In LDCs, radios are also more prevalent than TVs: around a third of households on average have a TV, compared to two-thirds with a radio. These data suggest that in those countries more efforts need to be made to bring broadcasting services to all households, in particular in rural areas.

The report argues that the broadcasting digital divide is not a pure income divide. Although income is without doubt an important factor, particularly in LDCs, the lack of electricity and the lack of content are major barriers that governments need to tackle. Policy-makers can also increase competition in the provision of content (for both TV and

radio services), especially in countries with a limited number of broadcasters. Satellite services offer the possibility for most developing countries to ensure nationwide broadcasting coverage, and countries could take advantage of existing regional systems to increase the availability of coverage and content. Increasing access to terrestrial digital and multichannel TV, for example through government subsidies, is an important objective in the information society and another way of expanding on existing content.

Target 9: Encourage the development of content and put in place technical conditions in order to facilitate the presence and use of all world languages on the Internet

Most WSIS targets focus on providing Internet access to institutions and citizens. However, access is only part of the story. The true essence of the Internet is that it fosters communication between humans (and with networked objects), and allows them to retrieve and exchange meaningful information. This implies that citizens need relevant content, in their (local) language. The main objective of Target 9 is to ensure that the Internet serves people worldwide by offering the greatest possible diversity in terms of content and languages.

Although discussions on the digital divide often focus on the availability of infrastructure, the lack of local content in local languages is critical: if there is nothing relevant for people to find on the Internet, they have no reason to go online. Thus, greater availability of local content, in local languages, will encourage more people to use the Internet. The development of user-friendly and affordable ICT applications targeted towards citizens and local communities is critical for increasing Internet use and building an inclusive information society.

Until recently, progress on Target 9 has been held back by a number of technical details with regard to the representation of different languages on the Internet, as well as the idea that English can act as an Internet *lingua franca*. However, efforts are increasingly being made not only to overcome technical barriers but also to encourage the production of local content, in local languages. Producing more content in local languages is key to bringing more people online, especially since it is estimated that only 15 per cent of the world population understands English. The proportion of English-speaking Internet users is indeed declining, falling from 80 per cent in 1996 to around 30 per cent in 2007, reflecting the fact that non-English speakers are increasingly going online.

The WSIS process has made an important contribution by acknowledging the issue of linguistic diversity and ensuring it has received higher priority on the global Internet-related policy agenda in recent years. Some changes have already taken place, such as the introduction of non-Latin script web addresses for domain names, reflecting the fact that more than half of the 1.7 billion people who use the Internet today speak languages with non-Latin scripts. This is likely to increase the demand for linguistic diversity on the Internet, adding a bottom-up driver to the efforts made at the political level and in the context of the WSIS process.

The number of initiatives to promote linguistic diversity is also rapidly increasing, and this process can be expected to show some tangible results by 2015, with likely increases in the number of languages that can be used on the Internet, the availability of local content, and the number of language versions of the main software and applications used on the Internet. However, it is difficult to determine precisely what drives the production of content and what incentives could be provided to stimulate the development of local content.

Implementing Target 9 requires, for example, the development and implementation of policies that promote diversity of cultural expression and indigenous knowledge and

The persistent digital divide is at least partly related to the issue of languages and content on the Internet

Even though English is still the predominant language on the Internet, only an estimated 15 per cent of the world population understands it

The internationalization of domain names is expected to increase demand for linguistic diversity on the Internet

traditions through the creation of varied information content. This requires, in turn, the development of local content (including through the translation and adaptation of existing content), digital archives and diverse forms of digital and traditional media, with support from local authorities.

It is also important to nurture local capacity for the creation and distribution of software in local languages. This calls for technologies and research in areas such as translation, iconographies, and voice-assisted services; the required hardware and software models covering character sets, language codes, electronic dictionaries, terminology and thesauri, multilingual search engines, machine-translation tools, internationalized domain names and content referencing; as well as general and application software which should also be available in local languages.

Eighty-six per cent of the world's population is covered by a mobile cellular network

Target 10: Ensure that more than half the world's inhabitants have access to ICTs within their reach

Target 10 goes to the heart of all the WSIS targets, since the success of creating an information society depends primarily on whether people have access to ICTs.

While the target sets a clear and quantifiable goal, i.e. "*more than half the world's inhabitants,*" it is vague in terms of the technologies or services concerned ("ICTs"). Two key technologies which need to be covered are mobile cellular and Internet. Also, it is important to monitor not only access to ICTs, but also their actual use. To reflect the importance of the use of ICTs, the target could be amended to read "*Ensure that more than half the world's inhabitants have access to ICTs within their reach and make use of them.*"

By 2015, more than half of world's inhabitants are expected to be using a mobile phone

One of the most striking developments since the conclusion of the Summit, surpassing all possible expectations, has been the rise of mobile telephony in all parts of the world. Mobile cellular network coverage already stands at 86 per cent of the population, and is likely to reach close to 100 per cent by 2015. This would translate into (potential) access to telephone services for all people in the world.

By 2009, 1.7 billion people — or 26 per cent of the world population — were online and 25 per cent of households had access to the Internet

The mid-term review reveals that, with respect to the number of mobile cellular subscriptions, the target has been achieved. By the end of 2009, worldwide mobile cellular penetration stood at 67 per cent, compared to 20 per cent in 2003, at the time of the first phase of the Summit, when few foresaw the rapid take-up of mobile services. Developing countries surpassed the 50 per cent penetration mark in 2008, and a number of regions (Europe and CIS) have passed the 100 per cent penetration mark. These penetration figures include double counts (because one person may have more than one subscription or SIM card) and do not therefore equate exactly to the number of actual users of mobile telephones. Recent data on the number of people who actually *use* a mobile phone show that most developed countries have already achieved Target 10 and many developing countries are steadily approaching it. If countries manage to sustain current growth rates, The target will be attained, with more than half of world's inhabitants expected to be using a mobile phone by 2015.

It is not possible to talk about the information society without measuring how many people are using the Internet. By the end of 2009, some 1.7 billion people, or 26 per cent of the world population, were online and global Internet user penetration has doubled between 2003 and 2009. While developed countries have achieved the target, with an estimated 64 per cent penetration rate at the end of 2009, less than 20 per cent of people in the developing world were using the Internet. Data also show that in the majority of countries still more men than women use the Internet. Major efforts are required to bring half the world population — including half of the female population — online by 2015.

Target 10 specifies that ICTs should be “*within reach*.” The report therefore also examines the availability of Internet access at home. Data show that at the end of 2008, some 25 per cent of households globally had Internet access. In the developed world, almost 60 per cent of households had Internet, compared to only 12 per cent in the developing world.

The report finds that the broadband divide remains significant and while some countries and regions of the world are going increasingly high-speed, others risk falling behind. Whereas in the developed countries most households today enjoy a broadband connection, penetration levels in the developing countries remain much lower. By the end of 2009, the fixed (wired) broadband penetration rate of developing countries stood at only 3.5 per cent, up from around one per cent in 2003. While these figures refer to broadband subscriptions rather than users (and one subscription is likely to benefit several users), they are still a good indication of the long way left to go before reaching the target.

However, current developments in the mobile sector are expected to have a major impact on *wireless* broadband access in the near future. Wireless broadband only started to take off after the conclusion of WSIS. While penetration rates are still as low as those for fixed (wired) broadband, especially in developing countries, an increasing number of countries are offering 3G (and now even 4G) services, and the number of subscriptions is expected to increase rapidly in the near future. Given the importance of high-speed Internet access, the report proposes that Target 10 should aim at ensuring that more than half the world’s inhabitants have broadband Internet access by 2015.

To achieve Target 10, governments need to take action on various fronts. This includes building the necessary infrastructure and providing public access; expanding skills; and creating relevant and local content. On the infrastructure side, governments need to exploit the potential of wireless broadband by expanding mobile network coverage, including 3G coverage, to all segments of the population, and particularly to rural areas, where fixed (wired) networks are limited. Governments can also encourage the uptake and use of broadband networks by increasing competition to lower the cost of access, and by providing public access for those portions of the population who cannot afford home access. Increasing the use of ICTs also calls for appropriate policies to provide citizens with ICT skills and to promote the development of locally relevant content. By creating an enabling environment for an inclusive information society, governments play a key role in increasing ICT access and use.

Towards 2015

The assessment of each of the ten WSIS targets has shown that, since the Summit, the area where most progress has been made is connecting people via mobile technologies. Mobile cellular network coverage already stands at 86 per cent of the population, and there is every chance it will rise to close to 100 per cent by 2015. Mobile cellular telephony has grown sharply, and it looks very much like more than half of the world population will be using a mobile telephone by 2015, thus fulfilling Target 10. Similarly, basic radio and TV services are widely available, and could reach the majority of the world population by 2015, provided electricity and broadcast content do not form a barrier. Furthermore, global Internet user penetration has doubled between 2003 and 2009, and by the end of 2009 around one-quarter of the world population was online — up from around 12 per cent in 2003. Good progress has also been made with respect to bringing Internet access to central governments, research and scientific institutions and to some extent schools, hospitals, museums, libraries and archives, at least in the major cities of developing countries.

Despite these encouraging trends, by the end of 2009 three-quarters of the world population (and more than 80 per cent of the developing countries’ population) were not

While most people in the developed world use a broadband Internet connection, the developing countries are still far from reaching the target

Since WSIS, the greatest progress has been made in connecting people via mobile technologies, but three-quarters of the population are not yet on the Internet

yet using the Internet, and even fewer via a broadband connection. In most developing countries, households, schools, hospitals and other public institutions located outside the major urban areas are not yet connected to (broadband) Internet. With five more years to go to 2015, all stakeholders should step up efforts to bring high-speed Internet to a larger number of people and institutions, especially in the developing world.

Turning targets into actions

In view of the challenges highlighted, and to ensure that the WSIS targets and goals are achieved by 2015, a concerted policy effort is needed on the part of all national, regional and international stakeholders. It should also be remembered that, given the significant impact that ICT use has on development in other economic and social areas, progress in ICT development will also drive progress towards the attainment of other international development goals, including the MDGs, also set for 2015. Policy action should focus on three main areas:

1. Expanding broadband Internet access. Affordable, high-speed Internet access is central to the development of an information and knowledge-based society. Like the printing press, electricity or the automobile, Internet is a technology that has far-reaching impacts on society. Internet, and especially broadband Internet, is increasingly accepted as a general-purpose technology that dramatically affects the way people communicate, do business, interact with governments and educate and inform themselves. This requires governments to pursue policies that will have a significant impact on Internet usage, including an enhanced effort to deploy (fixed/wired and/or wireless) broadband infrastructure and to include broadband in universal access plans. It might be possible to reach the goal of providing broadband Internet access to at least half the population by 2015 in view of the rapid spread of wireless broadband. Countries that have not yet done so should launch 3G networks as soon as possible and take advantage of the opportunities that wireless broadband networks offer, in particular high-speed access to the Internet. Developing countries need to seize the potential of wireless broadband for stimulating competition in the Internet market and increasing access levels. This is particularly relevant considering that fixed (wired) broadband options are extremely limited in many developing nations.

2. Building an ICT-literate society. In order to be used effectively, ICTs, particularly Internet, require a basic level of ICT literacy. Furthermore, many people around the world cannot use the Internet and its related applications (in areas such as health, education or government) because they are illiterate. This is tied to education, and learning opportunities must be universal if ICT use is to expand further. ICTs must be provided in schools, and ICT-skills development should form part of the curriculum. In addition, there are various segments of the population beyond school age who require ICT training. Policy-makers in developing countries, in partnership with the international community, should continue to commit resources to connecting education institutions to ICTs and address the multifaceted challenges of adapting curricula in primary and secondary schools to meet the demands of an ever-changing society.

3. Developing online content and applications. Greater availability of local content, in local languages, will drive more people to use the Internet. The development of user-friendly and affordable ICT applications, geared to citizens and local communities, is critical for increasing Internet use and building an inclusive information society. This must include initiatives and applications in the areas of e-health, e-government and e-business. In order to make content accessible to local communities, language diversity is of vital importance. Digitizing books, documents, exhibits and collections available in local libraries, museums, archives and cultural institutions could dramatically increase the availability of online content in local languages. Yet “e-culture” is often overlooked in national ICT strategies. The digitization and online availability of existing content should be a policy priority, and there are many best-practice examples that governments could

Access to broadband Internet for half the world population by 2015

ICT skills for ICT use

More online content in more languages

follow. With more than half of the Internet users speaking languages with non-Latin scripts, the recent opening up of Internet domain names to non-Latin script characters is an important development that needs to be continued. This is likely to increase the demand for content in local languages and can serve as an important driver from the user side, to complement government-initiated projects.

Monitoring progress

For each of the ten targets, the report has identified a set of measurable indicators, which could be used by countries in their monitoring efforts. The *WSIS Mid-term Review Table* (at the end of the chapter “Conclusions and the way forward”) summarizes the main results of the report, including proposed revisions to the targets to facilitate measurement, the most relevant action lines, and the indicators proposed to monitor each of the targets. The table also provides an overall assessment of the status of the targets and the indicators for which data were available. It shows that, whereas in developed countries most indicators have a high level of achievement, this is not the case in developing countries, where only few indicators have reached a high level of achievement and most indicators are still at a low level.

In developed countries, most indicators show a high level of achievement, whereas in developing countries most indicators still show low levels

The phrasing of the existing targets is sometimes vague, making it problematical to interpret the targets and select appropriate indicators. For measurement purposes, some revisions to the wording are desirable, including the deletion or addition of components, and the definition of more concrete targets. These suggestions may be found throughout the report.

Some areas, although vital to the development of the information society, are not covered anywhere in the targets. The most critical of these is the use of ICTs in business, which is essential for participation in today’s knowledge-based economy and is addressed in WSIS Action Line C7. The report therefore proposes that a new target be added: “Connect all businesses with ICTs.” Indicators for measuring ICT use by businesses have been developed by the *Partnership on Measuring ICT for Development* and are collected by an increasing number of countries. Other areas not addressed by the targets are e-agriculture and e-environment, which are also included in Action Line C7; building confidence and security (Action Line C5); and the ethical dimensions of the information society (Action Line C10). Progress in these areas should also be monitored, and indicators defined to this end.

The WSIS targets need to be revised

Limited data availability has constituted a major constraint in the preparation of this mid-term review. Even the most basic indicators chosen are often not collected at the national (or international) levels, or are outdated. It was therefore not possible to make a comprehensive, global assessment of all targets.

Governments and international stakeholders need to collect data to monitor progress towards 2015

In the absence of data, it will be difficult to assess whether the WSIS goals and targets are met by 2015. This is particularly alarming in the case of developing countries, where ICT penetration levels are lower and which are lagging behind on several of the targets. There is therefore an urgent need for governments to collect the data required for monitoring progress towards achieving the WSIS targets by 2015, and beyond.

The international community also needs to step in to assist countries in the measurement process. The indicators presented in this report can serve as a starting point, but they need to be further refined, and perhaps expanded, in consultation with the WSIS community. As a follow-up to this report, it is therefore proposed that a monitoring process be established under the framework of the *Partnership on Measuring ICT for Development*, which has been tasked by the WSIS outcome documents, as well as by the United Nations Economic and Social Council, to track progress towards the WSIS targets. In close collaboration with relevant stakeholders, a final matrix for all targets and action lines should be presented as soon as possible and disseminated widely in order to help

countries in their monitoring efforts. Data should be compiled on a continuous basis and regular quantitative updates of progress made on the goals should be prepared by the partners. A final report should then be prepared for 2015, setting forth a global assessment of progress achieved in reaching the WSIS targets.