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WSIS+10

Review and Strategic Directions for Building Inclusive Knowledge Societies for Persons with Disabilities

World Summit on the Information Society (WSIS)

Researched and edited by Axel Leblois,
Executive Director of G3ict,
The Global Initiative for Inclusive Information and Communications Technologies

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TABLE OF CONTENTS

List of Tables and Case Studies

INTRODUCTION

OBJECTIVE OF REPORT

This report has been commissioned in the context of the approaching deadline of 2015 for the MDG (Millennium Development Goals) as defined by the United Nations General Assembly to assess the progress of actions initiated after the first and second WSIS (World Summit on Information Society) to promote the digital inclusion of persons with disabilities and to provide policy recommendations.

WSIS Action Line 3 “Access to Information and Knowledge” and other relevant lines, include action points on inclusion of Persons with Disabilities, mainly focusing on improving access to information and knowledge. Within the framework of these action points, the objective of this report is to review the current status, analyze trends and emerging innovations in connection to the use by persons with disabilities of Information and Communication Technologies (ICTs) to access information and knowledge, and to formulate recommendations that will help UNESCO and other partners in shaping its strategy. In order to conduct such an analysis in the context of the WSIS Action Lines, this report specifically reviews:

1/ The WSIS Action Plans and process and how it contributed to set the stage for digital accessibility rights

2/ How digital accessibility impacts the participation of persons with disabilities in the Knowledge Societies

3/ The current level of access to knowledge societies by persons with disabilities around the world within the 10 targets of the WSIS statistical framework

4/ Latest technology and societal trends, and how they may influence the participation of persons with disabilities in Knowledge Societies.

Along those four areas of inquiry, the report suggests action steps which are consolidated in the last section into five policy and programmatic recommendations to build inclusive Knowledge Societies for Persons with Disabilities.

EXECUTIVE SUMMARY

With the ever expanding role of the Internet, the mass production of new ICT products, and the rapid development of infrastructure, digital services and contents, a new paradigm for universal, ubiquitous and instant access to knowledge permeates most areas of society such as public and private services, media and entertainment, employment, e-health or e-education. This new paradigm is further magnified by the exponential usage of mobile services and social networks allowing for considerable user generated contents and peer to peer sharing of information and knowledge.

As a result of this rapid evolution, patterns of participation in Knowledge Societies are deeply influenced by, and increasingly dependent upon using ICT tools. The degree to which individuals can participate in Knowledge Societies is determined by the availability, affordability of ICTs and relevance of contents and services, but also by their accessibility: users must be able to perceive, understand and act upon ICT interfaces.

Unfortunately, persons with disabilities experience a variety of barriers to access web sites, mobile phones, televisions, personal computers, tablets, as well as many other digital interfaces in public and private spaces such as electronic kiosks or electronic voting machines. If ICT accessibility requirements are not adequately addressed, persons with disabilities and senior citizens with sensorial, physical or cognitive impairments are excluded from mainstream information sources and services, reducing their ability to participate in Knowledge Societies. Such issues affect a population of one billion persons who live with a disability worldwide, two third of which with a severe disability and 80% in developing nations, a population grossly underestimated until proper statistical methodologies were promoted by the United Nations Group on Disability Statistics.

Meanwhile, the rapid evolution of Information and Communication Technologies has brought to market technical solutions that overcome most ICT accessibility barriers, complemented by new assistive technologies addressing most types of disabilities. The combination of those factors makes it possible in principle for persons with disabilities to access digital contents and services and participate in Knowledge Societies. However, those solutions are not widespread nor adequately promoted. In addition to those accessibility issues, economic and educational challenges, and the lack of relevant contents and services for persons with disabilities also play an important role in creating significant obstacles in reaching the objectives defined by WSIS towards inclusive Knowledge Societies.

In retrospect, the magnitude of the issues at stake for persons with disabilities was not generally fully recognized when WSIS Geneva (2003) and WSIS Tunis (2005) took place: the WSIS preparatory process thus played an important role as a forum and catalyst for civil society, industry and governments to define and promote those issues. The WSIS Declarations and Action should be credited for advancing the digital accessibility agenda for persons with disabilities. Actions outlined in the WSIS Geneva and WSIS Tunis agenda were the first global acknowledgement by United Nations Member States of the need to ensure that persons with disabilities can access ICTs in order to fully participate in society, have complete access to knowledge and services based on digital technologies, whether education, employment, e-government or leisure.

In particular, looking at the intense debates that occurred during those years around the role of ICTs, the WSIS Action Lines helped the global disability rights agenda expand the accessibility imperative to include ICTs. Since the early 2000s, more attention had been focused on persons with disabilities in the context of human rights rather than in the traditional approach of social welfare or economic and social development. WSIS was the first global venue where the accessibility of ICTs for persons with disabilities was defined as a condition for persons with disabilities to fully participate in society and enjoy all fundamental freedoms. As noted in this report, several Action Lines are reflected into articles of the Convention on the Rights of Persons with Disabilities (CRPD) written by the Ad ‘Hoc Committee of the United Nations General Assembly for the CRPD between 2002 and 2006.

As a follow-up to WSIS, the *Partnership on Measuring ICT for Development* launched in Tunis by UNESCO, ITU, several UN agencies and the OECD to assess the progress of the WSIS lines of action, selected ten targets covering the information infrastructure, the availability of ICTs, the installed base of devices and number of subscribers to services. Few metrics, however, were selected to measure actual ICT usage patterns and none covered the specific issues of accessibility for persons with disabilities.
Independent statistical research conducted by G3ict – the Global Initiative for Inclusive ICTs – in cooperation with Disabled People's International and case studies from a variety of WSIS stakeholders, however, provide data to assess the progress made along the Action Lines of WSIS 2003 and 2005.

Such analysis shows that policies, programs and the implementation of solutions to facilitate the access to information and knowledge for persons with disabilities are severely lagging compared to the substantial and rapid progress made in increasing the coverage of the information and knowledge infrastructure. Such gaps affect all areas of application and services in education, e-government, e-health, access to media, to the Internet and to basic communications services.

While addressing those gaps, it is suggested to leverage the ongoing innovations offered by new information and communication technologies. Ubiquitous mobile networks, decreasing cost of computing, miniaturization, alternative power generation, advances in neuroscience all point to multiple new enabling solutions for persons with disabilities to participate in Knowledge Societies.

RECOMMENDATIONS FOR THE DEVELOPMENT OF INCLUSIVE KNOWLEDGE SOCIETIES AND REMOVING BARRIERS TO ACCESS TO INFORMATION AND COMMUNICATIONS FOR PERSONS WITH DISABILITIES

Recommendation #1: Developing policies in support of an inclusive Knowledge Societies
- United Nations Agencies should cooperate in supporting countries to implement the WSIS Action Lines and the dispositions of the Convention on the Rights of Persons with Disabilities by:

- Supporting national legislative initiatives promoting accessibility including to information, and Information and Communication Technologies as per Art.9 of the CRPD (#1)
- Helping governments develop national policies and roadmaps for accessible ICT infrastructure, contents and services with appropriate stakeholders (#18)
- Encouraging governments to fund and set processes to ensure the participation of Organizations of Persons with Disabilities in policy making about information and ICT accessibility (#3)
- Assisting governments in adopting public procurement rules incorporating ICT accessibility criteria consistent with existing international standards (#9)
- Promoting good practices in accessible e-government, the use of standards, and the adoption of accessibility considerations at the inception of new web development projects (#14)

Recommendation #2: Setting measurements and targets. WSIS should define targets for the inclusion of persons with disabilities in Knowledge Societies and develop appropriate measurement tools by:

- Defining methodologies in cooperation with UNESCO, ITU and civil society to facilitate the implementation of national data collection on the accessibility of information, ICTs, media and knowledge for persons with disabilities (#2)
- Encouraging Governments to Apply Census and Survey Methodologies Defined by the UN Group on Disability Statistics in order to accurately measure disabilities prevalence in support of policy making (#4)
- Supporting and participate in the existing work of Civil Society in measuring and benchmarking the progress made by States Parties to the CRPD in implementing ICT accessibility (#10)

Recommendation #3: Building capacity to implement accessibility for persons with disabilities. WSIS should encourage governments to develop capacity building programs as a prerequisite to implement accessible contents, services and technologies by:

- Supporting awareness raising and training programs on ICT accessibility for ICT professionals, teachers, librarians, media, policy makers and other stakeholders developing ICT based contents and services in partnership with academia and the private sector (#6)
- Promoting research and development of universally designed products and Universal Design principles among developers (#7)
- Supporting the participation of national stakeholders in international ICT accessibility standards activities and to promote international ICT accessibility standards in their jurisdictions notably ISO, ITU, W3C and DAISY/ePUB3 (#8)
- Developing, supporting and leveraging national centers of expertise on assistive technologies serving multiple stakeholders involved in supporting persons with disabilities including in education, employers and rehabilitation services (#19)
- Deploying digital literacy and accessibility programs for senior citizens and persons with disabilities with an emphasis on relevant contents and services such as health, employment, cultural, government and information services (#5)
- Providing incentives for community based institutions and telecenters to train persons with disabilities in the use of ICTs and accessing relevant information and knowledge in application of CRPD art. 9 par. 2 c & g. (#11)
- In addition, United Nations agencies should cooperate to research and document countries good practices in making available technology tools for persons with disabilities and their benefits for the wider community and Knowledge Societies (#21)

Recommendation #4: Making education accessible to persons with disabilities.

- Governments should ensure that Assistive Technologies are made available to students with disabilities throughout their education system and that teachers are trained and supported in their implementation (#12)

- UNESCO should promote widely the conclusions of its report on Accessible ICTs and Personalized Learning for Students with Disabilities and Incorporate an Inclusive Education component in its ICT Competency Framework for Teachers (#15)
- UNESCO, in cooperation with relevant institutions, should develop a model policy for national education institutions. Such model policy should promote procurement criteria based upon standards including but not limited to the DAISY/ePUB3 and W3C - WAI guidelines as an incentive for publishers, information services, web services and hardware vendors to develop accessible education tools and contents (#13)
- UNESCO, in cooperation with education institutions, should research and document how technology can assist students with disabilities in excelling in inquiry based learning and becoming proficient in participating in all aspects of Knowledge Societies (#23)

Recommendation #5: Promoting accessibility solutions and innovation. International Organizations, in cooperation with civil society should contribute to promote solutions and innovations that can remove barriers for persons with disabilities to participate in the Knowledge Societies:

- ITU should promote solutions for accessible media services and contents and UNESCO serve as a forum for disability and accessibility related media issues taking into consideration a human-rights based approach. (#16)
- The Broadband Commission should dedicate research efforts to overcome the low rates of adoption of broadband services by persons with disabilities. (#25)
- UNESCO, in cooperation with ITU and other international agencies and civil society, should accompany the rapid transformation of knowledge sharing and dissemination via mobile platforms by promoting accessible mobile tools, contents and services for persons with disabilities including for general news and information, special education, participation in social networks and independent living (#24)
- ITU and United Nations agencies should cooperate to promote the use of mainstream mobile technologies for persons with disabilities in low resource environments to enhance their participation in Knowledge Societies (#20)
- UNESCO, in cooperation with ITU and other relevant agencies, should undertake a technical and economic evaluation of the best ways to promote the development of sustainable speech software in minority languages and seek to engage a dialogue with industry on those matters (#17)
- UNESCO, in partnership with WHO, ITU and other international organizations and research institutions should identify and promote good practices and innovations in “anywhere anytime” contextual knowledge generation and delivery, leveraging new types of devices for seniors and persons with disabilities including but not limited to health, rehabilitation and emergency support services (#22)

PART ONE

THE WSIS ACTION PLANS AND PROCESS: SETTING THE STAGE FOR DIGITAL ACCESSIBILITY RIGHTS

1. EMERGENCE OF THE INFORMATION AND KNOWLEDGE ACCESSIBILITY IMPERATIVE IN THE CONTEXT OF WSIS

Information and Communication Technologies have acted as a powerful enabler for the development of the Information Society towards the end of the 20th century. The notion of the information society is based on technological innovations giving new broad access to information, while the concept of knowledge societies encompasses much broader social, cultural, ethical and political dimensions. Knowledge is a key factor for a sustainable human development. Knowledge Societies also reflect universally accepted values of openness and public and equal participation enshrined in the Universal Declaration of Human Rights. Those values have progressively permeated the legal framework of a majority of countries around the world. They are particularly important as a background in relation to persons with disabilities, and their right to freedom of expression, access to information and education and to full participation in society; specifically:

- The freedom of opinion and expression (Article 19 of the Universal Declaration of Human Rights) as well as freedom of information and access to information (Article 21 of the Declaration);
- The right to education and its corollary, free basic education and progress towards free access to other levels of education (Article 26 of the Declaration and Article 13 of the International Covenant on Economic, Social and Cultural Rights); and,
- The right to "freely participate in the cultural life of the community, to enjoy the arts and to share in scientific advancement and its benefits" (Article 27 of the Declaration paragraph 1)

a. PRE-WSIS ACTIVITIES ON DISABILITY RIGHTS AND ICT ACCESSIBILITY TO PROMOTE INCLUSIVE KNOWLEDGE SOCIETIES

With the above principles applied to an ever greater number of categories of population as a background, since the early 1990s, the United Nations also pushed forward an agenda promoting equality for persons with disabilities. The World Declaration of Education for All (1990), the UN Standard Rules on the Equalization of Opportunities for Persons with Disabilities (1993), several fora and symposia addressing special education, all led to a greater awareness of the notion of disability rights and accessibility as a condition to exercise those rights. Separately, many countries put in place policies and legal frameworks to define and protect the rights of persons with disabilities, and ensure a better access to society, public services and employment. Examples of early developments of disability rights include:

- The American Rehabilitation Act of 1973, the American with Disabilities Act of 1990, the Individuals with Disabilities Education Act of 1990, all updated several times, were among the pioneering rights based legislations in the world: preventing discrimination against persons with disabilities in employment and education, and promoting equal access and opportunities for children and adults with disabilities.

- Australia promoted the rights of persons with disabilities as early as 1992 with the promulgation of the "Disability Discrimination Act" ("TDA") in order to standardize the rights of persons with disabilities nationwide, implement the Australian Government's

obligations as a signatory to international declarations on the Rights of Persons with Disabilities and to enable the Federal Government to establish regulations in this area.

- In 1991, Thailand adopted the "Rehabilitation of Disabled Persons Act", updated in 1998, while the Thai Constitution of 1997 (revised in 2007) contains anti-discrimination provisions for persons with disabilities. On December 3rd, 1998, the Prime Minister approved and signed the "Declaration on Rights for People with Disabilities", which still serves as a reference for the provision of services in Thailand.

- The European Union supported the creation in 1996 of the European Disability Forum in order to facilitate an ongoing dialogue with European disability stakeholders. "The impact of the EDF in the next decades, often in the form of effective advocacy for American-type rights-based antidiscrimination, cannot be overstated. Its policy papers produced in the early 1990s, which advocated that discrimination should be expanded from race and gender to include disability, prepared the ground for the transformation of Community disability policy in the late 1990s"[1].

In parallel to the emergence of a rights approach to disability, repealing traditional social or medical policies, the rapid expansion of ICT infrastructure, products, applications and services was progressively recognized as a major driver of economic, social and cultural development. ICTs proved to provide unique, powerful tools to support children's' education, share knowledge, improve access to cultural and social life and insure the full participation in society of disadvantaged and underserved groups, including women and children, and a global ageing population. As a consequence, exclusion from access to Information and Communication Technologies was increasingly acknowledged as a cause of exclusion from Knowledge Societies at large.

Such recognition of the role of ICTs in establishing inclusive Knowledge Societies was evidenced for instance by the efforts of several countries to make telephony or television broadcasting accessible to the deaf, by W3C[2] launching the Web Accessibility Initiative in 1997, by the IDEA Act in the United States regarding assistive technologies for students with disabilities and by the 2003 Biwako Framework defined by the United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP) which included specific guidelines for inclusive ICTs for persons with disabilities in the region.[3]

Reflecting those trends, UNESCO in its preparatory work for WSIS 2003[4] offered recommendations that emphasized the need for international and universal standards for ICTs and the participation of disabled persons' organizations in the design of products and services as well as in the implementation of accessibility policies. The report specifically offered eleven

[1] Vlad Perju, Cornell University Law Journal, 2011
[2] Worldwide Web Consortium
[3] See section 8 of the "Overview of regional implementation of the Biwako Millennium Framework for Action and Biwako Plus Five towards an Inclusive, Barrier-free and Rights-based Society for Persons with Disabilities in Asia and the Pacific," dated 1 August 2012 http://test.actionbias.com/sites/test/files/APDDP3_1E.pdf
[4] Status of Research on the Information Society – UNESCO 2003

recommendations[5] some of which carry notions reflected in the WSIS Action Lines and the CRPD while all others remain items of the digital accessibility advocates with the exception of the regulatory recommendation #4:

1. Governments should enact, amend and enforce laws, policies and programmes that protect the right to information and freedom of communication of Persons with Disabilities.

2. Governments should adopt and support ICT development based on international standards which are universal, open, non-proprietary and have accessible features.

3. Participation of disabled users' needs to be made mandatory from research to product development, policy planning and monitoring.

4. All technology development, replacement and upgrade initiatives should be regulated to ensure access to Persons with Disabilities and uninterrupted access to ICT utilities should continue as the technologies advance.

5. All Governments should endeavor to adopt an ICT disability plan for action through a multi-sectorial approach so that accessibility agenda with clear targets and budgetary provisions are worked out for every Government department to ensure equal access and full usability of ICTs by persons with disabilities.

6. Telecommunication policy and laws be so modified that people are able to hold long distance communication independently and in their preferred medium of communication such as sign language and local languages.

7. User Interface Standards, User Presentation Standards and Terminal Equipment Standards need to be developed and redefined so that all analogue and digital broadcasting services can be delivered on accessibility standards.

8. Funds for research and development be provided for the development of:
(i) Speech engines for local languages needed for effective operation of screen readers;
(ii) Electronics lexicons for local sign language needed for digitized conversion of audio and text to sign;
(iii) Voice algorithms for local language voice to text; and
(iv) Conversion software from native language to Braille.

9. For equity and equal distribution of ICT resources, international and national institutions engaged in primary and secondary data collection, collation and dissemination should incorporate a disability dimension in all their studies.

10. Inter-governmental, regional and all other development organizations should undertake and promote research studies in the area of ICTs and their use by PWDs, particularly

[5] *Ibid* Chapter 4, p. 69 "Information and Communication Technologies and Persons with Disabilities, by Anuradha Mohit, National Human Rights Commission, New Delhi, India

in developing countries.

11. Governments should promote the establishment of Department of Disability Studies in major state-sponsored universities.

In 2003, the General Conference of UNESCO also adopted the *RECOMMENDATION CONCERNING THE PROMOTION AND USE OF MULTILINGUALISM AND UNIVERSAL ACCESS TO CYBERSPACE.* It specifies that: "Member States and international organizations should establish mechanisms at the local, national, regional and international levels to facilitate universal access to the Internet through affordable telecommunications and Internet costs with special consideration given to the needs of public service and educational institutions, and of disadvantaged and *disabled population groups*. New incentives in this area should be designed towards this end including public-private partnerships to encourage investment and the lowering of financial barriers to the use of ICT, such as taxes and customs duties on informatics equipment, software and services."[6]

TABLE 1 - MILESTONES OF THE INTERNATIONAL FRAMEWORK TO PROTECT THE RIGHTS OF PERSONS WITH DISABILITIES AND PROMOTE ACCESSIBILITY TO ICTS AND KNOWLEDGE

Year	International Treaties and Declarations	Events
1948	Universal Declaration of Human Rights	
1960	Convention Against Discrimination in Education	
1979	Convention on the Elimination of All Forms of Discrimination Against Women	
1989	Convention on the Rights of the Child	
1990	The World Declaration of Education for All	
1993	The UN Standard Rules on the Equalization of Opportunities for Persons with Disabilities	
1994	The Salamanca statement and framework for action on special education	World Conference on Special Needs Education, Salamanca, Spain
2000	Millennium Development Goals Dakar Framework for Action	World Education Forum, Dakar, Senegal
2001	Ad'Hoc Preparatory Committee for the CRPD formed by the U.N. General Assembly	
2002	Promoting an inclusive, barrier-free and rights - based society for people with disabilities in the Asian and Pacific region in the twenty-first century[7]	

[6] Monitoring of the implementation of this recommendation was reported in the first (20 July 2007) and second (19 July 2011) reports to the General Conference

[7] UNESCAP Resolution 58/4 www.unescap.org/epoc/documents/L2.1_PacificResolution.doc

2003	UNESCO General Conference - Recommendation concerning the promotion and use of multilingualism and universal access to cyberspace	WSIS Geneva Principles and Lines of Action
2004	ISO/IEC Joint Technical Committee 1 (JTC 1) forms Special Working Group on Accessibility (SWG-A)	
2005	WSIS Tunis Declaration	WSIS Tunis
2006	UN Convention on the Rights of Persons with Disabilities	
2008		UNESCO International Conference on Education, Geneva, Switzerland
2012	ITU Telecom Treaty	World Conference on International Telecommunications (WCIT), Dubai, United Arab Emirates

b. Failure of the Millennium Development Goals to address disability

The United Nations developed and issued in 2000 the eight Millennium Development Goals with ambitious objectives to alleviate poverty and promote primary education specifically by ensuring that "by 2015, children everywhere, boys and girls alike, will be able to complete a full course of primary schooling." The MDGs also articulate the need to "develop a global partnership for development," and include a specific target #18, "in cooperation with the private sector, make available the benefits of new technologies, especially information and communication," with indicators drawn from Partnership on Measuring ICT for Development[8]: Core ICT Indicators (measuring telephone lines, cellular subscribers, personal computers in use and Internet users per 100 inhabitants).

However, while the awareness of the importance of the inclusion of persons with disabilities grew in the latter part of the 1990s, the Millennium Development Goals failed to capture the issue of persons with disabilities and their accessibility challenges. Such omission may be attributed to the lack of participation by organizations of persons with disabilities in the development of the MDGs. In retrospect, omitting disability, clearly identified today a key driver of poverty[9], created a major gap in the United Nations MDG strategy which still persists.

This gap has been recently addressed and was best summarized by the resolution adopted by the General Assembly of the United Nations on the report of its Third Committee on February 4, 2011 on "*Realizing the Millennium Development Goals for persons with disabilities towards 2015 and beyond*[10]*."* Its recitals state: *"Gravely concerned that persons with disabilities are often subject to multiple or aggravated forms of discrimination and are still largely invisible in the*

[8] Partnership on Measuring ICT for Development http://www.itu.int/ITU-D/ict/partnership/
[9] Disability and Poverty in Developing Countries: A Snapshot from the World Health Survey by Sophie Mitra, Aleksandra Posarac and Brandon Vick http://siteresources.worldbank.org/SOCIALPROTECTION/Resources/SP-Discussion-papers/Disability-DP/1109.pdf
[10] (A/65/448) 65/186

implementation, monitoring and evaluation of the Millennium Development Goals"… In a joint statement, IDA and IDDC[11] specify, "*Persons with disabilities were absent from the Millennium Declaration and have remained so throughout the Millennium Development Goals processes: According to the UN System Task Team report on the post-2015 agenda, the MDGs have not reached the poorest and most marginalized people. The exclusion and invisibility of persons with disabilities is indicative of how the present framework fails. This has been compounded by a lack of reliable statistics on persons with disabilities. They face discrimination on multiple levels, yet remain absent in the implementation, monitoring and evaluation of the MDGs."*

The agenda of the planned High Level Meeting on Disability and Development which will take place in September 2013 at UN headquarters in New York will address this gap which is further documented by a recent report published by UN DESA[12]. It is hoped that the present report may contribute to this important discussion.

c. WSIS 2003 Geneva and WSIS 2005 Tunis: Setting the stage for Information Access and the full participation of Persons with Disabilities in Knowledge Societies

The United Nations Educational, Scientific and Cultural Organization (UNESCO) took an early lead in including information and communication technologies in its mission to promote education, science and culture in the world. UNESCO started focusing on *"building inclusive knowledge societies through information and communication"* as a tool of empowerment for the world population.

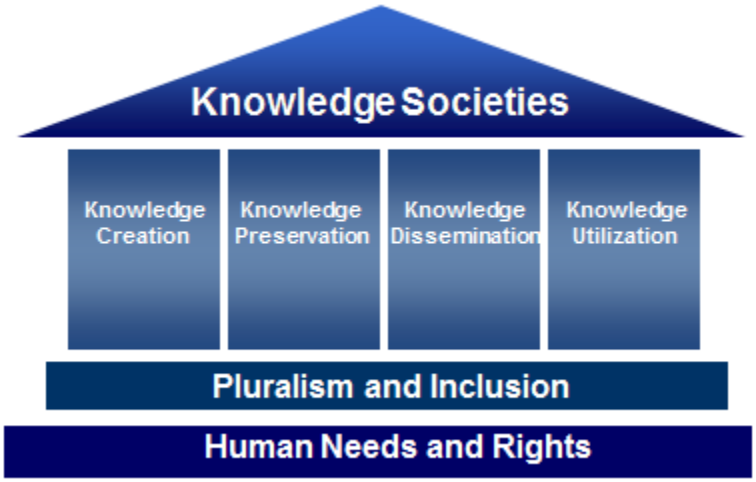

TABLE 2 - KNOWLEDGE SOCIETY PILLARS

[11] The International Disability Alliance (IDA) and the International Disability and Development Consortium (IDDC) have recently drafted a position paper on the post-MDG framework. In the position paper (Make the post-MDG framework inclusive of persons with disabilities), IDDC and IDA include a number of recommendations to be taken into account in order to create a more equitable and inclusive post-MDG agenda.

[12] UNDESA http://www.slideshare.net/undesa/disability-and-the-millennium-development-goals

Cooperating with other United Nations agencies and member governments, UNESCO along with the International Telecommunication Union (ITU) was a main driver in the organization of the World Summit on Information Society (WSIS), both in Geneva in 2003 and in Tunis in 2005. Both organizations complemented each other well: While UNESCO focused on exploring issues related to Knowledge Societies including content creation, capacity building and cultural, scientific, educational, ethical and linguistic factors, the International Telecommunication Union contributed its in depth expertise in tackling issues of the information infrastructure.

In its seminal world report "Towards Knowledge Societies"[13], UNESCO covered in great details the importance of the ICT infrastructure and access to information as an enabler of Knowledge Societies. It offered measurements based upon key statistics of computer and Internet usage, broadband access, mobile and fixed telephones and radio and television. It also emphasized the multifaceted digital divide that prevents a number of categories of population from accessing ICTs and thus participating in the benefits of Knowledge Societies. It mentioned economic and geographic inequalities, gender and age issues, language, education and cultural limitations and a lack of access to the Internet without employment. More specifically, the report also emphasized the risk of exclusion of persons with disabilities from ICTs access:

"Disabilities: in the year 2000, only 23.9 per cent of people with a disability possessed a personal computer in the United States (the national average at the time stood at 51.7 per cent of the population). Yet, because of their handicap, they frequently remain at home and the internet represents for them a unique opportunity for social integration, if only through remote working. However, people with a disability encounter a whole series of difficulties, whether economic, cultural or psychological, that helps to deepen the digital divide. Furthermore, physical disabilities are a real obstacle to using computers. Whereas in the year 2000, 31.2 per cent of people with learning disabilities had access to the internet in the United States, the figure for those with hearing difficulties was little more than 21.3 per cent, for those with problems in using their hands 17.5 per cent, for the partially sighted 16.3 per cent, and for those with motor disabilities 15 per cent. Due credit must however be
paid to those manufacturers who have tried to develop instruments that facilitate the use of computers by the disabled, such as access to contextual menus by means of single-handed key-in operations."

The report thus clearly established the criticality of access to ICTs as a condition for persons with disabilities to fully participate in Knowledge Societies.

d. The WSIS Plan of Action: Recognizing the Rights of Persons with Disabilities to access information and knowledge

In December 2003, WSIS in Geneva declared its *"desire and commitment to build a people-centered, inclusive and development-oriented Information Society, where everyone can create, access, utilize and share information and knowledge, enabling individuals, communities and peoples to achieve their full potential in promoting their sustainable development and improving their quality of life."*
The conclusions of the Summit called for a full cooperation between international institutions and national government, between public and private entities and corporations, to establish a

[13] UNESCO World Report, 2005 *Towards Knowledge Societies,* p.30

framework of accessible ICTs for all including a strong infrastructure, a sharing of global knowledge with respect to national identities and cultures, and to create the tools of capacity building for all users.

The Summit defined 11 action lines to push forward its agenda of inclusive information societies including several specifically addressing the situation of persons with disabilities: Action line C2 on *Infrastructure*, C3 on *Access to information and Knowledge*, C4 on *Capacity building*, C7 on *ICT applications benefits in all aspects of life*, and C8 on *Cultural diversity and identity*, *linguistic diversity and local content,* and outlined a series of steps to be implemented by public and private institutions.

The WSIS Action Plan includes notably the following guidelines covering persons with disabilities:

C2. Information and communication infrastructure: an essential foundation for the Information Society - #9

> Section (e) In the context of national e-strategies, address the special requirements of older people, persons with disabilities, children, especially marginalized children and other disadvantaged and vulnerable groups, including by appropriate educational administrative and legislative measures to ensure their full inclusion in the Information Society.
> Section (f) Encourage the design and production of ICT equipment and services so that everyone, has easy and affordable access to them including older people, persons with disabilities, children, especially marginalized children, and other disadvantaged and vulnerable groups, and promote the development of technologies, applications, and content suited to their needs, guided by the Universal Design Principle and further enhanced by the use of assistive technologies."

C7. ICT applications: benefits in all aspects of life - #19 on Employment

> Section (c) Promote teleworking to allow citizens, particularly in the developing countries, LDCs, and small economies, to live in their societies and work anywhere, and to increase employment opportunities for women, and for those with disabilities. In promoting teleworking, special attention should be given to strategies promoting job creation and the retention of the skilled working force.

C8. Cultural diversity and identity, linguistic diversity and local content - #23

> Section (i) Nurture the local capacity for the creation and distribution of software in local languages, as well as content that is relevant to different segments of population, including non-literate, persons with disabilities, disadvantaged and vulnerable groups especially in developing countries and countries with economies in transition.

While persons with disabilities are explicitly mentioned in four instances only, the language of the Action Lines covering "vulnerable groups" may be interpreted as covering persons with disabilities.

C3. Access to Information and Knowledge - #10

> Section (c) Promote research and development to facilitate accessibility of ICTs for all, including disadvantaged, marginalized and vulnerable groups.

C4. Capacity Building - #11

> Section (c) Promote e-literacy skills for all, for example by designing and offering courses for public administration, taking advantage of existing facilities such as libraries, multipurpose community centres, public access points and by establishing local ICT training centres with the cooperation of all stakeholders. Special attention should be paid to disadvantaged and vulnerable groups.

C7. ICT applications: benefits in all aspects of life - #18

> Section (e) Encourage the adoption of ICTs to improve and extend health care and health information systems to remote and underserved areas and vulnerable populations, recognizing women's roles as health providers in their families and communities.

While not focused on ICT accessibility for persons with disabilities, the WSIS Plan of Action represents the first global effort to specifically address the issues of access to information and knowledge for persons with disabilities and ICT accessibility. It is noteworthy that several articles of the Convention on the Rights of Persons with Disabilities (CRPD) contain similar language to the WSIS Plan of Action, in particular action line C2 #9 (f) on product development and Universal Design, and C3 #10 (c) Access to Information and Knowledge on research and development.

Conversely, several WSIS guidelines were not included in the CRPD which cover ICT accessibility and assistive technologies for persons with disabilities, such as nurturing the local capacity for the creation and distribution of software in local languages.

In this context, UNESCO's approach of Knowledge Societies contributed to set the foundation for a Human Rights approach to access to information and knowledge for persons with disabilities which was reflected in the WSIS process.

In the fall of 2005, WSIS convened in Tunis to reaffirm the commitments outlined in Geneva. In particular, WSIS recognized that *"Access to information and sharing, and creation of knowledge contributes significantly to strengthening economic, social and cultural development"* towards reaching the MDGs. Its Declaration of Principles further stated that "*This process can be enhanced by removing barriers to universal, ubiquitous, equitable and affordable access to information."* The Tunis Commitment issued at the end of the Summit included the following additional guidelines covering persons with disabilities:

> 18. We shall strive unremittingly, therefore, to promote universal, ubiquitous, equitable and affordable access to ICTs, including universal design and assistive technologies, for all people, especially those with disabilities, everywhere, to

ensure that the benefits are more evenly distributed between and within societies, and to bridge the digital divide in order to create digital opportunities for all and benefit from the potential offered by ICTs for development.

19. The international community should take necessary measures to ensure that all countries of the world have equitable and affordable access to ICTs, so that their benefits in the fields of socio-economic development and bridging the digital divide are truly inclusive.

20. To that end, we shall pay particular attention to the special needs of marginalized and vulnerable groups of society including migrants, internally displaced persons and refugees, unemployed and underprivileged people, minorities and nomadic people, older persons and persons with disabilities.

The Tunis Agenda for the Information Society also included specific guidelines covering persons with disabilities which included language that linked for the first time the need to take into account persons with disabilities in order to achieve the MDGs:

90 – "We reaffirm our commitment to providing equitable access to information and knowledge for all, recognizing the role of ICTs for economic growth and development. We are committed to working towards achieving the indicative targets, set out in the Geneva Plan of Action, that serve as global references for improving connectivity and universal, ubiquitous, equitable, non-discriminatory and affordable access to, and use of ICTs, considering different national circumstances, to be achieved by 2015, and to using ICTs, as a tool to achieve the internationally agreed development goals and objectives, including the Millennium Development Goals, by:

Section c. building ICT capacity for all and confidence in the use of ICTs by all - including youth, older persons, women, indigenous peoples, people with disabilities, and remote and rural communities - through the improvement and delivery of relevant education and training programmes and systems including lifelong and distance learning.

Section e. paying special attention to the formulation of universal design concepts and the use of assistive technologies that promote access for all persons, including those with disabilities.

Section n. promoting the use of traditional and new media in order to foster universal access to information, culture and knowledge for all people, especially vulnerable populations and populations in developing countries and using, inter alia, radio and television as educational and learning tools."

The WSIS Summit in Tunis also promoted a greater dialogue among stakeholders involved with ICT accessibility and persons with disabilities by organizing a Workshop on ICT and Persons with Disabilities on November 16, 2005 hosted by the Communication and Information Sector of

UNESCO. This event further contributed to the global awareness of the specific issues related to access to information and knowledge and ICTs for persons with disabilities.

In its Strategic Plan for the Information for All Programme (2008 – 2013),[14] UNESCO defined Information Accessibility including *"promoting the development of digital resources accessible to people with disabilities"* as one of its priorities. It also described in its proposed Outcome 9 on *"Digital Resources Accessible to People with Disabilities"* the following vision:

> *"In an ideal world, every human being, irrespective of any disability they may have, would have access to information they need to manage and enhance their lives, whenever required and at a place convenient to them. The rapid growth of mobile phones suggests this could become the ultimate personal information access device. However, there is no ubiquitous solution for people with disabilities – telephones are of limited value to the deaf community while the Internet is of less value to those who are blind. But there have been many innovative uses of information and communication technologies (ICTs) to overcome these challenges. The outcome IFAP seeks is to ensure that national information and knowledge policies provide for digital resources to be accessible to all people, including those with disabilities."*

e. Follow-up activities to WSIS

Under the co-responsibility of UNESCO and ITU, as assigned by the Summit, WSIS has convened several yearly fora to review the steps taken towards the goals defined by the Geneva and Tunis sessions.

TABLE 3 - WSIS IMPLEMENTATION MEETINGS ORGANIZED BY ITU, UNESCO AND UNDP

- WSIS Forum 2012: 14 – 18 May 2012, Geneva, Switzerland
- WSIS Forum 2011: 16 – 20 May 2011, Geneva
- WSIS Forum 2010: 10-14 May 2010, Geneva, Switzerland
- WSIS Forum 2009: 18-22 May, Geneva, Switzerland
- 2008: 13-30 May, Geneva, Switzerland
- 2007: 14-25 May, Geneva, Switzerland
- 2006: 9-19 May, Geneva, Switzerland
- 2006: 5 April, New York, The UN General Assembly endorses outcome of WSIS
- 2006: 27 February, first consultation meeting on the World Summit on the Information Society (WSIS) Action Line Facilitators, UNESCO, ITU, UNDP, Geneva Switzerland

[14] Strategic Plan for the Information for All Programme – UNESCO – 2008 pp. 28 and http://www.unesco.org/new/fileadmin/MULTIMEDIA/HQ/CI/CI/pdf/ifap2008_council_draft_strategic_plan.pdf

A number of conferences, expert group meetings, capacity building seminars and briefing sessions at the Conference of States Parties to the CRPD organized by United Nations agencies and WSIS stakeholders also took place during the same time frame, among which:

TABLE 4 - POST WSIS EVENTS ON ACCESS TO INFORMATION AND KNOWLEDGE FOR PERSONS WITH DISABILTIES ORGANIZED BY WSIS STAKEHOLDERS

Date	International Conferences	Events	Location
December 2006	Constitution of the Global Initiative for Inclusive ICTs (GAID – UNDESA)		United Nations, New York
March 2007	Global forum on ICT Accessibility for Persons with Disabilities		United Nations, New York
September 2007	GAID Global Forum on Youth and ICT Development		Geneva, Switzerland
September 2007	ITU Conference on Accessibility		Geneva, Switzerland
April 2008	Joint ITU/G3ict Forum on CRPD implications for Standards Development Organizations		Geneva, Switzerland
September 2008	Global Dialogue: "Empowering People with Disabilities for the Information Age", World Bank		Washington DC, USA
October 2008	UNESCAP: Regional Workshop on Enhancement of ICT Accessibility		Incheon, South Korea
December 2008	Internet Governance Forum Meeting	First meeting of the Dynamic Coalition on Accessibility and Disability (DCAD)	Hyderabad, India
April 2009	ILO International Training Center, "Labour Market Inclusion of People with Disabilities		Turin, Italy
April 2009		The International Cross Disciplinary Conference on Web Accessibility (W4A)	Madrid, Spain
August 2009	ITU-T Kaleidoscope 2009: "Innovations for Digital Inclusion		Mar Del Plata, Argentina

October 2009	ITU Telecom World	**UNESCO's** Pavilion "Empowering Persons with **Disabilities** through ICTs" at **ITU Telecom World** 2009	Geneva, Switzerland
November 2009	4th Internet Governance Forum Meeting	DCAD seminar	Sharm El Sheikh, Egypt
December 2009	International Day of Persons with Disabilities, UN Headquarters	G3ict – UNITAR seminar with SG Ban Ki-moon participation on Digital Accessibility	UN DESA, New York, USA
February 2010		Joint UNESCO-G3ict meeting: "Mainstreaming ICTs for Persons with Disabilities to Access Information and Knowledge"	Paris, France
February 2010		Launch of Joint ITU-G3ict Policy Toolkit for persons with disabilities	Geneva, Switzerland
March 2010		FOSS-AMA (Free and Open Source Software - for Accessible Mainstream Applications)	Paphos, Cyprus
June 2010	World Bank's Expert Group Meeting on Accessibility		Washington DC, USA
September 2010		UNESCO Open Forum, Internet Governance Forum (IGF 2010)	Vilnius, Lithuania
November 2010	ITU Workshop on Accessibility: "Accessibility and the contribution of International Standards"		Geneva, Switzerland
April 2011		World Broadcasting Union Technical Committee (WBU-TC) Meeting on Accessibility	Las Vegas, USA
		IDP Africa Forum and the Launching of	Accra, Ghana

		Techshare Africa	
June 2011		Launch of Broadband Commission for Digital Development report “Broadband: A Platform for Progress”	UNESCO-ITU, Paris, France
		International conference “i-access” by European Agency for Development in Special Needs Education	Copenhagen, Denmark
July 2011		XVI World Congress of the World Federation of the Deaf	Durban, South Africa
September 2011	4th Annual Conference of States Parties to the CRPD	ILO – G3ict seminar on reasonable accommodation	New York, USA
October 2011	Disabled Peoples' International (DPI) 8th World Assembly	Launch of the 1st edition of the G3ict – DPI CRPD ICT Accessibility Progress Report	Durban, South Africa
October 2011	ITU Telecom World		Geneva, Switzerland
November 2011		UNESCO-Microsoft consultative meeting on Accessible ICTs and Personalized Learning for Students with Disabilities	Paris, France
December 2011		M-Enabling Summit 2011: Global Conference on Mobile for Seniors and Persons with Disabilities	Washington DC, USA
February 2012		WHO-World Bank World Disability Report Launch Event: "No Barriers to Life!"	Istanbul, Turkey
April 2012		UN Expert Group Meeting on Building Inclusive Society and Development through Promoting ICT Accessibility:	Tokyo, Japan

		Emerging Issues and Trends	
May 2012		World Bank Inaugural Disability & Development Core Course - ICT accessibility module	Washington DC, USA
June 2012		Rio+20 Side Event: Promoting Disability-Inclusive Development for a Sustainable Future	Rio de Janeiro, Brazil
July 2012	ITU Connect Americas Summit		Panama City, Panama
September 2012	CRPD Conference of States Parties – Plenary session on accessibility to technology	- Launch of UNITE program "United Nations ICT Engagement for Persons with Disabilities" - Launch of 2n edition of CRPD ICT Accessibility Progress Report	United Nations, New York, USA
October 2012	Global Symposium of Regulators and ITU Telecom World 2012	Sessions on ICT accessibility	Dubai, UAE Colombo, Sri Lanka
December 2012		Microsoft/EDF Web Accessibility Forum: What is the Way Forward to make Real Progress on Accessible Web	Brussels, Belgium
March 2013	WSIS +10		UNESCO, Paris, France

f. UNESCO REPORT TO UNDESA – MAY 2012: ACTIVITIES RELATED TO PROMOTING ACCESSIBILITY TO INFORMATION AND KNOWLEDGE FOR PERSONS WITH DISABILITIES

In May 2012, UNESCO provided to UNDESA a report on its activities regarding persons with disabilities in the context of Resolution A/RES/65/186 on realizing the MDGs for Persons with Disabilities towards 2015 and beyond. It provides a useful summary of UNESCO's contributions to advancing the rights of persons with disabilities and their access to Knowledge Societies:

(a) Information on efforts and progress made, since 2010, in implementing programmes and policies related to persons with disabilities to realize each MDG:

• UNESCO adopted a policy on the employment of persons with disabilities in 2010 (AC/HR/5 Policy on the employment of persons with disabilities (13 October 2010)

• UNESCO, every two years, awards the UNESCO/Emir Jaber al-Ahmad al-Jaber al-Sabah Prize to Promote Quality Education for Persons with Intellectual Disabilities.
http://www.unesco.org/new/en/education/themes/strengthening-education-systems/inclusive-education/prizes/

• UNESCO continued to promote inclusive education systems to support the attainment of Education for All goals. UNESCO fulfills a mission of (a) advocacy – to convince Member States of the need to respect and fulfill their legal obligations; (b) catalysis – to accelerate the process of partnering for implementation between partners; (c) capacity building – to assist member states improve the planning and implementation capacity of their Ministries of Education and other Ministries involved for inclusion, and develop their national legislations on the right to education; and (d) monitoring – to tack global progress in the shift from exclusion to inclusion and the implementation of the right to education. The statement adopted by the Tenth Meeting of the High-Level Group on Education for All (EFA), 22-24 March 2011, Jomtien Thailand, addresses inequalities caused by disadvantages and discrimination associated with disabilities, and alerts that they are impeding the achievement of Education for All goals (Jomtien Statement - March 2011):
http://unesdoc.unesco.org/images/0019/001919/191931E.pdf

• UNESCO continued to enhance the national capacities for the design, management and implementation of inclusive policy frameworks and inclusive curricular guidance materials. The Inclusive Education programme “Promoting inclusive education in policy dialogue”, conducted by UNESCO International Bureau of Education in 2010 achieved the following:

(a) National, regional and interregional key partnership strengthened with a view to developing and implementing policy frameworks and guidelines based on a broadened concept of Inclusion Education;

(b) Regional and interregional capacity development workshops organized to develop capacity among Inclusive Education experts, educators and curriculum developers;

(c) Concrete guidance manual and modules for school and teachers produced in coordination with UNESCO Field Offices (Bangkok, Beirut, BREDA and Jakarta), regional Inclusive Education experts, educators and curriculum developers.

• UNESCO prepares a Global Report on the Use of ICTs in Education for Persons with Disabilities to be published in 2013. The report will provide an overview and critical assessment on the use of information and communication technology (ICT) in education, both in policy and in practice, for persons with disabilities based on five regional studies.

• UNESCO’s Institute for Information Technologies in Education (IITE) provides support to the policy dialogue and initiates the development of national e-inclusive strategies aimed at increasing disadvantaged and excluded groups` access to ICT infrastructure; promoting basic ICT literacy and vocational training programs targeted specifically at the most vulnerable segments of society; and supporting regional, sub-regional and inter-country cooperation and good practice exchange on the extension of ICT usage to excluded groups. The Institute

developed a specialized training course named: "ICTs in Education for People with Special Needs. The Institute also published in 2011 a Review “ICTs in Education for People with Disabilities”, in cooperation with the European Agency for Development in Special Needs Education. (http://iite.unesco.org/publications/3214682/).

- UNESCO in cooperation with the European Agency for Development in Special Needs Education launched in 2010 a database of actions that translate the principles of inclusive education into action. The examples are collected from countries around the world, and include policies, practices, curriculum and learning materials that aim at the inclusion of all, including persons with disabilities (http://www.inclusive-education-in-action.org/iea/)

- UNESCO is part of the Committee of experts on the rights of people with disabilities (CS-RPD), which has been set up under the authority of the European Committee for Social Cohesion in November 2011. The CS-RPD will undertake initiatives to ensure the promotion, implementation and follow-up of the Recommendation of the Committee of Ministers to Member States on the “Council of Europe Action Plan to promote the rights and full participation of people with disabilities in society: improving the quality of life of people with disabilities in Europe 2006-2015”.

- UNESCO, in partnership with Microsoft Corporation (in relation to the Partnership Agreement), has prepared a report entitled "Accessible ICTs and Personalized Learning for Students with Disabilities: A Dialogue among Educators, Industry, Government and Civil Society". The report provides concrete recommendations and good practices for educators and policy and decision makers on personalizing ICTs in education, particularly for students with learning difficulties and mild physical disabilities.

  (http://www.unesco.org/new/fileadmin/MULTIMEDIA/HQ/CI/CI/pdf/accessible_ict_personalized_learning_2012%20.pdf).

- UNESCO launched a project funded by West African Economic and Monetary Union (known by its French acronym- UEMOA) that will catalyze improvement in the quality of higher education in UEMOA Member States (Senegal, Mali, Benin, Burkina Faso, Guinea-Bissau, Niger, Togo, and Ivory Coast) in September 2011. The overall objective of this project is to strengthen the capacity of higher education institutions and centres of excellence in UEMOA member countries in order to facilitate effective implementation of the Licence-Master-Doctorate (LMD) reform. Accessibility aspects were included in the project.

- The Inclusive Design Institute, in partnership with UNESCO and the Ontario Ministry of Social Services and Community (Canada), has developed a consolidated and publicly-reviewed guidance to help to ensure the accessibility of office documents and the office application with which they are created. The accessible office documents are essential for the inclusion of persons with disabilities in employment market. (http://adod.idrc.ocad.ca/node/1).

- At the international level, UNESCO strengthened international cooperation, organized number of awareness raising events together with public, private and other UN agencies on the promotion of access to information and knowledge by persons with disabilities (Internet Governance Forum – IGF 2010, WSIS Forum 2011, WSIS Forum 2012, expert meeting in February 2010, contributed to the panel discussion ECOSOC Annual Ministerial Review in Geneva, July 2011). (http://www.unesco.org/webworld/en/access-people-disabilities

- UNESCO granted a patronage to the international events such as the International Conference on Computers Helping People with Special Needs (ICCHP) 2010 and 2012 (14-16 July 2010 in Vienna, Austria and 11-13 July 2012 in Linz, Austria). The conference is an open forum which provides unique opportunity for young researchers to present their research results and projects in the area of accessibility (http://www.icchp.org).

- In 2010-2011, UNESCO and the Trust for the Americas of the Organization of American States (OAS) launched a partnership in order to jointly analyze the situation of access to ICTs in formal and non-formal education for persons with disabilities in Latin America (see attachment).

- The World Heritage Committee will start a reflection on how the accessibility to World Heritage properties could be improved for persons with disabilities in the framework of the ongoing reflection on World Heritage and Human Rights undertaken by ICOMOS Norway.

- In 2009 and 2011, UNESCO implemented a two-year project, funded under UBW, on HIV prevention and empowerment programmes among vulnerable groups in Belize, Guyana, Jamaica, St. Vincent and the Grenadines and Suriname. Under the project, 30 peer educators with hearing impairment from 10 Schools for the Deaf in Jamaica were equipped with skills and techniques to reduce stigma and discrimination and vulnerability among the deaf community to HIV and AIDS in a five-day workshop organized by the UNESCO Kingston Office at the Caribbean Christian Centre in Mandeville, Jamaica, on 20-24 July, 2009.

- UNESCO held a sub-regional workshop in Antigua and Barbuda on 21-24 November 2011 to promote common understandings of a broadened concept of inclusive education and its implications for holistic education policy and curricular reforms. The Convention for Disabled Persons and other tools on disability were distributed during the workshop. The 30 participants in the workshop were mainly curriculum planners, special needs education experts and other experts from 13 UNESCO Member States.

- In close cooperation with the Ministry of Education and the Higher Council for the Affairs of Persons with Disabilities (HCD), UNESCO implemented a project to improve the quality of the education for children with hearing disabilities and raise awareness of their difficulties in Jordan. Training of trainers (ToT) were also conducted with school supervisors on the rights of persons with disabilities, sign-language interpretation (SLI), SL educational practices and teaching methodologies for students with hearing impairment. In coordination with the HCD, UNESCO has provided specialized equipment for the blind, computers and educational toys in support of teaching blind students in Jordan.

- To raise awareness on the rights of women with disabilities, the UNESCO Amman office organized a roundtable in March 2012 on the theme - Challenges facing women with disabilities in rural areas - in coordination with the Higher Council for Person with Disabilities Affairs (HCD) and the UNESCO Centre for Palestinian Women for Research and Documentation Centre (PWRDC).

2. THE TRANSLATION OF THE WSIS ACCESSIBILITY AGENDA INTO A RIGHTS-BASED APPROACH: THE CONVENTION ON THE RIGHTS OF PERSONS WITH DISABILITIES

While the imperative to ensure the full participation of persons with disabilities in Knowledge Societies was promoted by WSIS and integrated in its Action Plan, the Convention on the Rights or Persons with Disabilities, which benefited from WSIS' initial work, became the first enforceable legal instrument creating obligations for its States Parties in matters of ICT accessibility and access to information and knowledge.

a. AD HOC COMMITTEE FOR THE CRPD, INPUT FROM AROUND THE WORLD ON ICT ACCESSIBILITY

Following the 1981-1991 UN "Decade of Disabled Persons," a decision to draft an international convention to prevent and eliminate discrimination against persons with disabilities led to the creation in 2001 of an ad hoc committee to draft such a text, closely associating disability advocacy organizations worldwide.

The CRPD was negotiated during eight sessions of the Ad Hoc Committee of the General Assembly, making it the fastest negotiated human rights treaty in history. States negotiated the treaty with the active participation of the disability community through civil society organizations, national human rights institutions and inter-governmental organizations, including via remote participation over the Internet. A draft treaty was completed in 2004. Adopted by the UN General Assembly on December 13, 2006, the Convention was open for signature on March 30, 2007. As of the end of 2012, 156 countries have signed the Convention, and 126 countries have ratified it. The unique success of the CRPD among UN treaties is attributable to several factors:

- A raising awareness of the exclusion of persons with disabilities from modern societies, both in developed and developing countries.
- A text addressing the real issues and factors of exclusion affecting persons with disabilities with significant input from multiple stakeholders, including disabled persons organizations, international agencies, national governments, and the private sector.
- The adoption by the CRPD of a contemporary definition of accessibility, including information and communications and their multiple applications in Knowledge Societies, consistent with WSIS' directions.

The Committee on the Rights of Persons with Disabilities, part of the Office of the High Commissioner for Human Rights of the UN, monitors the implementation of the dispositions of the CRPD by ratifying countries, through reports submitted by those countries.

b. INFORMATION, KNOWLEDGE AND ICT ACCESSIBILITY IN THE CRPD

With the WSIS 2003 and 2005 declarations and action plans and several national legislations on ICT accessibility as references, the Ad Hoc Committee for the CRPD included very innovative and essential dispositions concerning Information and knowledge and ICTs. Indeed, for the first time, accessibility to the cultural environment, education and information and

communication is defined as a condition for persons with disabilities to exercise their rights and participate in knowledge societies including, but not limited to, political life, freedom of expression, education, employment, culture and leisure.

Section (v) of its preamble states: “Recognizing the importance of accessibility to the physical, social, economic and cultural environment, to health and education and to information and communication, in enabling persons with disabilities to fully enjoy all human rights and fundamental freedoms.”

Article 21 on Freedom of expression and opinion, and access to information covers “the right to freedom of expression and opinion, including the freedom to seek, receive and impart information and ideas on an equal basis with others and through all forms of communication of their choice.”

Article 9 on Accessibility includes ICT accessibility on par with accessibility to the physical environment and transportation: “To enable persons with disabilities to live independently and participate fully in all aspects of life, States Parties shall take appropriate measures to ensure to persons with disabilities access, on an equal basis with others, to the physical environment, to transportation, to information and communications, including information and communications technologies and systems...” This definition of Accessibility implies that all the dispositions of the Convention that include the terms «accessible» or «accessibility» cover ICT applications and services, a far reaching implication for industry, governments and civil society.

Throughout its entire set of articles, the Convention addresses issues related to ICTs as an essential enabler by bringing very clear and specific answers to two fundamental challenges:

- How to ensure that barriers are not created by ICTs?
- How to leverage ICT-based assistive solutions for persons with disabilities?

Very appropriately, given the rapid evolution of technologies and diverse ICT environments found around the world, those dispositions define obligations in relation to desired outcomes by application areas, rather than in specific technical terms. It is the responsibility of States, civil society and industry to define the required solutions in their respective jurisdictions. Meanwhile, similarly to the WSIS Action Plan, affordability is stated as an important underlying objective across the text of the Convention to ensure that accessible and assistive technologies are not priced out of reach for persons living with disabilities who are often economically disadvantaged.

Fourteen out of the first 32 non-procedural articles of the Convention mention obligations of states regarding Accessibility or Reasonable Accommodation with implications for Information and Communication Technologies.

TABLE 5 - CRPD DISPOSITIONS ON ICT ACCESSIBILITY BY APPLICATION AREAS

Application Areas	CRPD Article	Accessibility Dispositions with implications for ICTs	Reasonable Accommodation	Promoting Assistive Technologies
Non discrimination	**5**		**Y**	
E-Government	**9.2.a**	**Y**		

Media and Internet	**9.1, 9,2.g**	**Y**		
Television	**30.1.b**	**Y**		
Private Sector Services	**9.2.b**	**Y**		
Liberty and Security	**14**		**Y**	
Living Independently	**19**			**Y**
Education	**24**	**Y**	**Y**	**Y**
Employment	**27**	**Y**	**Y**	
Political Rights	**21, 29**	**Y**		**Y**
Emergency Services	**9.1.b, 11**	**Y**		
Culture and Leisure	**30.5.c**	**Y**		
Personal Mobility	**20**			**Y**
Rehabilitation	**2**			**Y**

Source: G3ict

There are three main types of mandates which States have to consider as they align their local legislation, regulations and programs with the dispositions of the Convention:

- Accessibility Mandates for: E-Government, Employment, Education, Media & Internet, Consumer Services, Freedom of Expression, Access to Information, Emergency Response, Personal Mobility, Independent Living, Culture & Leisure.
- Facilitating Assistive Technologies for Education, Emergency Response, Personal Mobility, and Independent Living.
- Supporting ICT Vendors R & D for assistive technologies applied to Personal Mobility and Independent Living.

In addition, a far reaching disposition of the Convention is that its accessibility mandates cover private sector services, including ICT-based services: "The state must insure that private entities that offer facilities and services to the public take into account the accessibility of those services" (Art. 9 - also mentioned in Art. 21).

Finally, the Convention directly addresses important issues related to the development of ICT products and services. It mandates States to:

- "Promote the design, development, production and distribution of accessible information and communications technologies and systems at an early stage, so that these technologies and systems become accessible at minimum cost" (Art. 9)
- "To undertake or promote research and development of universally designed goods, services, equipment and facilities, as defined in article 2 of the present Convention, which should require the minimum possible adaptation and the least cost to meet the specific needs of a person with disabilities, to promote their availability and use, and to promote universal design in the development of standards and guidelines" (Art. 4)
- States are also encouraged to establish international cooperation to support new technology

c. Obligation to Enact Legislation and Regulations for ICTs

The Convention presents various degrees of mandates in its text. It stipulates, however, that States Parties to the Convention shall undertake (Art. 4):

"To adopt all appropriate legislative, administrative and other measures for the implementation of the rights recognized in the present Convention;

To take all appropriate measures, including legislation, to modify or abolish existing laws, regulations, customs and practices that constitute discrimination against persons with disabilities;

To take into account the protection and promotion of the human rights of persons with disabilities in all policies and programs."

In regard to ICTs, however, limited references are available to policy makers to implement the many dispositions of the Convention covering ICT accessibility. In addition, two critical factors add to the complexity of the task at hand:

- The speed of change due to technological developments
- The mandate to policy makers to ensure that accessible and assistive ICT products are available and affordable

How to promote regulatory, programmatic and legislative good practices allowing ICT vendors to deliver accessible products at an affordable cost is of particular importance. This must be done by leveraging global standards, favoring mass production, economies of scale, competition, all of which ultimately result in global market dynamics driving lower prices and better interoperability. In this context, the greatest risk would indeed be market fragmentation caused by the adoption of heterogeneous standards at country level, disregarding international standards.

d. MEASURING PROGRESS

The first data collection and survey of the degree to which countries implement ICT accessibility policies and programs was undertaken by G3ict, the Global Initiative for Inclusive ICTs,[15] in cooperation with several UN agencies, organizations of persons with disabilities and the private sector. Two editions so far have been published in 2010 and 2012[16].

The 2012 CRPD ICT Accessibility Progress Report includes data collected via questionnaires sent to national disability advocates in 52 countries representing 77.4 percent of the world population. The report offers disability advocates, governments, civil society and international organizations -- monitoring the progress of the implementation of the Convention by States Parties -- data and benchmarks on country laws, policies, and programs pertaining to accessible and assistive ICTs around the globe. All results are available cross-tabulated by region, level of income per capita of Human Development Index to facilitate benchmarking by advocates and policy makers.

[15] Formed in December 2006 under the auspices of UNDESA - GAID in cooperation with UNESCO and ITU

[16] http://g3ict.org/resource_center/publications_and_reports/p/productCategory_whitepapers/subCat_0/id_244

The second edition of the CRPD ICT Accessibility Progress Report was released by G3ict in cooperation with DPI – Disabled Peoples' International, during the Fifth Session of the Conference of States Parties (CoSP5) to the Convention on the Rights of Persons with Disabilities at United Nations Headquarters in New York. The 2012 report shows considerable gaps in ICT accessibility for persons with disabilities. While 67 percent of ratifying countries have adopted laws, policies and programs consistent with the ICT accessibility provisions of the CRPD, only 32 percent have the capacity to implement those provisions, and only 45 percent reflect any implementation or impact, with a large proportion indicating minimum levels of implementation. This result translates into hundreds of millions of persons with disabilities excluded from the digital economy.

The study indicates that significant deficits remain to set in place a foundation to promote ICT accessibility. For example:

- Only 36 percent of countries have a definition of accessibility which includes ICTs or electronic media in their laws of regulations compliant with the definition of accessibility in CRPD Article 9;

Action Step #1: To support national legislative initiatives promoting accessibility including to information, and Information and Communication Technologies as per Art.9 of the CRPD

- While 71 percent of the countries have dispositions to consult persons with disabilities at large, only 16 percent have a mechanism to involve Disabled Persons Organizations (DPOs) in the design, implementation and evaluation of laws, policies and programs regarding ICT accessibility. This is inconsistent with Article 4 (i) 3 of the CRPD and reflects a lack of respect for the rights of persons with disabilities in the context of an Information Society.
- Although 82 percent of the countries have a government body dedicated to persons with disabilities, and 62 percent have a government body solely dedicated to ICTs, only 31 percent of the countries have government funds allocated to programs in support of digital accessibility;
- Only 26.7 percent of States Parties mention having public procurement policies promoting accessible ICTs, meaning that the vast majority of States Parties continue to purchase equipment or services that may be inaccessible to persons with disabilities; and
- In relation to the above, only 35.6 percent provide services to the general public, including through the Internet, in accessible and usable formats for persons with disabilities.

A vital area of ICT accessibility with the greatest impact on the largest population of users, the accessibility of the information infrastructure, is lagging behind ratifying countries' general commitments to the CRPD. More than 75 percent of ratifying countries report no or minimum levels of implementation of policies or programs promoting accessibility in critical areas such as mobile telephony, web sites, fixed telephony, public address systems, television or Automatic Teller Machines (ATMs).

Finally, only 4 percent of the countries surveyed have either statistics or data accessible for the general public about digital access by persons with disabilities, which indicates that basic measurement foundations for policy making and setting objectives are severely lacking.

Action Step #2: WSIS should facilitate the definition of methodologies in cooperation with UNESCO, ITU and civil society to facilitate the implementation of national data collection on the accessibility of information, ICTs, media and knowledge for persons with disabilities

As the above results indicate, while most countries are generally aware of their basic obligation to implement ICT accessibility, they have not translated essential CRPD dispositions into actual policies or programs nor tried to measure their degree of compliance with those.

Confirming the imperative of focusing on the capacity of countries to implement ICT accessibility policies, the following key success factors were identified through regression analysis in relation to successful ICT accessibility outcomes, which WSIS participants and States Parties to the CRPD should consider as priorities:

1. Financial support for DPOs and NGOs working in the field of digital accessibility for persons with disabilities

2. Involvement of organizations of persons with disabilities in the drafting, designing, implementation and evaluation of ICT accessibility laws and policies

3. Government funding for programs in support of digital accessibility

4. A systematic review mechanism (e.g., regular report of progress) of existing legislation and/or policies concerning digital accessibility

During the session of the Conference of States Parties when the CRPD ICT Accessibility Progress Report was presented, Javed Abidi, Chair of Disabled Peoples' International and vice-chair of the International Disability Alliance, summarized the position of disabled persons organizations: "This joint G3ict-DPI global survey clearly establishes the severe gaps in ICT accessibility that remain among States Parties and their lack of compliance with Article 9 of the CRPD. It also demonstrates the urgency for States Parties to involve Disabled Persons Organizations in policy making and monitoring."

Action Step #3: United Nations agencies should encourage governments to fund and set processes to ensure the participation of Organizations of Persons with Disabilities in policy making about information and ICT accessibility

3. DISABILITY DEMOGRAPHICS IN SUPPORT OF THE WSIS ACTION LINES FOR INCLUSIVE KNOWLEDGE SOCIETIES

a. EMERGENCE OF DEMOGRAPHIC EVIDENCE DURING THE WSIS PROCESS

While the WSIS process was the first head of states venue to underline the importance of access to information and knowledge for persons with disabilities, the scope of the issues at stake was generally underestimated by many governments due to the lack of accurate statistical information. In other terms, disability was perceived as a challenging but marginal societal issue by policy makers. As the table below shows, measurements of disability prevalence via censuses or surveys had shown very heterogeneous results around the world during the past two decades, creating significant hindrances in raising awareness about disability and promoting policies and programs for persons with disabilities:

TABLE 6 - PREVALENCE OF DISABILITY IN SELECTED COUNTRIES

Censuses			Surveys		
Country	**Year**	**Percent of population with a disability**	**Country**	**Year**	**Percent of population with a disability**
United States	2000	19.4	New Zealand	1996	20.0
Canada	2001	18.5	Australia	2000	20.0
Brazil	2000	14.5	Uruguay	1992	16.0
United Kingdom	1991	12.2	Spain	1986	15.0
Poland	1988	10.0	Austria	1986	14.4
Ethiopia	1984	3.8	Zambia	2006	13.1
Uganda	2001	3.5	Sweden	1988	12.1
Mali	1987	2.7	Ecuador	2005	12.1
Mexico	2000	2.3	Netherlands	1986	11.6
Botswana	1991	2.2	Nicaragua	2003	10.3
Chile	1992	2.2	Germany	1992	8.4
India	2001	2.1	China	1987	5.0
Colombia	1993	1.8	Italy	1994	5.0
Bangladesh	1982	0.8	Egypt	1996	4.4
Kenya	1987	0.7			
Data sources: United Nations Statistics Division; IBGR (Brazil), INEC (Nicaragua), INEC (Ecuador), INEGI (Mexico), Statistics New Zealand, INE (Spain), Census of India 2001, SINTEF Health Research					

Source: Measuring Disability Prevalence, D. Mont et al., World Bank, March 2007

Statistical discrepancies came from a lack of standardized definitions and from the use of questionnaires for national censuses and surveys based upon broad questions on disability or medical conditions. Those yielded extremely low prevalence rates, in large part due to the fact that most persons living with disabilities do not self-identify as such. Evidence of such methodological problems was best identified by a report of the World Bank: *Measuring Disability Prevalence* by D. Mont et al., published in March of 2007. The following table shows that countries which adopted an activity based measure of disability were able to scope the real size of their population of persons with disabilities:

TABLE 7 - CENSUS-BASED DISABILITY RATES BY TYPE OF QUESTION

Country	Disability Rate
"Do you have a disability? Yes/No	
Nigeria	0.5
Jordan	1.2
Philippines	1.3
Turkey	1.4
Mauritania	1.5
Ethiopia	3.8
Jamaica	6.3
List of conditions	
Colombia	1.8
Mexico	1.8
Palestine	1.8
Chile	2.2
Uganda	3.5
Hungary	5.7
Activity Based	
Poland	10.0
United Kingdom	12.2
Brazil	14.5
Canada	18.5
United States	19.4

Source: Measuring Disability Prevalence, D. Mont et al., World Bank, March 2007

As a consequence of those condition-based census or survey methodologies, policy makers and the private sector in many countries around the world have grossly underestimated the scope of disability and the impact that inaccessible ICTs have on a large segment of their population. The WSIS 2005 Summit in Tunis, by bringing the issue of ICT accessibility for persons with disabilities at the forefront of its priorities, helped raise the awareness of disability issues at large and of ICT accessibility at a critical time.

Indeed, in parallel to the WSIS process, an important development occurred in February 2002 when the *UN Group on Disability Statistics* also known as the *Washington Group on Disability Statistics* was formed. Its objective is to promote and co-ordinate international co-operation on disability statistical methodologies for censuses and national surveys. Its annual meetings and reports since then have developed a wealth of detailed information about the use of activity based questions, and helped promote the International Classification of Functionalities, a source of information particularly important when analyzing barriers to access to ICTs.

Action Step #4: WSIS should encourage Governments to Apply Census and Survey Methodologies Defined by the UN Group on Disability Statistics in order to accurately measure disabilities prevalence in support of policy making

The activity based census methodology which the Washington Group on Disability Statistics developed is now adopted by an increasing number of countries. This methodology, in addition to providing an accurate evaluation of the population living with disabilities, also offers a much greater detailed picture of the specific functional limitations experienced by persons with disabilities, and of the degree to which those limitations affect their ability to participate in daily activities and in society at large.

Evidence of the scope of disability issues and of the imperative to implement accessibility policies and programs was further publicized when the World Health Organization and World Bank jointly published the *World Report on Disability* [17] which estimates that 15 percent of the world population, or one billion persons, live with some form of disability that restricts their full participation to society. The publication of this important data point is helping change the mindset of policy makers and various stakeholders around the world. It calls on countries with deficient censuses to adopt contemporary methodologies. It also gives to in-country disability advocates around the world stronger data points to promote their agenda.

b. VULNERABLE GROUPS

Disability may be acquired at birth, during one's adult life time as a result of accident, disease or war, or as a result of aging. Strategies for inclusive information and knowledge societies need to adjust to those various situations. Specific programs are particularly important for vulnerable groups, among which children and aging persons, as emphasized by the WSIS lines of action C2 9. Sections e and f:

"e) In the context of national e-strategies, address the special requirements of older people, persons with disabilities, children, especially marginalized children and other disadvantaged and vulnerable groups, including by their full inclusion in the Information Society.

f) Encourage the design and production of ICT equipment and services so that everyone has easy and affordable access to them including older people, persons with disabilities, children, especially marginalized children, and other disadvantaged and vulnerable groups, and promote the development of technologies, applications, and content suited to their needs, guided by the Universal Design Principle and further enhanced by the use of assistive technologies."

i. CHILDREN

Close to 20 percent of persons with disabilities in the world are children and the absolute number will more than likely pass 200 million by 2050. Disability has a major impact on their education level. On average, disabled persons attend primary school in much lower numbers than the general population: 50.6 percent of disabled men and 41.7 percent of disabled women

[17] World Report on Disability, WHO and the World Bank, 2010
http://www.who.int/disabilities/world_report/2011/en/index.html

have completed primary education, while those numbers are respectively 61.3 percent and 52.9 percent for the general population[18]. According to the Education for All report, of the 75 million children of primary school age worldwide who are out of school, one third are children with disabilities. The resulting limited literacy has immediate consequences on their ability to access information and services when they become of age, as well as restrict their employment potential. Consistent with this data, in countries where all children attend school, disability prevalence among K to 12 public school students is as high as 13.2 percent, including 5 percent with learning disabilities.[19]

ii. AGING POPULATION

The absolute ageing of the world population will have a profound impact on both the number and types of disabilities affecting access to information and knowledge: the proportion of population over 60 years in the world has doubled since 1980, and will double again from 2000 to 2050, reaching 2 billion (22 percent), with 400 million people aged over 80. Countries such as China, Iran, and Chile will have a majority of their population age 60 years or older. Prevalent consequences of ageing are loss of vision and hearing, osteoarthritis and dementia, all of which restrict the elder population's participation in society and notably its access to ICTs. The rate of disability prevalence in older population increases from less than 20 percent for the 45 to 55 age group to more than 50 percent for people over 75 (World Bank - WHO Report on Disability 2011). The senior population tends to develop multiple simultaneous forms of disabilities, ranging from mild to severe: loss of vision, loss of hearing, reduced mobility, and reduced mental agility. Barriers to access ICTs can be daunting for senior users: while younger persons with disabilities typically overcome specific limitations by leveraging alternate modes of communication with ICT devices, older users are often unable to do so due to multiple limitations. Yet, essential services for seniors are increasingly delivered on-line by e-government applications and services, with the potential risk of excluding some of the most vulnerable citizens.

iii. WOMEN AND GIRLS

While the WSIS lines of action C2 9. Sections e/ and f/ did not specifically cover women and young girls among vulnerable groups with disabilities the CRPD in its preamble recognized that *"women and girls with disabilities are often at greater risk, both within and outside the home of violence, injury or abuse, neglect or negligent treatment, maltreatment or exploitation."* Further, Article 6 of the CRPD on Women with disabilities stipulates that:

"1. States Parties recognize that women and girls with disabilities are subject to multiple discriminations, and in this regard shall take measures to ensure the full and equal enjoyment by them of all human rights and fundamental freedoms.

2. States Parties shall take all appropriate measures to ensure the full development, advancement and empowerment of women, for the purpose of guaranteeing them the exercise and enjoyment of the human rights and fundamental freedoms set out in the present Convention."

[18] WHO-World Bank Disability Report 2011 - ibid
[19] U.S. Department of Education, OSEP, http://www2.ed.gov/about/offices/list/osers/osep/studies.html

c. LIMITED POLICY STEPS TO ADDRESS VULNERABLE GROUPS

The 2012 CRPD ICT Accessibility Progress Report finds that among 52 ratifying countries, specific programs promoting ICT accessibility among children, elderly persons or women are promoted by a minority of countries:

TABLE 8 - PERCENTAGE OF RATIFYING COUNTRIES WITH ICT ACCESSIBILITY POLICIES COVERING SPECIFIC TARGET GROUPS

% of Ratifying Countries	Yes
Children	41%
Elderly Persons	25%
Women	14%

Source: CRPD Progress Report 2012, www.g3ict.org

Data points on usage of mobile and broadband services meanwhile indicate that elderly users and persons with disabilities are at a particular high risk of exclusion. In 2010, a survey of the Federal Communications Commission[20] showed that while broadband was available to 93 percent of U.S. households, only 63 percent purchased a broadband service. Among the 30 percent of non-adopters, 39 percent have some type of disability, more than twice the proportion of Americans living with a disability(15 percent). In addition, one telling number is that only 35 percent of senior citizens (those over the age of 65) have broadband-at-home, about half of the national average. Similarly, a *Wall Street Journal* article reported in March of 2012 that close to 50 percent of the non-adopters of broadband in the United Kingdom live with a disability.

Three categories of factors are generally identified to explain such gaps in adoption:

- Lack of perceived value of services offered due to lack of awareness of relevant available contents and services
- Lack of accessibility and overly complex user interfaces
- Economic factors since disability and poverty are highly correlated

Action Step #5: WSIS should encourage the deployment of digital literacy and accessibility programs for senior citizens and persons with disabilities with an emphasis on relevant contents and services such as health, employment, cultural, government and information services

[20] Source: U.S. Federal Communication Commission, Report by John Horrigan, February 2010

PART TWO

DIGITAL ACCESSIBILITY BARRIERS: IMPACT ON THE PARTICIPATION OF PERSONS WITH DISABILITIES IN KNOWLEDGE SOCIETIES

4. DIGITAL ACCESSIBILITY FOR PERSONS WITH DISABILITIES IN KNOWLEDGE SOCIETIES

a. A MULTIFACETED CHALLENGE

In its article on ICT Accessibility Basics in the *e-Accessibility Policy Toolkit for Persons with Disabilities,* Dr. Mark Magennis[21] provides the following examples: "Accessibility is a measure of the extent to which a product or service can be used by a person with a disability as effectively as it can be used by a person without that disability.

For example, if a blind person can use all the functions of a railway ticket machine just as easily as a sighted person, then that machine can be said to be fully accessible to blind people. However, a person in a wheelchair might find the same machine difficult or impossible to use. It would then be described as "inaccessible to a person in a wheelchair". In some cases, it may be possible but very difficult for some people to use the machine, or it may be possible to use some of its functions but not all of them. The machine could then be described as "partially accessible" or even "relatively inaccessible" to those people. The exact description would depend on the extent of the problems experienced by the different types of users.

So the concept of accessibility relates to the diverse needs and abilities of a diverse section of the user population – persons with disabilities – and is expressed in degrees, from "fully accessible", to "partially accessible", to "completely inaccessible" for a specified user group.

Where legislation, public policy or organizational policies require ICT products and services to be accessible, a recognized accessibility standard is usually referenced. Being 'accessible' then means complying with that standard. Accessibility standards for specific product types often attempt to quantify accessibility in measurable ways by listing required attributes, objective tests and pass/fail criteria. A good example is the Web Content Accessibility Guidelines (WCAG 2.0) which specifies testable "success criteria" for three compliance levels (A, AA or AAA), so it is possible to state objectively whether a given web page is accessible to a recognized level. The question of whether a website is "accessible" can then be answered by stating whether it complies with an agreed level (A, AA or AAA) of the WCAG 2.0 guidelines. But for many types of ICT products, there are no internationally agreed, objective and complete accessibility standards. So compliance with standards often cannot be relied on as a measure of accessibility.

In practice, accessibility is about the experiences of people with disabilities in trying to carry out the tasks for which the product is designed. The more people who can use the product, the more tasks they can carry out with it, and the easier it is for them to carry out those tasks, the more accessible the product is. In essence, a product or service is accessible to the extent that its design caters for the needs of people with disabilities.

[21] Section derived from article edited by Dr. Mark Magennis, Director, Centre for Inclusive Technology (CFIT), NCBI, Dublin, Ireland for the ITU – G3ict Policy Toolkit for Persons with Disabilities www.e-accessibilitytoolkit.org

EXAMPLES OF HOW ICTS CAN BE INACCESSIBLE

It is often easier to understand a concept like accessibility by considering some real world examples, in this case examples of inaccessibility. All of the problems described below result in some people being unable to use the product for its intended purpose. All of them could be alleviated by appropriate design.

A bank ATM

An automated Teller Machine (ATM) provided by a bank for public use may be inaccessible in the following ways:

- The machine is positioned too high, so a person in a wheelchair cannot reach some of the controls.

- The quality of the visual display is poor, with low contrast between text and background, making it difficult to read for people with vision impairments, particularly in bright sunlight.

- Prompts and responses are presented only as text on a visual display and cannot be read by blind people or people with reading impairments.

- Prompts and responses are written in complex language or jargon, making them difficult to understand for people with some cognitive or learning disabilities.

A mobile phone or PDA

A mobile phone or personal digital assistant (PDA) may be inaccessible in the following ways:

- The device consists entirely of a touchscreen with no physical keys, tactile feedback or text-to-speech capability, so it is completely unusable by a blind person.

- The quality and volume of audio output is not sufficient for many hard of hearing people.

- Some built-in or third party applications do not use the accessibility API (application program interface) to make their functions and outputs available to accessibility utilities, such as text-to-speech screen reading or screen magnification software.

- A deaf person cannot communicate with the emergency services because it requires spoken conversation. Note that this is not a problem of the phone itself but the lack of a real time text-based emergency response system.

A website

Websites typically contain a mixture of text, images, links, buttons, tables, interactive forms and other content. There are many ways they can be inaccessible, including the following:

- On-screen buttons are made to respond only to a mouse click, so a person with a physical disability who is unable to use a mouse cannot ‘click’ them by pressing the Enter key on their keyboard, as is usual.

- On a payment form, the labels of input boxes and controls (e.g. ‘name’, ‘choice of payment method’) are displayed in a way that cannot be read by the text-to-speech software used by a blind person, so this person does not know the purpose of each box or control.

• Visual design and layout are inconsistent from page to page, making the website confusing and difficult to learn for people with some cognitive or learning disabilities.

• Online videos have no captions (subtitles), audio description tracks or text transcripts. So deaf, hard of hearing and blind users do not have access to the full content."

CHALLENGES OF MULTIPLE DISABILITIES AMONG AGING PERSONS

While most barriers are well identified and solutions and standards developed to overcome them, the situation of aging persons is particularly difficult. Among OECD countries, functional censuses point to the fact that more than 50% of persons aged 65 and above live with disabilities. As a person ages, three main challenges appear to overcome accessibility issues:

- **Cognitive overload** manifested by an increasingly difficult time to sort and comprehend massive amounts of information and digital interfaces solicitations
- **Processing speed** of user interfaces: NHK in Japan for instance, successfully launched a radio that buffers broadcasted news programs and allows listeners to slow down the rate of speech of news anchors and reports. Many digital or telephone interfaces have short response time programmed which make it difficult to complete a transaction
- **Weakening of alternative sensorial capabilities,** which translate in an inability to learn alternative means of communications. Whereas a young adult becoming blind is likely to have the energy and hearing faculty to start using a screen reader, such move is far more difficult for an elderly person

b. SCOPE AND IMPACT OF DIGITAL INTERFACES TO ACCESS INFORMATION AND KNOWLEDGE

Access, production and sharing of information and knowledge are dependent upon the use of digital interfaces in all aspects of life. From e-readers to television or the Internet and telecommunications, the installed base of ICT devices has grown considerably during the past decade. It reaches all corners of the world, including the most remote areas with television, mobile phone and, increasingly, Internet connections via wireless networks or shared access points such as Internet cafés or community centers. The foreword of the 2010 World Telecommunication/ICT Development Report, *Monitoring the WSIS Targets* by ITU's Secretary-General Hamadoun Touré, summarized the situation as follows: "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."

As of the end of 2012, average statistics compiled by the author from leading sources indicate the following installed bases:

- 6 billion mobile phones in use
- 2.3 billion Internet users
- 1.4 billion TV sets
- 1.2 billion personal computers
- 2.2 million ATMs or one per 3,000 persons worldwide

From education to news, commerce, leisure, political life, to health, employment or government services, all aspects of society are affected by the considerable advances of the information infrastructure. And while WSIS and its many stakeholders, the Broadband Commission co-chaired by ITU and UNESCO and other international development organizations continue promoting the information infrastructure, implications for Knowledge Societies are yet to be fully comprehended. In all areas of knowledge creation, exchange or dissemination, however, barriers to access to the information infrastructure and digital interfaces certainly translates into exclusion.

c. ACCESSIBILITY BARRIERS AND PRODUCT DESIGN

For digital interfaces to be ***accessible***, and as described in paragraph a/ above, users must be able to ***perceive*** output information, ***understand*** it and ***act*** upon it. A large body of knowledge exists on human factors and barriers raised by ICTs for persons with disabilities covering sensory, motor or cognitive impairments.[22]

In all cases, the preference is to offer interfaces designed along Universal Design principles, meaning that ICT products user interfaces can adjust to the largest variety of situations and user profiles. A mobile phone, for instance, may be designed to offer alternative menus with pictures to assist persons with cognitive impairments, language limitations, or memory losses. It may also offer a voice alternative to text output for persons with visual impairments or other forms of reading disabilities such as dyslexia. The phone can also work with voice commands to select menu items, a very useful feature for persons with mobility or dexterity impairments. Text messages, peer-to-peer video or video relay services reached with the same mobile phone may also help deaf persons or users with speech impairments to communicate.

In many cases, however, legacy ICT products and services have not been designed with a Universal Design approach and cause insurmountable issues for persons with disabilities. As reported above, a bank ATM for instance may be placed too high for a user in a wheel chair to access its control or may not have voice output with an earphone plug for blind users. Or a web site may be designed in such a way that blind users cannot read its contents with screen reader software or it may be using colors that color blind users cannot differentiate. In many instances, television broadcasting does not include captions or signed interpretation, excluding deaf users from enjoying its programming including news. Emergency communications, including call centers, may also be unreachable for persons with disabilities who cannot use voice communications and would need to use text messages.

While an exhaustive list of ICT accessibility barriers would be out of the scope of this report, it is fair to state that every single ICT application can create barriers, but that for each type of barrier, there exist in most cases proven available solutions. Lack of implementation is therefore often a result of lack of awareness and local support of those solutions and of economic barriers.

Article 4 of the CRPD directs States Parties "To undertake or promote research and development of universally designed goods, services, equipment and facilities, as defined in article 2 of the present Convention, which should require the minimum possible adaptation and the least cost to meet the specific needs of a person with disabilities, to promote their availability

22 http://www.e-accessibilitytoolkit.org/toolkit/eaccessibility_basics/introduction_to_e-accessibility%20basics

and use, and to promote universal design in the development of standards and guidelines." A root cause for the lack of Universal Design approach across all sectors of ICTs is the lack of training of IT professionals about human factors, disability, accessibility and relevant standards.

The 2012 CRPD ICT Accessibility Progress Report finds that, although awareness raising activities are taking place in almost half of the countries surveyed, a small minority of countries actually train systematically their engineers on ICT accessibility:

TABLE 9 - COUNTRIES PROGRAMS IN SUPPORT OF DIGITAL ACCESSIBILITY CAPACITY BUILDING

In your Country, are there?	**Yes**
Participation in the work of international standards development organizations related to digital accessibility	46.8%
Nationwide conferences and other awareness raising information programs, projects, in the field of digital access over the past two years organized by Civil Society	46.5%
Nationwide conferences and other awareness raising information programs, projects, in the field of digital access over the past two years organized by Government	46.0%
Mandatory training programs (at universities, vocational schools, etc.) for future professionals about digital access for Persons with disabilities	19.6%

Source: CRPD Progress Report 2012, www.g3ict.org

Action Step #6: WSIS should encourage governments to support awareness raising and training programs on ICT accessibility for ICT professionals, teachers, librarians, media, policy makers and other stakeholders developing ICT based contents and services in partnership with academia and the private sector

Similarly, a small proportion of countries are actually following the dispositions of Article 4 of the CRPD regarding product development and Universal Design, an important contribution of WSIS to promoting ICT accessibility for persons with disabilities:

TABLE 10 - COUNTRIES POLICIES PROMOTING UNIVERSAL DESIGN

Does your country through its laws, regulations, policies or programs	**Yes**
Promote research and development of universally designed (UD) goods	34.8%
Promote the incorporation of accessibility features at an early stage of new product development	20.0%

Action Step #7: WSIS should encourage governments to promote research and development of universally designed products and Universal Design principles among developers

TABLE 11 - ASEANNET CASE STUDY

Country: Thailand
Project: ASEANNet for Persons with Disabilities National Electronics and Computer Technology Center (NECTEC)
Description: ASEANNet for Persons with Disabilities is a knowledge sharing network on Universal design and Assistive Technology for persons with disabilities and seniors within ASEAN countries. This network aims to be the linkage of professionals who work in the field of medical rehabilitation, rehabilitation engineers, therapists, teachers, psychologists, or anyone whose work relates to disability services and also persons with disabilities to share their research and development of assistive technology devices or universal design products in order to help disseminate the knowledge to the public for other countries to learn. This will help the ASEAN experts to brainstorm in order to take care of persons with disabilities in the ASEAN region with equity and equal opportunity.
Stakeholders: National Electronics and Computer Technology Center (NECTEC), Assistive Technology Research groups in Singapore, Malaysia, Brunei, Burma, Lao, Cambodia, Vietnam, Philippines and Indonesia.
More information: http://www.nectec.or.th/en/international-cooperations/multilateral.html

d. ICT ACCESSIBILITY STANDARDS

Article 9.2 of the CRPD stipulates that "States Parties shall also take appropriate measures to:

(a) Develop, promulgate and monitor the implementation of minimum standards and guidelines for the accessibility of facilities and services open or provided to the public."

While this disposition should apply to ICT based services provided to the public, it does not mention products. And the term "facility" cannot apply to ICTs. However, to the extent that country reporting guidelines issued by the United Nations Secretary-General for States Parties[23] do cover public procurement rules, the adoption by States Parties of accessibility standards for ICT products would be expected.

To date, only a third of the countries (32.6 percent) have actually developed national ICT accessibility standards. This may be due to the fact that a large proportion of ICT products are developed and manufactured in a relatively small number of countries while a majority of States Parties are importers of technology with limited local industry participation to address accessibility standards issues. It also reflects the fact that the pace of ICT innovations and of ICT accessibility is faster than typical standard development cycles which can take many years. For instance, ICT accessibility evolves with each specific operating system environment such as

[23]Guidelines on treaty-specific document to be submitted by states parties under article 35, paragraph 1, of the Convention on the Rights of Persons with Disabilities www.ohchr.org/Documents/HRBodies/CRPD/CRPD-C-2-3.pdf

Windows, Android or iOS that keep adding features, user interfaces, functionalities and form factors such as for mobile and tablets at an unprecedented pace.

While developing "national" accessibility standards, one potential risk for countries would be adopt different specifications compared to international standards, thereby abandoning the benefits of the global market for accessible ICTs such as economies of scale, raising the cost of devices for persons with disabilities and creating new barriers in interoperability, especially in relation to the use of assistive technologies. For instance, should countries each adopt different hearing aid compatibility standards for mobile handsets, the cost of compliant mobile handsets would become prohibitive. Participation in international standards development organizations or keeping abreast of their work is an effective way to avoid this issue.

The ISO, ITU, IEC, W3C and DAISY Consortium, besides regional or national organizations such as ANSI or ETSI, are the main global international bodies involved in ICT accessibility. Among the most widespread ICT accessibility standards are the Worldwide Web Consortium web accessibility guidelines, ISO standards, the DAISY and EPUB standards, as well as telecommunications accessibility standards developed and promoted by the ITU.

One noteworthy common trend among those organizations is their stated interest and efforts in involving persons with disabilities in standards development work.

i. Work of the ISO/IEC Joint Technical Committee 1 (JTC 1)

The ISO/IEC Joint Technical Committee 1 (JTC 1) formed a Special Working Group on Accessibility (SWG-A)[24] in October 2004 with the following objectives to:

- Determine an approach, and implement, the gathering of user requirements, being mindful of the varied and unique opportunities (direct participation of user organizations, workshops, liaisons)
- Identify a mechanism to work proactively between meetings to make forward progress
- Gather and publish an inventory of all known accessibility standards efforts
- Identify areas/technologies where voluntary standards are not being addressed and suggest an appropriate body to consider the new work
- Track public laws, policies/measures and guidelines to ensure the necessary standards are available
- Through wide dissemination of the SWG materials, encourage the use of globally relevant voluntary standards
- Assist consortia/fora, if desired, in submitting their specifications to the formal standards process

SWG-A has since delivered three fundamental documents which constitute the foundation for ICT accessibility standards:

1. ***Users' needs summary***, published under ISO/IEC TR 29138-1. The primary purpose of the user's needs summary is to provide guidance to standard development organizations on how to include accessibility considerations during standard planning and development.

[24] http://www.jtc1access.org/ and http://www.jtc1access.org/documents/J1N7688.pdf

2. ***Standards inventory***, published as ISO/IEC TR 29138-2. The objective of the standards inventory is to list all know standards and public policies related to accessibility to help standard development organizations and policy makers avoid duplication of effort and take advantage of existing accessibility standards.

3. ***Guidance on mapping user needs***, published as ISO/IEC TR 29138-3, provides guidelines for standard development organizations on how to map a standard against user needs.

Since their adoption, those three documents have helped numerous organizations develop their own ICT accessibility policies and standards including the U.S. Access Board, the European Commission as well as other international standards organizations.

ii. International Telecommunications Union – ITU

With considerable work in the field of accessibility to information and communication technologies since several decades [25], the ITU has issued numerous standards and recommendations on, or including, accessibility and human factors. ITU's strategy is to mainstream accessibility criteria in the development of all of its standards and recommendations. Examples of the standards developed by ITU–T that address accessibility and usability needs of persons with disabilities, older persons, and children: [26]

- E.121: "Pictograms, symbols and icons to assist users of the telephone service" (Easy-to-understand symbols)

- E.135: "Human factor aspects of public telecommunication terminals for people with disabilities"

- E.136: "Specification of a tactile identifier for use with telecommunication cards"

- E.138: "Human factor aspects of public telephones to improve their usability for older people".

- V.18 provides for harmonization of text telephony

- V.151 Procedures for the end-to-end connection of analogue PSTN text telephones over an IP network utilizing text relay

- T.140 specifies the general presentation protocol for text conversation

- T.134 details how to use text conversation in the T.120 data conferencing environment

- H.323 Annex G defines text conversation in H.323's packet multimedia environmentH.248.2 allows gateway procedures between Text Telephony in PSTN and real-time text in IP and other networks

- H Series Supplement 1 gives users the requirements on video communication for sign language and lip reading

[25] For instance, in 1994 the ITU approved the V.18 standard for text telephony for the deaf
[26] All ITU-T Recommendations can be downloaded for free from the ITU-T website at http://www.itu.int/ITU-T/publications/recs.html

- Telecommunication Accessibility Checklist for standards writers.

- F.790 provides telecommunications accessibility guidelines for older persons and persons with disabilities

ITU-T SG 16 Recommendations in which sections on accessibility have been integrated:

- Definition in F.703 of Total Conversation and Text Telephony services, offering real-time text, video and audio communication

- Definition of the real-time conversational text medium in F.700

- Inclusion in H.320 of real-time text conversation in ISDN multimedia

- Section on transport of real-time text in ISDN multimedia environments in H.224

- Sections on modem negotiation for text telephony in V.8

- Sections in V.8 bis on modem negotiation for text telephony

- Sections in V.250 on control of V.18 modems

- Inclusion in H.324 of real-time text conversation in circuit switched multimedia

- Section in H.245 for handling real-time text connections in H.324 and H.323 multimedia environments

- Inclusion in T.120 of real-time text in data conferencing

- Section in T.124 for handling real-time text sessions in the T.120 environment

- Section in G.168 for testing of echo cancellation in calls with text telephony

- Section in F.724 for accessible media additions in service description and requirements for video telephony services over IP networks

- Section in F.733 for accessible media additions in multimedia conference services over IP

- Section in F.741 for accessible media additions in service description and requirements for audiovisual on-demand services

- Section in F.742 for accessible media additions in service description and requirements for distance-learning services

- Inclusion in V.152 of text telephony considerations in voice band data gateway procedures

- Accessibility provisions in Y.2000 – Series Supplement 1 NGN Release 1 scope - the accessibility guidelines are referred to in the specifications for NGN Release 1.

- ITU-T Recommendation Y.1901 “Requirements for the support of IPTV services”.
  As an example of how accessibility is mainstreamed in ITU standard development work, this recommendation includes accessibility features in the main architecture for IPTV services and describes the functionalities expected from IPTV terminal devices. For instance, it

covers electronic program guides where the associated metadata provided must include elements that facilitate access and usability by the widest possible range of users.

iii. WORLDWIDE WEB CONSORTIUM WEB ACCESSIBILITY INITIATIVE[27]

W3C-WAI's objective is to promote the highest possible degree of usability of the web for persons with disabilities. It pursues accessibility of the Web through five primary activities:

- ensuring that core technologies of the Web support accessibility
- developing guidelines for Web content, user agents, and authoring tools
- facilitating development of evaluation and repair tools for accessibility
- conducting education and outreach
- coordinating with research and development that can affect future accessibility of the Web

Three important documents have been published by the worldwide Web Consortium:

1 - WCAG 2.0 is the latest Web Content Accessibility Guidelines (WCAG) of the W3C Web Accessibility Initiative. The Web Content Accessibility Guidelines (WCAG) explain how to make Web content accessible to persons with disabilities. Web "content" refers to information contained by a web page, including web applications, and rich media such as video or sound.

2 - The Authoring Tool Accessibility Guidelines (ATAG) are meant to help design web content authoring tools that are both (1) more accessible to authors with disabilities and (2) designed to enable, support, and promote the production of more accessible web content by all authors.

3 - The User Agent Accessibility Guidelines (UAAG) cover issues related to User Agents, i.e. software that retrieves, renders and facilitates end user interaction with Web content. UUAG 2.0 specifies how user agents can promote accessibility through their own user interface and through other internal facilities, including their ability to communicate with other technologies (especially assistive technologies).

The W3C – WAI guidelines have been adopted widely around the world. Recently, on December 3, 2012, the European Commission issued a proposal for a "Directive of the European Parliament and of the Council on the accessibility of public sector bodies' websites" which endorsed WCAG 2.0 as a reference. In October 2012, ISO adopted WCAG 2.0 which is referenced as ISO/IEC 40500:2012[28].

TABLE 12 - HISTORIC PERSPECTIVE: W3C 1997 ANNOUNCEMENT TO PROMOTE WEB ACCESSIBILITY FOR PERSONS WITH DISABILITIES

CAMBRIDGE, Massachusetts, USA -- April 7, 1997 -- The World Wide Web Consortium (W3C) today announced the launch of the Web Accessibility Initiative (WAI) to promote and achieve Web functionality for people with disabilities. Endorsed by The White House and W3C Members, the WAI will involve the establishment of an International Program Office (IPO) responsible for developing software protocols and technologies, creating guidelines for the use

[27] http://www.w3.org/WAI/
[28] http://www.iso.org/iso/iso_catalogue/catalogue_tc/catalogue_detail.htm?csnumber=58625

of technologies, educating the industry, and conducting research and development.

The W3C will be working with government, industry leaders, Web developers, content providers, and non-profit organizations, including the Yuri Rubinsky Insight Foundation, to lead the development efforts of the newly created Initiative.

"Worldwide, there are more than 750 million people with disabilities. As we move towards a highly connected world, it is critical that the Web be usable by anyone, regardless of individual capabilities and disabilities," said Tim Berners-Lee, Director of the W3C and inventor of the World Wide Web. "The W3C is committed to removing accessibility barriers for all people with disabilities - including the deaf, blind, physically challenged, and cognitive or visually impaired. We plan to work aggressively with government, industry, and community leaders to establish and attain Web accessibility goals."

According to Jim Miller, W3C Technology & Society Domain Leader, the World Wide Web Consortium will be the central point for the formation of accessibility goals, and will also be an advocate for people with disabilities to Web developers and content providers. In addition, the IPO will be housed and fully integrated within the W3C, with technologists working to ensure that Consortium-developed protocols meet or exceed accessibility goals.

The W3C's technology development will focus initially on protocols and data formats aimed at making the Web itself more accessible. W3C will develop descriptive video and captioning enhancements to HTML and XML, develop extensions to CSS that will support speech output, and work on the negotiation of user agent features for HTTP and PEP.

"In addition to technology development, the Web Accessibility Initiative is designed to provide the infrastructure for education and outreach programs," said Mike Paciello, Executive Director, Yuri Rubinsky Insight Foundation. "Through strategic international partnerships, particularly with disability organizations, the YRIF will insure that content providers, application developers, and users are well educated in the area of accessible Web design."

The W3C will provide funds and staff to the Initiative's International Program Office, with additional resources provided by commercial, non-profit and government organizations. W3C Member organizations that have committed funding to the Initiative have been designated "charter sponsors."

The project begins this week with a WAI workshop held on Sunday, April 6, 1997. The International Project Office and developments for the overall project will begin in the summer of 1997.

iv. DAISY CONSORTIUM AND EPUB3

DAISY Consortium was formed in May 1996 by talking book libraries to lead the worldwide transition from analog to Digital Talking Books. DAISY stands for “Digital Accessible Information System”. Members of the Consortium developed the DAISY Standard for Digital Talking Books. The Consortium's vision since inception was that all published information should be available to people with print disabilities, at the same time and at no greater cost, in an accessible, feature-rich, navigable format. The history of the DAISY Consortium is of significance since its foundation is intimately linked to organizations providing services to persons with disabilities such as libraries for the blind. The DAISY Consortium has since its inception pursued a strategy to partner with industry: it works in close cooperation with the W3C – WAI and other standard development organizations, introduced a “Save as Daisy” utility with Microsoft support

for WORD in 2008 and recently successfully developed with the International Publishers' Forum a common set of guidelines incorporating the DAISY accessibility requirements into the non-proprietary ePUB3 standard.[29] Publishers can check their level of compliance of their publishing files with the ePUB validator.[30]

DAISY maintains a number of useful resources including applications for mobile devices and e-readers, and continues to develop specifications for advanced accessibility functions for challenging contents such as rich media embedded in e-books or scientific language.

The potential impact of ePUB3 cannot be understated in the context of promoting access to knowledge for persons with disabilities in particular in relation to Education.

Action Step #8: WSIS should encourage the participation of national stakeholders in international ICT accessibility standards activities, and to promote international ICT accessibility standards in their jurisdictions notably ISO, ITU, W3C and DAISY/ePUB3

For a detailed list of major sources of international ICT accessibility standards, one can consult section 8 on international cooperation of the *e-Accessibility Policy Toolkit for Persons with Disabilities*.[31]

Besides the international Standard Development Organizations mentioned above, it is worthwhile mentioning the impact that public procurement rules will have in the future. Informal international coordination among the United States, the European Commission and a couple of other major IT markets is facilitating the *de facto* alignment of ICT accessibility standards across borders.

Action Step #9: United Nations agencies should assist governments in adopting public procurement rules incorporating ICT accessibility criteria consistent with existing international standards

Most often, at country level, telecom regulatory authorities and ICT ministries are the logical center of expertise for ICT standards among government agencies. Of paramount importance because they affect broad audiences and are core building blocks of Knowledge Societies are:

- Human factors definitions
- Mobile accessibility guidelines
- Web accessibility standards
- Electronic documents standards
- Fixed telephony accessibility standards
- Television accessibility standards
- E-book standards

[29] http://idpf.org/epub/30 - See also ePUB3 accessibility forum at: http://idpf.org/forums/epub-accessibility
[30] http://validator.idpf.org/
[31] www.e-accessibilitytoolkit.org/toolkit/international_cooperation/international_standards_development

However, other areas of ICT accessibility which States Parties must consider are ATMs and mobile payments, electronic voting machines, public transportation automated kiosks, and electronic public signage.

5. SOCIETAL FACTORS IMPACTING ACCESS TO INFORMATION AND KNOWLEDGE

While accessible technology, infrastructures and services provide tools for persons with disabilities to participate in knowledge Societies, societal factors play a critical role in actual outcomes. Lack of awareness and attitudes towards disability play an important role in influencing policy priorities as well as community support for persons with disabilities.

a. THE DIRE METRICS OF EDUCATION OPPORTUNITIES FOR PERSONS WITH DISABILITIES

Around 20% of the world population of persons with disabilities were born or acquired a disability during childhood. Issues around education are thus extremely important when considering this particular group, especially in developing nations. According to the *Flagship on Education for All and the Right to education for Persons with Disabilities: Towards Inclusion* launched by UNESCO under the Education for All Programme to ensure that the right to education and the goals of the Dakar Framework are realized for individuals with disabilities:[32]

- 98% children with disabilities in developing countries do NOT attend schools

- 500,000 children every year lose some part of their vision due to vitamin A deficiency.

- 41 million babies are born each year at risk of mental impairment due to insufficient iodine in their mothers' diets.

- For every child killed in armed conflict, three are injured and permanently disabled. 40% out of 26,000 persons killed and injured by landmines every year are children. Over 10 million children are psychologically traumatized by armed conflicts.

- Child labor and maltreatment such as corporal punishment, amputation, blinding of detainees, are responsible for children becoming disabled, and can lead to mental illness, physical and psychological disabilities, difficulties in schools or at work, etc. (UNICEF, 2002)

- The vast majority of individuals with hearing or visual impairments in developing nations lack basic literacy

- Individuals with intellectual and psychiatric disabilities are treated with often cruel neglect

Lack of education and literacy leads in turn to lack of employment activities and to near complete exclusion from Knowledge Societies

In many countries, stigma, religious beliefs, parental and traditional attitudes further segregate children with disabilities who are a source of shame for families and communities. Ignorance of disability issues creates extraordinary barriers with dire consequences. Excluded children inevitably become excluded adults living in poverty.

[32] http://www.unesco.org/education/efa/know_sharing/flagship_initiatives/disability_last_version.shtml

Among developed nations, recent years have seen the concepts of Inclusive Education progressively implemented: children with disabilities attend regular schools, a practice that significantly improves education outcomes, attitude towards disability and fosters the generalization of special education programs, including offering assistive technologies. As referenced earlier in this report, in the United States, 13.2% of students enrolled nationwide in K to 12 public schools live with a disability.

TABLE 13 - THE FLAGSHIP ON EDUCATION FOR ALL AND THE RIGHT TO EDUCATION FOR PERSONS WITH DISABILITIES: TOWARDS INCLUSION

The Flagship on Education for All and the Right to Education for Persons with Disabilities: Towards Inclusion, represents a joint effort among UN organizations, NGOs and donor countries acting together as a catalyst in the process of achieving Education for All. The Flagship seeks to unite all partners in its effort to reach out to children, young people and adults with disabilities, and to promote solutions that can translate universal rights into inclusive realities.

THE FLAGSHIP GOAL
Recognizing the universal right to education, the Flagship seeks to unite all Education or All partners in their efforts to provide access to and promoting completion of quality education for every child, youth, and adult with a disability.

Strategic Objectives:
- to combat discrimination and remove structural barriers to learning and participation in education
- to promote a broad concept of education, including essential life skills and life-long learning
- to contribute to a focus on the needs of persons with disabilities when resources and activities address the realisation of EFA goals

FLAGSHIP Actions and Activities
In order to reach this goal, the Flagship will:
- Have the full participation of persons with disabilities and families in the design of all Flagship activities.
- Promote the full participation of persons with disabilities and families in the development of policies and practices related to the education of persons with disabilities at local, national, regional, and global levels.
- Seek to ensure that all governmental entities, donors, and NGO's endorse the universal right of education for all children, youth, and adults with a disability.
- Act as a catalyst to fully incorporate the Flagship Goal into national plans of action and regional policies.
- Work in partnership with all other EFA Flagships to fully endorse and incorporate the right of educating every person with a disability into their efforts.
- Mobilize resources in support of the Flagship Goal through obtaining commitment of new resources from national and international entities and leveraging existing EFA resources.
- Seek to ensure that the EFA Monitoring Process includes specific quantitative and qualitative statistics and indicators related to persons with disabilities and documentation of resources allocated to the implementation of EFA for these individuals.
- Identify and disseminate effective practices and stimulate research and studies related to the Flagship Goal to include such areas as:
- Quality teacher education
- School organization including adequate and accessible facilities
- Curriculum and pedagogy
- Assistive devices and appropriate materials.

- Promote the right of every child and youth with a disability to express his/her view pertaining to his/her education and life skills as defined by Article 23.1 of the Convention on the Rights of the Child.

b. UNEMPLOYMENT EXCLUSION FACTORS

As a direct result of limited education opportunities, persons with disabilities are likely to be illiterate and lack education. This naturally impacts their ability to participate in economic activities. Comparable international data on the employment of persons with disabilities is not available. UN Enable (UNDESA) however, collected useful anecdotal comparisons from media and reports around the world and concluded that in developing countries, 80% to 90% of persons with disabilities of working age are unemployed, whereas in industrialized countries the figure is between 50% and 70%. In most developed countries the official unemployment rate for persons with disabilities of working age is at least twice that for those who have no disability.[33]

Those numbers remain extremely high despite legislations and regulations promoting the employment of persons with disabilities and efforts by employers (see table 5 below). Article 27 of the CRPD on employment further defines obligations of States parties, including ensuring that "reasonable accommodation" of the work place is provided which often translates into implementing assistive technologies.

TABLE 14 - DISABILITY IN THE WORKPLACE: EMPLOYERS' ORGANIZATIONS AND BUSINESS NETWORKS[34]

In 2011, the ILO surveyed employer's organizations and business networks promoting the employment of persons with disabilities. The report documents activities in both developed and developing nations developed voluntarily by the private sector to promote good practices in employing persons with disabilities. Activities also include training persons with disabilities involving information technology such as the Employers' Federation of Ceylon, Sri Lanka, which trains blind persons to use screen readers and professional software and place them among its members.

Australian Network on Disability, Australia
Chamber of Industries of Guayaquil, Ecuador
UnternehmensForum, Germany
Confederation of Indian Industry, India
NASSCOM Foundation, India
Employers' Disability Network, New Zealand
Business Advisory Board on Disability, the Russian Federation
Serbian Association of Employers, Serbia
Employers' Federation of Ceylon, Sri Lanka
Employers' Forum on Disability, the United Kingdom
US Business Leadership Network, the United States
Blue Ribbon Employer Council, Viet Nam

Unemployment and its correlated condition, poverty, is a leading cause of exclusion. Limited financial resources, combined with a lack of exposure to tools of the Knowledge Society are likely factors in low broadband adoption among persons with disabilities in the U.S. or the UK.

[33] http://www.un.org/disabilities/default.asp?id=255
[34] International Labor organization – 2011 http://www.ilo.org/wcmsp5/groups/public/---ed_emp/---ifp_skills/documents/publication/wcms_167204.pdf

Yet, considerable potential exist in theory to leverage information technology for employment among persons with disabilities. Solutions exist to accommodate the work environment at a fairly limited cost: the average cost of accommodation per work station at major corporations is generally under $500 in developed nations.

TABLE 15 - CASE STUDY: ABILITY FOUNDATION OF INDIA - NATIONAL CENTRE FOR INFORMATION & COMMUNICATION TECHNOLOGY (NCICT)

Country: India
Project: NCICT

Employment oriented soft skills are an important value addition for every job seeker - disabilities notwithstanding. The Indian National Centre for Information & Communication Technology (NCICT) serves to enhance candidates' skills so as to meet employer expectations. NCICT offers holistic and comprehensive job-oriented training to graduates with disabilities.

NCICT seeks to impart state-of-the-art computer education and life skills that prepare graduates with disability to strike out on their own in today's demanding corporate workplace. In addition to spoken English, mathematics and preparing for aptitude tests, training is also provided in personality development, techniques of communication and facing interviews.

For more information contact ability@abilityfoundation.org

c. DISASTERS, CONFLICT AND POST CONFLICT SITUATIONS

Compounding the effects of lack of access to education and employment, disaster, conflict or post-conflict situations create extreme conditions of exclusion and life threatening situations for persons with disabilities. In such situations, this particular group is at much greater risk than the average population. Initiatives in many countries are tackling the issues of the accessibility of emergency call centers and emergency communications with the public.

In post disaster and post conflict situations, mobile technology and services deployed by disaster relief organizations bring new opportunities to provide fast effective communications and geo-positioning location of affected populations. Crowd sourcing of pictures taken with mobile phones is used in conjunction with satellite applications such as UNOSAT [35].

[35] http://www.unitar.org/unosat/ UNOSAT is a program of the United Nations Institute for Training and Research delivering imagery analysis and satellite solutions to relief and development organizations within and outside the UN system

TABLE 16 - CASE STUDY: UNOSAT

United Nations Institute for Training and Research – Geneva

UNOSAT uses specialized skills to perform satellite analysis, design integrated solutions in GIS and geo-positioning, and develop the capacity of agencies and recipient counties via training and technical support. UNOSAT is designed to produce concrete output for identified users and beneficiaries by turning technology into concrete and usable applications for UN agencies, member states, and communities in a variety of areas. UNOSAT addresses three main homogeneous user systems:

Humanitarian Affairs and Relief Coordination

- Crisis & Situational Mapping
- Damage and Impact Assessment

Human Security

- Monitoring
- Safety and Security
- Human Rights

Territorial Planning and Monitoring for national and local governments

- Capacity Development & Technical Assistance
- In-country Project Development & Implementation

Created in 2003, the UNOSAT humanitarian rapid mapping service is today fully developed and has been activated over 200 times in relief and coordination operations in the aftermath of disasters, complex emergencies and conflict crises. This work involves very rapid acquisition and processing of satellite imagery to generate geographic information and analytical reports in addition to GIS layers in support of UN emergency relief agencies. UNOSAT remains engaged beyond the emergency phase by supporting early recovery and reconstructions activities. A technology-based partnership with the European Commission Joint Research Centre and the World Bank provides standard operational procedures for vast damage assessment exercises using remote sensing and geospatial analysis.

UNOSAT uses satellite derived geo-information for human security in all areas in which monitoring, GIS, and remote sensing can offer a strategic advantage, from monitoring piracy activities to illustrating and documenting human rights cases in the context of complex emergencies. It offers a free application for mobile phone users to contribute pictures and reports automatically geo-located, thus adding the power of user generated reporting to satellite observations.

More information at: http://www.unitar.org/unosat

To underscore the issue of communications, in Japan, a country with a high level of technology adoption by seniors, the death rate among persons with disabilities was more than double the average death rate in regions affected by the tsunami in 2011, in large part because of a lack of accessible alert processes. In order to lower the risks of those situations for persons with disabilities, effective design of multi-modal communication systems, the use of proper languages or alternative communications and the accessibility of television and mobile phones must be implemented to make a difference.

d. Beyond ICT accessibility: Accelerating gaps in knowledge access skills

The speed of development of the new paradigm of instant accessing, creating and sharing of knowledge anywhere, anytime, led by the mobile revolution and the Internet, creates massive new opportunities in all domains of activity. The degree to which individuals can interact with online contents and services but also create, share and disseminate contents themselves determine their ability to fully participate in the new emerging Knowledge Society. Information delivered in context, based upon user's preferences and location, reinforced by social networking features to share with others, becomes a powerful tool in all domains of activity: commerce, education, political life and freedom of expression, culture, health, to name a few. While a large segment of the population in major countries can fully benefit from such features, individuals living in areas where a minority language is spoken or localized online services unavailable are at risk of being significantly left behind. As innovation accelerate, so do user interfaces, social networking habits, and skills and patterns in accessing knowledge in new smart ways. Users of the latest generations of smart phones from around the world enjoy unique services in dominant languages. However, as noted in target #8 of the WSIS statistical framework, many efforts remain to be made to balance content generation and services around the world in multiple languages and cultures.

While minority languages are already under-represented in terms of available web contents, the critical mass and efficiency of new knowledge access systems, sharing and dissemination will continue to favor speakers of major languages around the world. This in turn carries the risk of creating gaps in knowledge access literacy: while every individual around the world may end up having a mobile phone and be able to access the Internet, not everyone will be in a position to leverage their connectivity to participate in the most advanced features of Knowledge Societies.

Similarly, in regard to persons with disabilities and seniors, accessibility will progressively translate into new challenges around ever smarter knowledge access, creation, sharing and dissemination processes. Cognitive and interactivity abilities in particular, will play an ever greater role in their participation in Knowledge Societies. This for instance may impact persons using health, education, freedom of expression, emergency or employment related services.

PART THREE:

ASSESSING ACCESS TO KNOWLEDGE SOCIETIES BY PERSONS WITH DISABILITIES WITHIN THE 10 TARGETS OF THE WSIS STATISTICAL FRAMEWORK

6. THE 10 TARGETS OF THE WSIS STATISTICAL FRAMEWORK

In order to assess the level of access to knowledge societies by persons with disabilities defined by the WSIS action lines, the present report attempts to evaluate the degree to which persons with disabilities are included in the implementation of each of the 10 targets defined by the WSIS Statistical Framework by associating relevant data points with each target. Selection of data points are extracted from the 2012 CRPD ICT Accessibility Progress Report.[36]

The Task Group led by ITU established in 2010 a first assessment of the progress towards the WSIS goals, with statistical studies of its core 10 targets to promote the dissemination and usage of ICTs. This report emphasizes the new role of mobile communications, particularly in the developing world, as a primary means of access to information. It also stresses the limited high speed Internet access of many schools and public services (including libraries) in low income countries. The universal presence of TVs and radios in world households offer potential for information access, but opportunities are still restricted by lack of adequate content development, including programming in local languages.

The Partnership on Measuring ICT for Development and the mid-term report on WSIS[37] set specific targets that were adjusted in 2011.

Those targets are:

• Target 1. Connect all villages with ICTs and establish community access points;
• Target 2. Connect all universities, colleges, secondary schools and primary schools with ICTs;
• Target 3. Connect all scientific and research centers with ICTs;
• Target 4. Connect all public libraries, cultural centers, museums, post offices and national archives with ICTs;
• Target 5. Connect all health centers and hospitals with ICTs;
• Target 6. Connect all local and central government departments and establish websites and email addresses;
• Target 7. Adapt all primary and secondary school curricula to meet the challenges of the information society, taking into account national circumstances;
• Target 8. Ensure that all of the world's population has access to television and radio services;
• 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;
• Target 10. Ensure that more than half the world's inhabitants have access to ICTs within their reach and make use of them.

Results are well laid out with detailed data points showing the progress of ICTs and information and knowledge dissemination around the world.

While concentrating on geographical coverage and addressing availability of ICTs in major areas of information and knowledge creation and dissemination, none of those targets include any measurement of accessibility or services for persons with disabilities.

However, it is noteworthy that the modifications made to the ten targets in 2011 were in part meant to capture data on actual usage,[38] showing a concern that beyond ensuring availability of

[36] http://g3ict.org/resource_center/CRPD_2012_ICT_Accessibility_Progress_Report
[37] http://www.uis.unesco.org/Communication/Documents/WTDR2010_e.pdf

ICTs, it is also essential to promote actual usage among all categories of population. This logically will lead WSIS to incorporate in its targets accessibility and ICT services for persons with disabilities who represent 15 percent of the world population.

Since very few statistics exist to monitor ICT accessibility at country level (see Recommendation#3), cooperating with Civil Society and the private sector to collect such essential data would seem to be a practical path to pursue in complement of the existing WSIS Statistical Framework.

Action Step #10: WSIS should support and participate in the work of Civil Society in measuring the progress made by States Parties to the CRPD in implementing ICT accessibility

a. STATUS OF THE ACCESS OF PERSONS WITH DISABILITIES TO *KNOWLEDGE SOCIETIES VS. THE 10 WSIS TARGETS*

b. TARGET #1 - CONNECT ALL VILLAGES WITH ICTS AND ESTABLISH COMMUNITY ACCESS POINTS

There are more than one million public access points to access the Internet around the world, a vast majority of them in the developing world. Grassroots initiatives have been identified, but not documented, in several countries including in Mali, Syria or Colombia to make telecenters physically accessible and to provide assistive devices and software for users with disabilities. However, while grassroots initiatives led by disability advocates have been a, it appears that governments at large do not promote those centers with a focus on accessibility for persons with disabilities. In a related question, the *2012 CRPD ICT Accessibility Progress Report* indicates that 73 percent of ratifying countries have no or minimum levels of programs for ICT accessibility in the context of community services.

TABLE 17 - COUNTRIES PROMOTION OF DIGITAL ACCESSBILITY IN COMMUNITY SERVICES

Levels of Implementation	None	Minimum	Partial	Substantial	Full
Are there any dispositions among Country laws, regulations or government supported programs promoting digital accessibility, the use of ATs or provisions for reasonable accommodations in Community Services?	55.6 %	17.8 %	13.3 %	13.3 %	0.0%

Source: CRPD Progress Report 2012, www.g3ict.org

In 2010, the ITU launched the "Connect a School, Connect a Community" Toolkit which includes an entire section on how to make school computing centers accessible.[39] Its module 4 includes a wealth of practical information for operators to make their centers accessible.[40]

[38] Measuring the WSIS Targets: A statistical framework – ITU www.itu.int/dms_pub/itu.../D-IND-MEAS_WSIS-2011-PDF-E.pdf
[39] http://www.connectaschool.org/
[40] http://www.connectaschool.org/itu-module/15/331/en/persons/w/disabilities/connectivity/introduction/

TABLE 18 - CASE STUDY: ACADEMIA DE GESTORES TIC (VIRTUAL ACADEMY FOR MANAGERS OF ICT CENTERS)

Country: Colombia

Project: Academia de gestores TIC (Virtual Academy for Managers of ICT Centers)

Description: A series of 16 free courses (tutored or self-trained) for human capacity building, offered at least 3 times per year since 2010, training of individuals who manage public access centers for ICT, strengthening skills and knowledge in the use of ICT tools. Courses offered in various fields of ICT include digital creativity, social entrepreneurship, image editing tools, digital marketing, digital literacy, ICT centers for children, seniors and people with disabilities, women in technology and community and social networking and communication strategies.(See: http://www.soytic.gov.co/) To date, 1600 managers have been trained and we expect 28000 in 2014.

Stakeholders: Colombia - Ministerio de Tecnologias de la Informacion y las Comunicaciones

More information : http://academia.telecentros.org.co

UNESCO has been very involved with multimedia community centers and community radios and hosted meetings and produced a number of publications and reports on case studies. In 2012, following a meeting at the 2011 WSIS in Geneva, G3ict – The Global Initiative for Inclusive ICTs and Telecentre.org initiated a joint project to develop a training module for telecentre managers from around the world on how to reach senior users and persons with disabilities in their communities, understand their needs, identify relevant contents and services, and train them to use technology including assistive technologies. Most accommodations required can often be achieved with low cost solutions, including open source software, although in the case of specialized assistive technology devices, availability remains a challenge in many countries.

Action Step #11: WSIS should encourage governments to provide incentives for community based institutions and telecenters to train persons with disabilities in the use of ICTs and accessing relevant information and knowledge in application of CRPD art. 9 par. 2 c & g.

c. TARGET #2 - CONNECT ALL UNIVERSITIES, COLLEGES, SECONDARY SCHOOLS AND PRIMARY SCHOOLS WITH ICTS AND
d. TARGET #3 - CONNECT ALL SCIENTIFIC AND RESEARCH CENTERS WITH ICTS

The Education sector is one of the areas where most efforts have been made by governments around the world to promote ICT accessibility and assistive technologies. Almost half of the countries report having some level of program in place to promote reasonable accommodation for students[41]:

[41] 2012 CRPD ICT Accessibility Progress Report

TABLE 19 - COUNTRIES POLICIES FOR ASSISTIVE TECHNOLOGIES AND REASONABLE ACCOMMODATION IN EDUCATION

Are there any dispositions among Country laws, regulations or government supported programs promoting digital accessibility, the use of ATs or provisions for reasonable accommodations in Education?	No	Minimum	Partial	Substantial	Full
Higher Education	47.8	26.1%	17.4%	8.7%	0.0
Primary and Secondary Education	44.7	27.7%	23.4%	4.3%	0.0

Source: CRPD Progress Report, www.g3ict.org

The same survey shows that the actual availability of assistive technologies at major universities is closely related to the level of income per capita of the country:

High Income	Upper- Middle Income	Lower-Middle Income	Low-Income
83%	**53%**	**44%**	**30%**

Source: CRPD Progress Report 2012, www.g3ict.org

Action Step #12: Governments should ensure that Assistive Technologies are made available to students with disabilities throughout their education and that teachers are trained and supported in their implementation

e. TARGET #4 - CONNECT ALL PUBLIC LIBRARIES, CULTURAL CENTERS, MUSEUMS, POST OFFICES AND NATIONAL ARCHIVES WITH ICTS

While no specific data on ICT accessibility exist for the various components of WSIS target #4, several data points extracted from the *2012 CRPD ICT Accessibility Progress Report* give an indication of the degree to which the needs of persons with reading impairments are addressed, a segment of the population particularly subject to exclusion from public libraries, cultural centers, or the use of national archives.

TABLE 20 - AVAILABILITY OF LIBRARY FOR THE BLIND OR E-BOOK SERVICES IN COUNTRY BY LEVEL OF INCOME PER CAPITA

Availability of a Library for the Blind or e-books Services in country by level of income per capita	High Income	Upper-Middle Income	Lower-Middle Income	Low-Income
	100%	80%	78%	60%

Source: CRPD Progress Report 2012, www.g3ict.org

From a policy and programmatic standpoint, supporting distribution networks for accessible e-books is anatural extension of the function of libraries for the blind. With the rapid decrease of

the costs of tablets and the availability of free open source, embedded or inexpensive e-book reading software, UNESCO can play an important role in promoting public procurement policies for education systems around the world based upon ePUB3 3 and W3C – WAI guidelines.

Action Step #13: UNESCO, in cooperation with relevant institutions, should develop a model policy for national education institutions to promote accessible and assistive technologies in support of Inclusive Education.

Such model policy should include procurement criteria based upon standards including but not limited to the DAISY/ePUB3 and W3C - WAI guidelines as an incentive for publishers, information services, web services and hardware vendors to develop accessible education tools and contents

f. TARGET #5 - CONNECT ALL HEALTH CENTERS AND HOSPITALS WITH ICTS

TABLE 21 - COUNTRIES WITH ICT ACCESSIBILITY POLICIES FOR HEALTH SERVICES PER LEVEL OF INCOME PER CAPITA

Countries with ICT Accessibility policies and programs by level of income per capita for	High Income	Upper-Middle Income	Lower-Middle Income	Low-Income
Health Services	62%	20%	13%	11%

Source: CRPD Progress Report 2012, www.g3ict.org

While percentages vary by income per capita, it is likely that they also follow the availability of ICT based health services in country.

g. TARGET #6 - CONNECT ALL LOCAL AND CENTRAL GOVERNMENT DEPARTMENTS AND ESTABLISH WEBSITES AND EMAIL ADDRESSES

TABLE 22 - COUNTRIES WITH POLICIES AND PROGRAMS FOR ACCESSIBLE E-GOVERNMENT BY LEVEL OF INCOME PER CAPITA

Countries with policies and programs by level of income per capita which:	High Income	Upper-Middle Income	Lower-Middle Income	Low-Income
Provide services to the general public in accessible and usable formats	92%	38%	0%	0%
Ensure that government communications to public using ICTs are provided in accessible formats, sign language or Braille	83%	50%	29%	36%
Have ICT accessibility programs for Emergency Response Services	86%	33%	0%	10%
Accessible Government Web Sites	93%	60%	22%	10%

Source: CRPD Progress Report 2012, www.g3ict.org

Accessibility of e-Government is an area addressed by policy making in most OECD countries and less so in middle and low income countries. Since retrofitting web sites is far more costly than including accessibility at an early stage of development, countries in the process of developing e-government services should include accessibility considerations in all new projects.

Action Step #14 - United Nations agencies should promote good practices in accessible e-government, the use of standards, and the adoption of accessibility considerations at the inception of new web development projects

h. TARGET #7 - ADAPT ALL PRIMARY AND SECONDARY SCHOOL CURRICULA TO MEET THE CHALLENGES OF THE INFORMATION SOCIETY, TAKING INTO ACCOUNT NATIONAL CIRCUMSTANCES

While no specific metrics are available to measure the degree to which this objective is met in relation to students with disabilities, anecdotal evidence as well as national surveys point to significant gaps. UNESCO, in collaboration with Microsoft, organized a consultative expert meeting of Special Educators in Paris 17 – 18 November 2011: “Accessible ICTs and Personalized Learning for Students with Disabilities: A Dialogue among Educators, Industry, Government and Civil Society”.

Specific recommendations were formulated for teachers, policy makers and administrators in core areas. In relation to section vii of the WSIS framework on curriculum applied to students with disabilities, the expert group concluded that “An inclusive curriculum means considering students’ needs from the earliest stages of curriculum development. The development of curriculum that is designed from the outset to meet the greatest number of students will reduce the need for costly and time consuming retrofitting (universal design).”

TABLE 23 - ACCESS-ED: TOOLS TO DEVELOP ACCESSIBLE CURRICULA

The ACCESS-ed Project was a model demonstration project from 2005-2008. It was one of about two dozen Demonstration Projects to Ensure a Quality Higher Education for Students with Disabilities, funded by the U.S. Department of Education's Office of Postsecondary Education. The R2D2 Center, of the University of Wisconsin - Milwaukee (UWM), also hosted Project Impact (1999-2002) and is currently hosting its third generation Demonstration Project, called UD ITEACH (2008-2011).
The R2D2 Center projects promote universal design in higher education as the primary method of ensuring that students with disabilities receive access to the full scope of higher education campuses. This includes development and delivery of low-cost resources to help members of the campus community deliver universally designed instruction, services, information media, and physical environment through eliminating barriers to accessibility.
Its web site contains a number of practical tools to ensure that curriculum and instruction materials are accessible to students with disabilities.

Action Step #15:
UNESCO should promote widely the conclusions of its report on Accessible ICTs and Personalized Learning for Students with Disabilities and incorporate an Inclusive Education component in its ICT Competency Framework for Teachers and develop follow-up activities with member states

i. TARGET #8 - ENSURE THAT ALL OF THE WORLD'S POPULATION HAS ACCESS TO TELEVISION AND RADIO SERVICES

Television accessibility has emerged in the 1990s as a critical requirement to ensure the participation of deaf persons to society. While relatively simple from a technology standpoint, captioning and live signed programs require a specific effort on the part of broadcasters. It took two legislative measures in the United States to impose captioning across all broadcasters. Today most countries have some level of captioning or sign language interpretation available, most often offered by public broadcasters and less so by commercial broadcasters. Historically, public broadcasters have been at the forefront of accessibility: WGBH in Boston or the BBC are good examples of leading edge accessibility practices till today.

As the CRPD ICT Accessibility Progress Report shows it, the availability of accessible television in countries is still very much correlated with their income per capita. While such result is not surprising, it represents an area of great potential. Indeed, case studies show that accessible television can be operated in low resource environments especially since a large part of the costs are labor related and thus consistent with the economic environment. In particular, captioning is increasingly made easier thanks to re-speaking technologies when speech recognition software exists in the local language. A complete review of the processes required

to making television accessible was published by ITU and G3ict in 2012 in a report: "Making Television Accessible".[42]

Other areas of importance related to the accessibility of television are:

- Accessibility of remote consoles
- Accessibility of programs and
- Accessibility of television for blind persons (audio description or video description)
- The use of mobile devices as second screens to provide accessibility features to television spectators

TABLE 24 - CASE STUDY: AMI, FIRST 24 X 7 AUDIO DESCRIBED TV CHANNEL WORLDWIDE

Country: Canada Accessible Media Inc. (AMI) is a not-for-profit multimedia organization operating two broadcast services, AMI-audio and AMI-tv, and a companion website (ami.ca). AMI serves more than five million Canadians who are blind, deaf, vision, hearing or mobility impaired, learning disabled, print-restricted or learning English as a second language by making print, broadcast and online media accessible. Its mission is to make all media accessible to all Canadians. In pursuit of that mission, it believes that for all impacted and concerned Canadians, AMI can be a new model media organization that creates, advocates, collaborates and enables accessibility to all media. AMI-tv, its accessible channel, is a national English language, descriptive-video, closed-captioned, basic HD digital TV specialty service operating 24 x7. Licensed by the CRTC, AMI-tv is part of the basic digital package of TV programming offered by all Class 1 & 2 cable systems and satellite direct-to-home services. AMI-tv broadcasts TV programs from conventional and specialty TV services and foreign-rights holders in open described closed-captioned format for people who are blind, vision-impaired, deaf or hard of hearing - a world first!

TABLE 25 - COUNTRIES WITH ACCESSIBLE TELEVISION SERVICES BY LEVEL OF INCOME PER CAPITA

Countries with accessible television services by level of income per capita	High Income	Upper-Middle Income	Lower-Middle Income	Low-Income
Policy covering the Accessibility of TV Sets and Remote Controls	29%	13%	0%	11%
Closed Captioning/Sign Language Interpretation by TV Broadcasters	86%	80%	33%	11%
Sign language for news, emergency communications/ live announcements	64%	60%	33%	11%
Captioning of Live Programs	57%	36%	0%	11%
Captioning of pre-recorded programs or movies	50%	29%	11%	0%
Video or Audio Description for the Blind	64%	0%	0%	0%

Source: CRPD Progress Report 2012, www.g3ict.org

[42] ITU – G3ict report: http://www.itu.int/ITU-D/sis/PwDs/Documents/ITU-G3ict%20Making_TV_Accessible_Report_November_2011.pdf

Action Step #16: ITU should promote solutions for accessible media services and contents and UNESCO serve as a forum for disability and accessibility related media issues taking into consideration a human-rights based approach.

j. 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

The availability of text to speech and voice recognition software is a critical component of many applications for persons with disabilities. Speech and voice have deeply rooted connections to cultural heritage, ways of thinking and traditions, and are closely associated with the personal identity of all persons around the world and their way of acquiring and memorizing knowledge. When a sensorial limitation makes it necessary to use an alternative way to communicate, voice solutions are often a critical component of the life of a person with disability. For instance, a paraplegic person may be able to accomplish much of his or her communications tasks via voice commands and voice recognition software. A blind person may rely on text to speech to read digitalized print documents. And a deaf person may rely on live captions produced via a re-speaking process based upon voice recognition.

Driven by market forces, the development of speech related software has naturally covered the main languages commanding large ICT markets. Oftentimes, however, for smaller countries and minority languages, no product is readily available.

TABLE 26 - CASE STUDY: MALAYALAM RESOURCE CENTER WITH OCR AND TEXT TO SPEECH

Country: India, State of Kerala, language Malayalam
The official web site of the TDIL Resource Centre for Indian Language Technology Solutions-Malayalam contains information on Malayalam Language, Literature, Kerala's Art and Culture, and the Ayurvedic system of medicine.

In addition, some of the Software products (such as Sandesam – e-mail Server, Anweshanam-Search Engine and e-com application) developed at the Resource Centre is integrated into this portal. Demo versions of some of the software products are available. Users can download free fonts (including Unicode fonts) from this site as well as a variety of accessibility and productivity software including a text to speech engine:

Nayana™ - Malayalam OCR System.
Aksharamaala - Malayalam Font Package & Script Manager.
Ezhuthachan™ - The Malayalam Tutor.
Nerpadam™ - Malayalam Spell Checker.
Subhashini ™ - Malayalam TTS System.
Aachaaryan - The English Tutor.
Prakes - Prakruti Estimation Software.
Sandesam ™ - Malayalam Web-based Mail Server.
Anweshanam™ - Malayalam Web-based Search Engine
Kalakeralam - Knowledge base of Traditional Art Forms & Culture of Kerala.

Voice related software is a relatively complex area requiring much development effort, especially for good speech recognition. Text to speech or artificial digital voices are simpler to program. Levels of expected performance also influence the level of investment required. Speech recognition or text to speech for menu options on a device are simple to develop. A full fledge voice recognition engine, on the other hand, requires massive investments that only a handful of companies can afford. When no market forces are likely to generate the development of language solutions, it is in the best interest of governments to use their own resource such as their Universal Service Fund to support the development of a national or minority language text to speech and voice recognition software. Projects of this nature have also developed via voluntary open source initiatives while the most advanced solutions are generated by private industry. Whichever path is chosen, it is crucial that the investment be made with a sustainable business model to support it long term, including adapting the software to new generations of operating systems environment, devices and applications.

TABLE 27 - COUNTRIES WITH AVAILABILITY OF NATIVE LANGUAGE ASSISTIVE TECHNOLOGIES BY LEVEL OF INCOME PER CAPITA

Countries with availability of native language assistive technologies by level of income per capita	High Income	Upper-Middle Income	Lower-Middle Income	Low-Income
PC Operating System most used in the country official language supports Text to Speech and Voice Recognition capabilities	79%	67%	33%	20%
Screen readers available in the main language	100%	64%	56%	20%
Screen reader available in the minority language of the country	50%	14%	11%	0%

Source: CRPD Progress Report 2012, www.g3ict.org

Action Step # 17: UNESCO, in cooperation with ITU and other relevant agencies, should undertake a technical and economic evaluation of the best ways to promote the development of sustainable speech software in minority languages and seek to engage a dialogue with industry on those matters

k. TARGET #10 - ENSURE THAT MORE THAN HALF THE WORLD'S INHABITANTS HAVE ACCESS TO ICTS WITHIN THEIR REACH AND MAKE USE OF THEM

The goal of ensuring that half of the world inhabitants have access to ICTs when it comes with persons with disabilities can be supported by governments in two major ways listed in the two tables below:

TABLE 28 - COUNTRIES WITH PROGRAMS PROMOTING ACCESS TO ICTS AND ASSISTIVE TECHNOLOGIES BY LEVEL OF INCOME PER CAPITA AND HUMAN DVELOPMENT

Countries by level of income per capita with policies and programs to:	High Income	Upper-Middle Income	Lower-Middle Income	Low-Income
Promote access for persons with disabilities to ICTs and systems	91%	81%	14%	36%
Facilitate access by persons with disabilities to Assistive Technologies	100%	44%	29%	50%

Countries by level of human development (UNDP HDI) with policies and programs to:	Very High	High	Medium	Low
Promote access for persons with disabilities to ICTs and systems	92%	82%	44%	33%
Facilitate access by persons with disabilities to Assistive Technologies	92%	45%	33%	55%

SOURCE: CRPD PROGRESS REPORT 2012, WWW.G3ICT.ORG

7. ADDRESSING GAPS: STEPS TO BUILDING INCLUSIVE KNOWLEDGE SOCIETIES

a. BUILDING BLOCKS

The following list of areas summarizes key areas of intervention for governments and the private sector to build inclusive Knowledge Societies:

- Adopting Universal Design principles for Information infrastructure and services
  - Accessible TV
  - Accessible mobile phones, services and fixed lines
  - Accessible emergency services
  - Accessible web sites for e-government and e-health services
  - Accessible electronic kiosks: banking, transportation and voting
- Promoting assistive technologies for persons with disabilities
  - Accessible and assistive technologies in education and info structures
  - Accessible and assistive technologies for the workplace
  - Assistive technologies for rehabilitation and independent living
- Working with the education and private sectors to promote accessible contents and services
  - Accessible textbooks
  - Accessible technologies in education

Action Step # 18: United Nations agencies should help governments develop national policies and roadmaps for accessible ICT infrastructure, contents and services with appropriate stakeholders

Most governments around the world face the same challenge to address the many facets of ICT accessibility. Issues vary considerably among the three areas of intervention listed above.

However, most share the same issue of a lack of awareness and competencies in addressing disability accessibility issues.

TABLE 29 - CASE STUDY: MONTENEGRO PORTAL FOR PERSONS WITH DISABILITIES

Country: Montenegro Project: Portal for Persons with Disabilities Description: Portal for people with disabilities, with the aim of fostering the inclusion of persons with disabilities in the information society. The aim of the web site is to enable organizations and associations to communicate fast, safely and simply, as well as to inform citizens about all aspects of life and work and all activities relating to people with disabilities in Montenegro. Stakeholders: Ministry of Information Society and Telecommunications, Association of Youth with Disabilities of Montenegro More information: http://www.disabilityinfo.me/1/

b. Making the information infrastructure Accessible

This responsibility has been assigned to national governments by the WSIS Action Plan, with an emphasis on "in the context of national e-strategies, address the special requirements of older people, persons with disabilities, children – especially marginalized children, and other disadvantaged and vulnerable groups."

Making the information infrastructure accessible can be achieved with programs concentrated among a limited number of mobile service providers, broadcasters and administrations responsible for e-government. In almost all countries, those organizations are either integral part of the government or regulated and operating under licenses from the government. It is therefore possible for governments to implement appropriate policies which can benefit millions of users at a time. Examples of good practices from around the world demonstrate that there is no technology or significant economic obstacle today to make the information infrastructure accessible – only political inertia, and lack of awareness and expertise.

For instance, television is captioned 100 percent in several OECD countries, e-government web sites reach an above 90 percent level of compliance with web accessibility standards in the Republic of Korea, telephone services are available through video relay services for the deaf or speech impaired users in Colombia, emergency response services are made accessible via text messaging in the United States, and accessible mobile phones and services bringing unprecedented benefits to users with disabilities are successfully promoted and distributed in countries as varied as France, Egypt, Japan, Italy or the United States.

c. Promoting assistive technologies for persons with disabilities

Promoting assistive technologies for persons with disabilities, on the other hand, is a very complex and labor/service intensive endeavor. Assistive technologies can only be effectively promoted with proper individual assessment of needs, understanding the environment of the user, sourcing the appropriate technology, testing it, training the user and offering support during the lifetime of the assistive solution. And while younger persons or adults can adopt new technology based solutions, many challenges exist with elderly persons with disabilities. Countries also face the added challenge of a fragmented assistive technology eco-system:

- By type of disability:
  - Visual
  - Hearing
  - Speech
  - Motor
  - Cognitive
- By type of service channel:
  - Schools and universities
  - Rehabilitation centers
  - Workplace accommodation by employers

TABLE 30 - CASE STUDY: QATAR MADA CENTER FOR ASSISTIVE TECHNOLOGIES

Country: Qatar Project: MADA Center People living with disabilities in Qatar have access to a valuable new Center for Assistive Technology. MADA is an innovative center that strives to connect people with disabilities to the information and communications technologies (ICT) that can empower them to excel in all aspects of their life. Mada, a non-profit organization, includes an interactive resource center that showcases the latest Assistive Technologies (AT) and offers personal consultations for people with disabilities to identify the AT solutions that can best fit their needs, as well as training on how to use the various technologies. Mada, which also features an accessible library, is designed to be a barrier free space for people with a wide range of disabilities. Mada also supports schools, rehabilitation centers and employers by providing technical assistance and training in offering support to persons with disabilities. Stakeholders: ICT Qatar More information: http://mada.org.qa/en/ - http://www.ictqatar.qa/sites/default/files/documents/OpEd_WorldTelecomDay08_EN.pdf

From a government budget standpoint, the cost of services such as the distribution, training, support and maintenance of assistive technologies is the largest expense to be considered. Anecdotal evidence suggests that countries with the greatest level of achievement in promoting assistive technologies have developed or rely on national centers whose role is to provide support to a variety of professionals involved in providing assistive solutions to persons with disabilities across multiple sectors. Examples such as the Job Accommodation Network in the United States[43] or the Mada Center in Qatar[44] show that the consolidation of expertise and resources can provide significant economies of scale and efficiencies to address the infinite variety of situations addressed by assistive technology professionals.[45]

Such initiatives can help develop better training and support for users and for the maintenance of technology. This area is covered by Article 4.1.i of the CRPD which requires States Parties to "promote the training of professionals and staff working with persons with disabilities"./ For instance, even if an Open Source screen reader, such as NVDA, is available free of charge for blind users of computers, minimum amounts of training and support are required to get a blind user who has never used a computer to become proficient with basic features of the screen reader and its interaction with various applications. This would be even more obvious in the

[43] http://askjan.org/
[44] http://mada.org.qa/en/
[45] See AT Centers Leadership Network www.g3ict.org

case of a rehabilitation professional providing a customized solution with training and support to a paraplegic person using various alternative input methods including switches to use a computer.

Given the above observations, helping the development of an adequate national assistive technologies "eco-system" including skilled professionals should be an important objective for governments. This requires inter-agency cooperation as well as partnerships with the private sector and education institutions since, as mentioned above, assistive technologies are primarily deployed in the context of education, the workplace and rehabilitation services.

While new, mass produced, hardware and software such as computers, smart phones or tablets are bringing embedded alternative modes of communication and innovative applications for users with disabilities, successful adoption remains conditioned by human training and support , for instance by special educators in schools or customer services in the private sector.

Action Step # 19: International organizations should encourage governments to support and leverage national centers of expertise on assistive technologies serving education, employers and rehabilitation services

d. SPECIAL EDUCATION

UNESCO, in collaboration with Microsoft, organized a consultative expert meeting of Special Educators in Paris 17 – 18 November 2011: "Accessible ICTs and Personalized Learning for Students with Disabilities: A Dialogue among Educators, Industry, Government and Civil Society" which provided important insights in the status of assistive technologies and accessible education materials around the world. It pointed to the pressing need to leverage technology for students with disabilities in order to successfully implement Inclusive education strategies and acknowledged the little progress made around the world in this area. It also recommended introducing a component on assistive technologies and accessibility in the UNESCO ICT Competency Framework for Teachers.[46]

TABLE 31 - CASE STUDY: OMAN TRAINING ON ACCESSIBILITY FOR TEACHERS

Country: Oman Project: Web Accessibility Workshops Description: Organization of web accessibility workshops to enhance disabled children's learning processes. One such workshop, organized in cooperation with the Association for Disable Children, sought to disseminate information about web accessibility for children with disabilities. Attended by 16 volunteer teachers and trainers working at the Association for Disabled Children, the workshop allowed teachers to acquire knowledge on how to teach disabled children about information technology. Topics covered during the workshop included: the importance of accessibility programmes; how disabled children can use computers; and available software for disabled users. Through this cooperation, ITA is pursuing its efforts to make information technology accessible to all segments of society and to ensure everyone enjoys equal opportunities to participate in Oman's digital society and e-government initiative. Stakeholders: Information Technology Authority (ITA), Disabled Persons Organizations More information: http://www.ita.gov.om/ITAPortal/ITA/default.aspx

Key recommendations of the Expert Group were as follows;

[46] http://unesdoc.unesco.org/images/0021/002134/213475e.pdf

- Maximizing the use of the many existing accessibility features in mainstream ICTs such as personal computers, tablet PCs, mobile phones etc. already in use in classrooms;

- Empowering students to "self-accommodate" and learn their own preferences and settings when using technology for learning;

- Removing attitudinal barriers to the use of technology for inclusive education, in particular those of teachers who may struggle with modern ICTs;

- Supporting teachers, students and their families in using technology for learning through developing local teams and networks of expertise in accessible ICTs;

- Developing national and regional policies and school-level ICTs plans that fully incorporate the use of accessible ICTs as a key tool in in making inclusive education a reality;

- Developing and collating resources on the attitudes, skill and knowledge required by teachers to develop the competencies to be able to incorporate accessible ICTs to enable inclusive education in the classroom and wherever learning happens.

e. Working with the private sector to promote accessible contents and services

While governments may be able to create the conditions for accessible Knowledge Societies by addressing the accessibility of information infrastructure and services and making assistive technologies available to persons with disabilities, ultimately, all contents, web sites and e-services must equally be accessible to fulfill the promises of an accessible Knowledge Societies for all.

Key policy tools include awareness raising campaigns in cooperation with private sector organizations, adopting public procurement rules including accessibility criteria for contents and services such as education text books, offering incentives and recognition for providers achieving high levels of accessibility, and promoting standards.

It is also envisioned that crowd sourcing initiatives letting users rank contents and service providers via the Internet may influence private sector organizations.

In countries where substantial advances have been accomplished, legal action has often been the source of progress: although the case for accessibility makes sense from a business and marketing standpoint, many businesses remain more attentive to the risks of litigation than to the benefits of an increased reach of customers with disabilities.

TABLE 32 - The UNITE project – United Nations accessible information technology engagement for persons with disabilities

Launched in 2012, the UNITE project consists in approaching ICT accessibility at country level in a holistic manner, taking into account horizontal technology solutions applied to multiple sectors covered by various United Nations agencies. Web accessibility or mobile accessibility for instance are important to a variety of projects in e-government, e-education or e-health which are meant to reach all segments of the population. However, fragmented efforts to promote accessibility are unlikely to succeed, especially when multiple stakeholders need to work together. Coordinated by G3ict, UNITE will initiate two pilot projects to promote comprehensive ICT accessibility policies and programs in two countries in 2013. WHO, ITU,

UNESCO, UNDP, ILO, WIPO which all are involved in significant activities related to ICT accessibility, participated in the launch of this program at the 5th Conference of States Parties at the United Nations in New York in September 2012 alongside Disabled People's International and large IT corporations including Microsoft, Adobe Systems, AT&T, IBM and ePhox.

As governments consider policies, promoting specific standards are of utmost importance.

- **Web accessibility standards** are well established and issued by the Worldwide Web Consortium web accessibility initiative which developed the Web Contents Accessibility Guidelines – WCAG 2.0 recently adopted an ISO and IEC standard: ISO/IEC 40500[47].

- **Electronic publishing**: while a diversity of formats exist today, the International Digital Publishing Forum (IDPF) completed in 2011 a major revision to ePUB, the global standard interchange and delivery format for digital publications.[48] EPUB 3, aligned with HTML5, adds support for rich media (audio, video), interactivity (JavaScript), global language support (including vertical writing), styling and layout enhancements, embedded fonts, expanded metadata facilities, MathML, and synchronization of audio with text and other enhancements for accessibility. It offers the best level of accessibility ever reached for electronic publishing with all features of DAISY incorporated in the latest version of ePUB 3.

[47] http://www.w3.org/TR/WCAG/
[48] http://idpf.org/epub/30

PART FOUR:

LATEST TECHNOLOGY TRENDS, INFLUENCE ON THE PARTICIPATION OF PERSONS WITH DISABILITIES IN KNOWLEDGE SOCIETIES

8. TRENDS IN ENABLING TECHNOLOGIES AND THEIR IMPACT ON THE PARTICIPATION OF PERSONS WITH DISABILITIES IN KNOWLEDGE SOCIETIES

This section summarizes technology trends which will impact digital accessibility, enabling technologies and further contribute to transform Knowledge Societies patterns. It also examines prospects for low resources environments. In reviewing those trends, the report focuses on the interaction between innovation and mainstream applications for mass markets that may create new affordable assistive solutions for persons with disabilities.

a. KEY TRENDS

- **Continuous drop of the cost of computing by a factor of 10 approximately every 4-5 years**
  - ⇨ Will break the cost barrier of smart mobile devices for persons with disabilities including in low income economies
  - ⇨ Will allow complex software such as voice or image recognition to work on affordable mobile devices for all users
  - ⇨ Will allow for Artificial Intelligent Agents able to interact with the user to solve complex situations, either on the user device or on a remote server

- **Nanotechnology will lead to the development of smart nano and micro devices and systems with radical breakthroughs in vital fields such as healthcare, energy, environment and manufacturing**
  - ⇨ Will create the potential for mass produced inexpensive micro sensors applicable to assistive technologies
  - ⇨ Will favor the development of intelligent controls in sectors as diverse as automotive and transportation, aeronautics, creating an industrial ecosystem which can benefit the sector of assistive technologies
  - ⇨ Will support the development of new types of implants to help individuals with severe disabilities

- **Photonics will provide the technological basis for the economic conversion of sunlight to electricity which is important for a variety of electronic components**
  - ⇨ May significantly improve the energy independence of mobile solutions for persons with disabilities
  - ⇨ Will possibly alleviate the issues of environments or situations with limited power supply

- **Near Field Communications (NFC) based upon Radio Frequency Identification (RFID) will continue to benefit from economies of scale driven by large mainstream applications in all areas of commerce and industry**
  - ⇨ NFC will increasingly serve as a technology of choice to automate processes and applications on mobile devices, including automatically starting Bluetooth or Wi-Fi connections

- ⇨ NFC will open an unlimited field of creativity for automated processes in the built environment and transportation for persons with disabilities
- ⇨ Will allow accessible mobile devices to replace inaccessible interfaces of electronic kiosks and other public devices requiring user interaction
- ⇨ Mobile devices will become the universal console for environment and multi-media controls

- **Geo Positioning Systems, already very popular, will be complemented by additional technologies such as radio triangulation and Inertial Navigation System (INS) using motion sensors (accelerometers) and rotation sensors (gyroscopes) present in commodity mobile devices**
  - ⇨ Mobile devices will offer unprecedented accuracy in navigation systems
  - ⇨ Geo-positioning will be available indoors

- **Human interfaces will transform the way users interact with technology**
  - ⇨ Projected and virtual interactive interfaces will free users of touching a device
  - ⇨ Gesture recognition
  - ⇨ User behavior anticipation can help persons with disabilities
  - ⇨ Augmented and virtual reality solutions may considerably help users with sensorial or cognitive impairments

- **Multi-modal alternative communications will continue to gain in accuracy**
  - ⇨ Will allow to cross-translate between modalities – text – speech - video
  - ⇨ The ability to translate between sensory modalities will greatly benefit persons with disabilities

- **Advances of Neuro-science**
  - ⇨ Direct control of devices by the brain will be available for persons with extreme mobility limitations
  - ⇨ May allow for the control of artificial limbs

- **Ability to be connected anywhere, anytime with wireless networks expansion**
  - ⇨ Allows for ubiquitous access to information and knowledge for all
  - ⇨ Allows for services on demand for all
  - ⇨ Can include cloud based solutions for persons with disabilities including assistive software or resources such as image databases for image recognition
  - ⇨ Will remain contingent on network coverage, bandwidth and latency

- **Because all mobile users require alternate modes of communication for situational disabilities such as inability to use hands, speech or sound, or read a screen, mobile devices will continue to drive ICT accessibility innovation**
  - ⇨ Already representing the largest installed base of any technology in history, mobile devices will benefit from the competition among operating system providers who are all offering embedded accessibility functionalities

- ⇨ Because the three largest providers of mobile operating system are committed to a full implementation of their accessibility features on all devices either by controlling their production or via the licensing of handset manufacturers, the entire ICT industry will eventually follow their example for all devices

- **Broadband expansion will favor the emergence of next generation services for seniors and persons with disabilities**[49]

  - ⇨ Will favor tele-health and well-being services
  - ⇨ Work and education at home
  - ⇨ Remote social interaction
  - ⇨ Participation to public life
  - ⇨ Remote access to products and services

- **Cost and physical space of data storage will continue to decrease alongside increasingly intelligent information retrieval systems**

  - ⇨ Systems will continue to evolve from information processing to creation of knowledge
  - ⇨ Image and pattern recognition based on mega databases will assist users in all types of circumstances
  - ⇨ Portability of massive data storage will help create new mobile assistive technologies applications

b. Impact of future trends on the participation of persons with disabilities in Knowledge Societies

i. Because mobile devices will drive market growth over the next few years, accessibility of ICTs will evolve from being an afterthought and compliance issue to an area of innovation and strong competition among vendors. This is because all users of mobile devices require accessibility features at times due to temporary disabling situations such as inability to read a screen (sun), inability to use a keyboard (driving or operating another device), inability to use sound (in a meeting), or lack of time or visual accuracy to read (use of pictures and symbols as alerts) to name a few. As a result many smart phones and tablets are sold with embedded innovative functionalities such text to speech, voice recognition and a variety of alternative input/output based upon near field communications for secondary input or output devices. Current competition in voice recognition is a good example of industry's current eagerness to compete on accessibility features.

Action Step # 20: ITU and United Nations agencies should cooperate to promote the use of mainstream mobile technologies for persons with disabilities to enhance their participation in Knowledge Societies

[49] See Next Generation Services for Older and Disabled People OFCOM – 2010 www.ofcom.org.uk/files/2010/09/ACOD-NGS.pdf

ii. Information technology devices and connectivity will eventually be available to all people on the planet driven by mobile services and low cost handsets and tablet computers. This means that the economic barrier to access ICTs for persons with disabilities will become a lesser obstacle. In addition, governments and civil society may take advantage of those trends to distribute ICT tools for persons with disabilities as a way to streamline the cost of supporting them. Pioneering/precursor examples include the program launched by the Federal Government of Canada to distribute free computers to qualifying persons with disabilities, the program funded by the Italian government to provide free assistive technology to students with disabilities at Universities, the United States program to distribute free equipment to deaf/blind users, Etisalat Egypt distribution of free screen readers to blind users of mobile phones or the program launched by the Republic of Ecuador to offer free GPS locating devices to persons with disabilities to facilitate support and emergency services in remote areas.

Action Step #21 – United Nations agencies should cooperate to research and document countries good practices in making available technology tools for persons with disabilities and their benefits for the wider community and Knowledge Societies

iii. Miniaturization of technology will allow for extreme portability of devices to access information and knowledge such as the incorporation of connectivity, display, camera and microphone into glasses. For persons with disabilities, this will translate into sophisticated virtual reality assistive technologies, automatic use of sensor technology and connectivity to interpret complex situations and provide real time contextual support. Current vendors leading the mobile technology industry will be the likely actors in this new space.

iv. Paradigm will evolve from *ensuring access to information* to all to *generating relevant contextual knowledge for all* covering multiple domains in support of sustainable human, social and economic development. For persons with cognitive disabilities and seniors in particular, this will open new assistive solutions enhancing independent living among many areas of applications.

Action Step #22 – UNESCO, in partnership with relevant research institutions should identify and promote good practices and innovations in "anywhere anytime" contextual knowledge generation for seniors and persons with disabilities including but not limited to health, rehabilitation and emergency support services

v. Neuro-science and micro-electronics will increasingly leverage each other, leading to sophisticated implant solutions for a variety of rehabilitation scenario.

vi. Issues of minority languages will be exacerbated due to lack of accessibility solutions and lack of available digital contents in local language.

c. Patterns in Education

i. Emphasis will increasingly be on "Inquiry based" teaching, developing students' skills to search, acquire and critically analyze information to develop relevant knowledge. Curricula which emphasize the proactive use of technology and the Internet to accomplish such tasks will become prevalent in mainstream K to 12 schools.

Action Step #23: UNESCO, in cooperation with education institutions, should research and document how technology can assist students with disabilities in excelling in inquiry based learning and becoming proficient in participating in all aspects of Knowledge Societies

ii. As technology in the form of mobile devices such as tablets become an accepted tool in schools, students with disabilities will benefit from multiple applications dedicated to overcome learning, physical and sensorial disabilities. Because all students will be using such devices, students with disabilities won't experience limits to using technology in the classroom as is the case in most schools today (94% of students in public school in the United States cannot use computer based ATs if other students are not using a computer).

d. Opportunities for low resources environments

Mobile markets will continue to expand making mobile devices ubiquitous in all low resource environments as documented by the ITU statistical indicators. Mobile accessible and assistive solutions are the result of the interaction of multiple mobile eco-system participants:

- Handset manufacturers
- Operating system vendors
- Application developers
- Mobile service providers
- Organizations offering mobile services to the public
- Telecom regulators

While seniors and persons with disabilities have not been a focus for most mobile service providers, the saturation of many mobile markets among emerging economies creates an incentive for them to reach out to non-adopters. This means implementing Universal Design strategies and focused marketing, sales and services such as those adopted by NTT DoCoMo in Japan, Orange in Europe or AT&T in the United States[50].

[50] See ITU – G3ict report on "Making Mobiles Phones and Services Accessible for Persons with Disabilities", 2011

Action Step #24: UNESCO, in cooperation with ITU and other international agencies and civil society, should accompany the rapid transformation of knowledge sharing and dissemination via mobile platforms by promoting accessible mobile tools, contents and services for persons with disabilities including for general news and information, special education, participation in social networks and independent living

RECOMMENDATIONS

The following table summarizes the recommendations derived from the four preceding sections of this report. An attempt is made to weigh the required participation of the main categories of stakeholders in the WSIS process from three stars (leading role) to two stars (active participation) and one star (consultative). One constant among countries which achieve progress is the involvement of multiple stakeholders in the development of accessibility policies and programs. Participation of organizations of persons with disabilities is of paramount importance when designing policies, programs and solutions. Oftentimes, private sector involvement also contributes to defining practical achievable objectives and solutions.

Recommendation #1: Developing policies in support of inclusive Knowledge Societies.
United Nations Agencies should cooperate in supporting countries to implement the WSIS Action Lines and the dispositions of the Convention on the Rights of Persons with Disabilities by:

- Supporting national legislative initiatives promoting accessibility including to information, and Information and Communication Technologies as per Art.9 of the CRPD (#1)
- Helping governments develop national policies and roadmaps for accessible ICT infrastructure, contents and services with appropriate stakeholders (#18)
- Encouraging governments to fund and set processes to ensure the participation of Organizations of Persons with Disabilities in policy making about information and ICT accessibility (#3)
- Assisting governments in adopting public procurement rules incorporating ICT accessibility criteria consistent with existing international standards (#9)
- Promoting good practices in accessible e-government, the use of standards, and the adoption of accessibility considerations at the inception of new web development projects (#14)

Recommendation #2: Setting measurements and targets for inclusive Knowledge Societies. WSIS should define targets for the inclusion of persons with disabilities in Knowledge Societies and develop appropriate measurement tools by:

- Defining methodologies in cooperation with UNESCO, ITU and civil society to facilitate the implementation of national data collection on the accessibility of information, ICTs, media and knowledge for persons with disabilities (#2)
- Encouraging Governments to Apply Census and Survey Methodologies Defined by the UN Group on Disability Statistics in order to accurately measure disabilities prevalence in support of policy making (#4)

- Supporting and participate in the existing work of Civil Society in measuring and benchmarking the progress made by States Parties to the CRPD in implementing ICT accessibility (#10)

Recommendation #3: Building capacity to implement accessibility for persons with disabilities. International organizations should encourage governments to develop capacity building programs as a prerequisite to implement accessible contents, services and technologies by:

- Supporting awareness raising and training programs on ICT accessibility for ICT professionals, teachers, librarians, media, policy makers and other stakeholders developing ICT based contents and services in partnership with academia and the private sector (#6)
- Promoting research and development of universally designed products and Universal Design principles among developers (#7)
- Supporting the participation of national stakeholders in international ICT accessibility standards activities and to promote international ICT accessibility standards in their jurisdictions notably ISO, ITU, W3C and DAISY/ePUB3 (#8)
- Developing, supporting and leveraging national centers of expertise on assistive technologies serving multiple stakeholders involved in supporting persons with disabilities including in education, employers and rehabilitation services (#19)
- Deploying digital literacy and accessibility programs for senior citizens and persons with disabilities with an emphasis on relevant contents and services such as health, employment, cultural, government and information services (#5)
- Providing incentives for community based institutions and telecenters to train persons with disabilities in the use of ICTs and accessing relevant information and knowledge in application of CRPD art. 9 par. 2 c & g. (#11)
- In addition, United Nations agencies should cooperate to research and document countries good practices in making available technology tools for persons with disabilities and their benefits for the wider community and Knowledge Societies (#21)

Recommendation #4: Promoting accessible and assistive information and communication technologies in support of Inclusive Education

- Governments should ensure that accessible contents and services and assistive technologies are made available to students with disabilities throughout their education system and that teachers are trained and supported in their implementation (#12)
- UNESCO should promote widely the conclusions of its report on Accessible ICTs and Personalized Learning for Students with Disabilities and Incorporate an

Inclusive Education component in its ICT Competency Framework for Teachers (#15)

- UNESCO, in cooperation with relevant institutions, should develop a model policy for national education institutions to promote accessible and assistive technologies in support of Inclusive Education. (#13)
- Such model policy should include procurement criteria based upon standards including but not limited to the DAISY/ePUB3 and W3C - WAI guidelines as an incentive for publishers, information services, web services and hardware vendors to develop accessible education tools and contents (#13)
- Recommendation #23: UNESCO, in cooperation with education institutions, should research and document how technology can assist students with disabilities in excelling in inquiry based learning and becoming proficient in participating in all aspects of Knowledge Societies (#23)

Recommendation #5: Promoting accessibility solutions and innovation. International Organizations, in cooperation with civil society should contribute to promote solutions and innovations that can remove barriers for persons with disabilities to participate in Knowledge Societies:

- ITU should promote solutions for accessible media services and contents and UNESCO serve as a forum for disability and accessibility related media issues taking into consideration a human-rights based approach. (#16)
- The Broadband Commission should dedicate research efforts to overcome the low rates of adoption of broadband services by persons with disabilities. (#25)
- UNESCO, in cooperation with ITU and other international agencies and civil society, should accompany the rapid transformation of knowledge sharing and dissemination via mobile platforms by promoting accessible mobile tools, contents and services for persons with disabilities including for general news and information, special education, participation in social networks and independent living (#24)
- ITU and United Nations agencies should cooperate to promote the use of mainstream mobile technologies for persons with disabilities in low resource environments to enhance their participation in Knowledge Societies (#20)
- UNESCO, in cooperation with ITU and other relevant agencies, should undertake a technical and economic evaluation of the best ways to promote the development of sustainable speech software in minority languages and seek to engage a dialogue with industry on those matters (#17)
- UNESCO, in partnership with WHO, ITU and other international organizations and research institutions should identify and promote good practices and innovations in “anywhere anytime” contextual knowledge generation and delivery, leveraging new types of devices for seniors and persons with disabilities including but not limited to health, rehabilitation and emergency support services (#22)

Table 33 - Summary of Recommendations with rating of stakeholders' required involvement

Recommendations	UNESCO & other UN and international organizations	Governments	Private Sector	Civil Society
Recommendation #1: Developing policies in support of inclusive Knowledge Societies	**	***	**	**
Recommendation #2: Setting measurements and targets for inclusive Knowledge Societies	**	***	*	**
Recommendation #3: Building capacity to implement accessibility for persons with disabilities	*	***	**	**
Recommendation #4: Promoting accessible and assistive information and communication technologies in support of Inclusive Education	**	***	*	*
Recommendation #5: Promoting accessibility solutions and innovation	*	**	***	**

Three stars = leading role; two stars = active participation and one star = consultative role

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APPENDIX

LIST OF COUNTRIES SURVEYED FOR THE 2012 CRPD ICT ACCESSIBILITY PROGRESS REPORT

Americas	**HDEV Ranking**	**Income Economies Ranking**	**Region**
Argentina	Very High	Upper Middle	Americas
Brazil	High	Upper Middle	Americas
Dominican Republic	Medium	Upper Middle	Americas
Honduras	Medium	Lower-middle	Americas
Mexico	High	Upper Middle	Americas
Peru	High	Upper Middle	Americas
United States	Very High	High Income	Americas

Africa	HDEV Ranking	Income Economies Ranking	Region
Burkina Faso	Low	Low-income	Africa
Egypt	Medium	Lower-middle	Africa
Gabon	Medium	Upper Middle	Africa
Kenya	Low	Low-income	Africa
Malawi	Low	Low-income	Africa
Mali	Low	Low-income	Africa
Mauritius	High	Upper Middle	Africa
Nigeria	Low	Lower-middle	Africa
Rwanda	Low	Low-income	Africa
Sierra Leone	Low	Low-income	Africa
South Africa	Medium	Upper Middle	Africa
Tanzania	Low	Low-income	Africa
Tunisia	High	Upper Middle	Africa
Uganda	Low	Low-income	Africa

Asia-Pacific	**HDEV Ranking**	**Income Economies Ranking**	**Region**
Azerbaijan	High	Upper Middle	Asia-Pacific
Bangladesh	Low	Low-income	Asia-Pacific
China	Medium	Upper Middle	Asia-Pacific
India	Medium	Lower-middle	Asia-Pacific
Indonesia	Medium	Lower-middle	Asia-Pacific
Japan	Very High	High Income	Asia-Pacific
Malaysia	High	Upper Middle	Asia-Pacific
Myanmar	Low	Low-income	Asia-Pacific
Nepal	Low	Low-income	Asia-Pacific
New Zealand	Very High	High Income	Asia-Pacific
Pakistan	Low	Lower-middle	Asia-Pacific
Philippines	Medium	Lower-middle	Asia-Pacific
Qatar	Very High	High Income	Asia-Pacific
Syria	Medium	Lower-middle	Asia-Pacific
Thailand	Medium	Upper Middle	Asia-Pacific

Europe	HDEV Ranking	Income Economies Ranking	Region
Armenia	High	Lower-middle	Europe
Belgium	Very High	High Income	Europe
Czech Republic	Very High	High Income	Europe
Denmark	Very High	High Income	Europe
France	Very High	High Income	Europe
Germany	Very High	High Income	Europe
Italy	Very High	High Income	Europe
Montenegro	High	Upper Middle	Europe
Portugal	Very High	High Income	Europe
Romania	High	Upper Middle	Europe
Russia	High	Upper Middle	Europe
Slovakia	Very High	High Income	Europe
Spain	Very High	High Income	Europe
Sweden	Very High	High Income	Europe
Turkey	High	Upper Middle	Europe
United Kingdom	Very High	High Income	Europe