

Question 7/1

**Access to
telecommunication/
ICT services by persons
with disabilities and
with specific needs**

6th Study Period
2014-2017



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telecommunications/ICT services
by persons with disabilities
and with specific needs

Final Report

Preface

ITU Telecommunication Development Sector (ITU-D) study groups provide a neutral contribution-driven platform where experts from governments, industry and academia gather to produce practical tools, useful guidelines and resources to address development issues. Through the work of the ITU-D study groups, ITU-D members study and analyse specific task-oriented telecommunication/ICT questions with an aim to accelerate progress on national development priorities.

Study groups provide an opportunity for all ITU-D members to share experiences, present ideas, exchange views and achieve consensus on appropriate strategies to address telecommunication/ICT priorities. ITU-D study groups are responsible for developing reports, guidelines and recommendations based on inputs or contributions received from the membership. Information, which is gathered through surveys, contributions and case studies, is made available for easy access by the membership using content-management and web-publication tools. Their work is linked to the various ITU-D programmes and initiatives to create synergies that benefit the membership in terms of resources and expertise. Collaboration with other groups and organizations conducting work on related topics is essential.

The topics for study by the ITU-D study groups are decided every four years at the World Telecommunication Development Conferences (WTDCs), which establish work programmes and guidelines for defining telecommunication/ICT development questions and priorities for the next four years.

The scope of work for **ITU-D Study Group 1** is to study “**Enabling environment for the development of telecommunications/ICTs**”, and of **ITU-D Study Group 2** to study “**ICT applications, cybersecurity, emergency telecommunications and climate-change adaptation**”.

During the 2014-2017 study period **ITU-D Study Group 1** was led by the Chairman, Roxanne McElvane Webber (United States of America), and Vice-Chairmen representing the six regions: Regina Fleur Assoumou-Bessou (Côte d’Ivoire), Peter Ngwan Mbengie (Cameroon), Claymir Carozza Rodriguez (Venezuela), Victor Martinez (Paraguay), Wesam Al-Ramadeen (Jordan), Ahmed Abdel Aziz Gad (Egypt), Yasuhiko Kawasumi (Japan), Nguyen Quy Quyen (Viet Nam), Vadym Kaptur (Ukraine), Almaz Tilenbaev (Kyrgyz Republic), and Blanca Gonzalez (Spain).

Final report

This final report in response to **Question 7/1: “Access to telecommunication/ICT services by persons with disabilities and with specific needs”** has been developed under the leadership of its three Co-Rapporteurs: Miran Choi (Republic of Korea), Abdoulaye Dembele (Mali) and Amela Odobasic (Bosnia and Herzegovina); and four appointed Vice-Rapporteurs: Lyliane Kalubi (D.R. of the Congo), Mitsuji Matsumoto (Japan), Godfrey Muhatia Mutsotso (Kenya) and Joëlle G. Zopani Yassengou (Central African Republic). They have also been assisted by ITU-D focal points and the ITU-D Study Groups Secretariat.

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i. Introduction

On 13 December 2006, the United Nations General Assembly approved the [United Nations Convention on the Rights of Persons with Disabilities](#) (UN CRPD). The CRPD was opened for signature on 30 March 2007 and, as of 16 February 2009, 137 countries had signed it, while 81 had signed the Optional Protocol. As per July 2016, there are 160 ratifications and 166 signatories and the numbers are continuously increasing. The CRPD establishes basic principles, and also a State's obligations to ensure equal access to telecommunications/ICTs, including the Internet, by Persons with Disabilities (PwD).

The vast majority of ITU Member States have ratified the UN Convention on the Rights of Persons with Disabilities, which addresses the risks of exclusion of PwD from participating equally in society by defining ICT accessibility as integral to general accessibility rights and at par with accessibility to the physical environment and transportation. It enshrines the principle that persons with disabilities must be able to enjoy human rights and fundamental freedoms on an equal basis with others. Its dispositions provide a human rights foundation for existing policies and programs, such as Universal Service and Access (UAS) policies for telephony, video programming, and/or web accessibility, and set a clear roadmap for State Parties lacking such policies.

Article 9 of the Convention sets out general obligations for the Member States to ensure that PwD have access on equal bases to information and communication technologies (ICTs) and to related facilities and services provided to the public, while articles 21, 29 and 30 expand on this and speak to media, communications and ICTs serving as platforms for furthering the rights of PwD to freedom of expression and opinion, access to information, participation in the political and public life and participation in cultural life, recreation, leisure, and sport. Accessibility is also identified in Article 3 (f) of the Convention as one of its eight principles, and accessibility.

ii. Statement of the situation

The World Health Organization (WHO) estimates that one billion persons in the world live with some form of disability. According to WHO, about 80 per cent of persons with disabilities live in low-income countries, with deafness and hearing loss. Considering the growing aging population that can be observed in most developed countries, it is likely that the number of PwD will continue to rise. The United Nations Educational, Scientific, and Cultural Organization (UNESCO) estimates that 774 million people (around 11 per cent of world population) aged 15 and above worldwide are illiterate, while two-thirds of them, i.e. 493 million, are women. It is furthermore noted that 52 per cent live in South and West Asia and 22 per cent in Sub-Saharan Africa.

Access to telecommunication/ICT services has been acknowledged as essential for social, cultural, economic, political and democratic development as well as an enabler to exercising several fundamental rights for all the world's citizens. Within the World Summit on the Information Society (WSIS), both the Declaration of Principles and the Tunis Commitment emphasized the immense impact that telecommunications/ICTs have in almost every aspect of life. Furthermore, WSIS acknowledged that special attention should be given to the needs of PwD and older persons with age-related disabilities.

ITU-D Study Group 1 study Question 7/1 (2014-2017) is mandated by the 2014 World Telecommunication Development Conference (WTDC-14) to enable Member States, Sector Members, Associates, Academia, relevant international and regional organizations, public and private institutions and civil society organizations involved in the design of policies and advocacy for the development of technological solutions, to alleviate the difficulties faced by persons with disabilities in accessing telecommunications/ICTs.

The work plan for Question 7/1 was devised with the aim to develop and strengthen capacity building on ICT accessibility for PwD, for ITU-D Study Group participants (Member States and Sector Members, Associates and Academia). Expected outputs for Question 7/1 include:

- Increase awareness among Members on accessibility issues;
- Capacity building and/or training for Members on accessibility issues/tools developed/increased;
- Development of case studies provided by Members on ICT accessibility, policy, strategies and best practices;
- Enhance dialogue sessions on accessibility policies, strategies, and best practices;
- Facilitate moderated discussions with the Member States, on designing policies and executing strategies for promoting and implementing telecommunication/ICT accessibility services and solutions for persons with disabilities and with specific needs, and for people with difficulties mastering reading and writing;
- Carry out competitions on best strategy/ies, policy/ies and project/s developed in the area of accessibility;
- Select and recognize Members for their best strategy/ies, policy/ies and project/s developed in area of accessibility;
- Showcasing of existing commercial solutions.
- Develop a report with recommendations and guidelines on accessibility issues.

Based on the abovementioned expected outputs, this Report presents good practices, outlines challenges, and proposes recommendations and guidelines for the following study items:

- What changes must be made to existing legislation to promote ICT accessibility?
- How to promote accessibility in public ICT spaces, such as telecentres and public pay phones?
- Which requirements for public procurement, including commercial best practices relating to telecommunications/ICT, should apply to persons with disabilities?
- What are the requirements for mobile phone accessibility? What are the requirements for TV and video programming accessibility?
- What are the requirements for web accessibility?
- How can accessibility tools be used by people with difficulties mastering reading and writing?
- What are the best strategies, policies, and projects on accessibility that are already implemented?
- What commercial solutions exist in the global ICT marketplace?
- What potential practical applications can be identified to promote accessible e-Education?

1 CHAPTER 1 – Telecommunications and ICT accessibility policy and regulatory framework

1.1 Introduction: Why promote and implement accessible telecommunications and ICTs for PwD and with specific needs?

Understanding the needs of Persons with Disabilities (PwD) is crucial in finding a suitable approach to promoting ICT accessibility.

Globally, it has been recognized that the promotion of ICT accessibility, across web, television, mobile, and public access platforms can enable PwD. It is the fact that many PwD face a range of barriers and challenges and are unable to take full advantage of the benefits of ICTs, which represents a problem.

There are many reasons to promote and implement accessible telecommunications and ICTs for PwD. It is a well-known fact that in many, mainly developing countries, PwD have a tendency to show resistance to the use of ICTs because they are not accessible to them. To a large extent, the lack of Internet access prevents PwD to expand their knowledge, and a low percentage uses social networks due to lack of web and mobile accessibility. The lack of legally binding provisions, lack of funds and insufficient awareness about existing accessible services as well as the needs to increase their development remain the main challenges.

National Regulatory Authorities (NRAs) and governmental institutions can play an essential role in improving the current situation by updating current legislation and promoting ICT accessibility. Although recognising that the key goal of any policy is to remove barriers to ICT use for persons with different kinds of disabilities, using all sorts of ICT devices, the NRAs, and governmental institutions lack knowledge and funds in achieving this. In spite of a motto “*Nothing about us without us*”, the voice of PwD is not heard by policy makers. Change in attitude should go hand in hand with the solving of legal issues.

1.2 Legal, policy, and regulatory framework for telecommunications and ICT accessibility for PwD and with specific needs

With the aim to increase the capacity of Members in ICT accessibility topics, the ITU Telecommunication Development Bureau (BDT) developed in cooperation with The Global Initiative for Inclusive ICTs (G3ict), the **Model ICT Accessibility Policy Report** as a tool for national policy makers and regulators in developing ICT accessibility policy frameworks. This report, which is available in all six official ITU languages as well as in accessible e-Book format, assists countries in understanding the generic steps and requirements necessary to promote accessibility by PwD and provides guidance in areas where they can be adapted to meet national circumstances. Members can also turn for guidance to the ITU/G3ict **e-Accessibility Policy Toolkit for PwD** (www.e-accessibilitytoolkit.org).

In all ITU Member States, the relevant ministries are responsible for making policies which govern the ICT sector. These policies should be included in the general policy framework. Although policies are formally put in place by governments, different stakeholders, including the NRA, the private sector, civil society and organizations representing PwD, provide inputs into the policy process and affect its outcomes. Policy needs to be turned into legislation, regulations, and/or licence conditions to make it enforceable.

However, simultaneously, throughout the Member States, it is evident that substantial changes are necessary to be incorporated into existing legislation to promote ICT accessibility to advance the area of ICT accessibility.

The common challenge facing developing countries relates to the Universal Service obligation, which should take into account the accessibility needs of PwD. The Universal Service legal and regulatory framework should include accessibility as an explicit goal for Universal Service and consideration

within the Universal Service Fund, as well as the need to include ICT accessibility at all levels of education. Thus, in the process of developing and updating any general policies or laws on accessibility for ICTs, PwD and their representatives and/or related bodies/organizations should be involved from the conceptualization stage.

1.3 Guidelines and recommendations for implementing necessary changes to existing legislation to promote ICT accessibility

Many countries are in the process of amending their broadcasting or ICT legislation to address emerging issues such as convergence and the introduction of broadband. This is an ideal time to incorporate into the new law key amendments aimed at promoting accessibility. Alternatively, policy-makers may wish to initiate amendment processes to their existing laws specifically to promote ICT accessibility.

Countries around the world have adopted different regulatory approaches ranging from “light touch” regulatory frameworks that include industry self- and co-regulation to more traditional regulatory approaches that require the promulgation of regulations, depending of what approaches are suitable for them.

According to the Model ICT Accessibility Policy Report, the role of the regulator in facilitating ICT accessibility ranges from implementing policy through drafting and enforcing regulations, setting targets and licence conditions, monitoring and enforcing obligations, drafting or approving of codes of practice and undertaking awareness campaigns and consultation.

However, most of the NRAs in developing countries do not have ICT accessibility as a priority, thus relying on voluntary actions by the industry. The NRAs need to take a proactive approach and consider taking steps that will inevitably improve the current situations.

The ‘quick wins’ or changes that are necessary to be included in existing ICT legislation to promote ICT accessibility for persons with disabilities, include:

- Revising existing ICT policies, legislation and regulations to promote ICT accessibility;
- Consulting with persons with disabilities on the development of such revised ICT policies, legislation and regulations, by establishing a Committee on ICT Accessibility;
- Making persons with disabilities and organizations of persons with disabilities aware of revised ICT policies, legislation, and regulations;
- Adopting ICT accessibility technical and quality of service standards;
- Adding and revising key ICT legislation definitions to promote ICT accessibility;
- Amending the UAS legal and regulatory framework to include ICT accessibility as an explicit goal of UAS and the Fund;
- Ensuring that quality of service requirements take into account the specific needs of persons with disabilities and set quality of service standards for accessible services;
- Revising legal frameworks for emergency communications to ensure emergency services are accessible for persons with disabilities;
- Establishing clear targets and report annually on their implementation; and
- Amending disability legislation to refer to ICT accessibility.

Guidelines and recommendations should be in line with ITU-D, ITU-T, ITU-R databases and other outside resources. For more information, see **Annex 2**.

1.4 Overview of current policies and regulations for telecommunications and ICT accessibility for PwD and with specific needs

To operate in the ICT sector, service providers require licences which authorize them to provide specified services (which may also include multiple services, usually technology neutral) under conditions that are stipulated by the issuing authority (usually the NRA) and the licensee. In most cases, provisions to ensure ICT accessibility may be included in licence conditions and imposed as part of the enforcement of an entity's obligations.

Voluntary measures can, however, only be considered in countries that have a regulatory and legal framework that supports such an approach. In such countries, the legislation provides an added layer of assurance that the voluntary measures will achieve ICT accessibility. However, in many such countries, these voluntary measures do not recognize and involve organizations of PwD in public consultations regarding the adoption of standards or selection of commercially available solutions and their effective implementation.

It is beneficial to ICT accessibility regulations to put in place rules that apply broadly across the sector, and that enable the implementation of consistent standards and requirements and ensure a coordinated approach. Regulations, however, are made following a consultative process in which all relevant stakeholders have an opportunity to make an input. In developing countries, the voluntary measures taken by industry are not particularly effective in promoting equitable access to ICT in a fast-changing technology environment, because the regulator does not have total control over the market players.

In some regulatory regimes, ICT accessibility requirements are included in licence conditions, while in others, they are included in general regulations. In cases where countries allow for self- or co- regulation, ICT accessibility is achieved through Codes of Conduct. The efficiency of regulatory tools applied depend on the country's legal framework and the structure of the industry.

In many countries, ICT legislation does not provide for self-regulatory or co-regulatory regimes, which would be enforced through "Industry Codes" or "Codes of Conduct". Furthermore, the law does not provide for the recognition of industry associations or other bodies including organizations of PwD.

ICT laws, policies, and regulations support the principles of UAS by focusing on providing a framework to facilitate the deployment of ICT networks, promotion of affordable services and products, protection of consumers and provisions of reliable emergency services. However, PwD is not always included in these provision of services.

1.5 Good practices, challenges and available case studies

Globally, on a daily basis, PwD face a range of barriers and challenges relating to access to information, access to education and employment, which can be alleviated through equitable access to ICTs.

Some of the challenges PwD face when interacting with ICT services include a need to have accessible ICTs that is mainstreamed by the equipment such as mobile handsets, televisions, tablets and computers which offer a feature or features to enable PwD to use ICTs effectively. The features include the possibility to enlarge text on the screen or locate controls by touch only, to have access to Assistive Technology such as screen reading software or adaptive keyboard that is free or available at a low cost through subsidies or grants. Also, there is a need for training of PwD and those who assist them on the use of assistive technologies with accessibility features.

As a result of ITU-D work on raising visibility on ICT accessibility policies to its Members the Americas region developed a series of "Accessible Americas – Information and Communication for ALL" events held in 2014 in Brazil, in 2015 in Colombia, and 2016 in Mexico. The Accessible Americas events have become one of the key events in the Americas region on the topic of ICT accessibility for PwD. The purpose of these events is not only to bring together all stakeholders to work together in implementing ICT accessibility policies but also to raise awareness, provide training, share best practices and

track concrete results and progress of the region on this topic. The positive results provided by these events, represent a good practice to be replicated in other regions.

The following are summaries of available case studies that were submitted during the ITU-D Study Group 1 Question 7/1 meetings.

Mexico started a telecommunication reform with an amendment to its Constitution in June 2013. According to the Mexican experience, awareness may come from the civil society when accessibility is not within the government's priority. Furthermore, the civil society is turning to the regulator to create and implement the secondary legislation in this area. The constitutional amendment did not directly address any issue of ICT accessibility. The NRA has taken specific action to give effect to the rights of telecommunication service users and provide a follow-up, including equal access to telecommunication services by people with disabilities. This legal framework gives the NRA the mandate to issue the Guidelines on Telecommunication Service Accessibility for People with Disabilities. Furthermore, the Federal Telecommunications Institute of Mexico recognizes the need of having accurate quantitative data on accessibility to telecommunications and ICT in the interests of having a general overview of the situation prior to taking appropriate decisions for the development and implementation of public policies for PwD.

In **Brazil**, the regulatory authority receives and processes complaints about accessibility provision faced by PwD. The new rules, published on May 31, 2016, enable PwD to have expanded rights, such as, receiving telecommunication services plans and contract and other relevant information in accessible format (Braille, talking to anyone through the intermediation of an interpreter in Libras, which is a Brazilian sign language for hearing impaired and using a Communication Intermediation Central (CIC) with video calling.

The **Republic of Korea** guarantees ICT accessibility to people with disabilities including old people to use products, systems, services and facilities regardless of their physical or technical difficulties. In achieving this, in Korea the focus is equally on government's role to prepare legal system for ICT accessibility, standardization strategy for the ability of the society and efforts, such as providing trainings, consulting and promoting to ensure participation of other stakeholders other than the public sector. Although the focus is on web accessibility and mobile app accessibility, the focus is slowly shifting to other areas such as disaster situations, and regulation for broadcasting for PwD. In 2015, the regulation on broadcasting for accessibility were amended to reflect exceptional situations such as natural disaster. In some cases, the government supports the cost for accessible programs to guarantee the accessible broadcasting rights to people with disabilities.

Most countries in the **African region** lack clear and accurate statistics on the number of people with disabilities, the nature of their specific needs and the underlying causal factors. There are no periodic (annual) studies or surveys that might enable us to update available statistics on PwD and their specific needs in the countries of the African region. In the African region, PwD has limited access to information and communication technologies, and those who have such limited access live in urban areas. What is more, most African countries lack any telecommunication/ICT policy or measures intended for PwD.

In **Kenya**, the legislative landscape has been changing over the years to respond to the challenges. The Government of Kenya through its NRA initiated the projects aimed at providing access to ICT for PwD. Regulatory licencing tools are imposed by the NRA to ensure that the requirements and interests of PwD are fully addressed. In promoting its mandate of ensuring universal access to communication services and facilities, the NRA supported the establishment of ICT centres in learning institutions for PwD. As opposed to many advantages, some challenges remain that are related to maintenance, lack of ICT instructors to provide training, the demand for more facilities and sustainability. Furthermore, the Communications Authority of Kenya implements the project supporting the establishment of ICT centers in learning institutions for PwD. The project is a multi-stakeholder's initiative involving both the government and the private sector. Organizations for PwDs continue to play a critical role on this project. Although sustainability remains a challenge, the regulator continues to support the

connectivity and maintenance of facilities in the school and this support will be taken over by the Universal Service Fund (USF) in the coming years.

Mali lacks accurate statistics on the number of people with disabilities, the nature of their specific needs and the underlying causal factors. Both in urban and rural areas, PwD are without access to information and communication technologies. The relevant Ministry and the NRA should take appropriate measures in defining the public network access and interconnection conditions to enable all users to communicate freely within a framework of fair and equal competition, as well as acknowledging that access to service and equipment to accommodate the needs of PwD.

Senegal marks significant progress in its work stop discrimination and improve the lives of PwD, and particularly regarding mobility and access to health and education services. A “Centre for Disabled People in the Workplace” (CHAT) is part of the State Informatics Agency (ADIE) with a focus on the digital divide and support social inclusion.

In **Benin**, as is the case in many developing countries, the Law on electronic communications and posts includes a provision to promote digital access for PwD, but its implementation is low. There are social categories for which Universal digital access should be guaranteed by the State according to law, but in order to ensure compliance, a policy must be developed and applied for access to electronic communications for PwD.

In addressing the challenges of ICT accessibility, the government of **Guinea** drew up a plan for the inclusion of the PwD. The education system was identified as key for PwD inclusion in the society as well as taking advantage of new technologies. However, there is no a specific law enabling employment or access to ICT of PwD. It is envisaged that having technologies in national language will enable educational programs for PwDs to be implemented efficiently and thus contribute to combating poverty and ensure inclusion of PwD. In that respect, there is a need to raise awareness about the benefit of such programmes to all levels.

Côte d’Ivoire has about 3 400 700 people living with a disability (WHO) and ratified the Convention on the Rights of Persons with Disabilities on 10 January 2014. Côte d’Ivoire committed itself to a process of making telecommunications/ICTs accessible. The country’s policy for the digital economy and the legal and institutional frameworks take account of PwD. The bodies responsible for implementing the policy are the regulator ARTCI, for asymmetric regulation, the National Universal Service Agency, for universal service aspects, the Ivorian Agency for Frequency Management (AIGF), for frequency management, and the Ministry of the Digital Economy for policy and legislation development.

In the developing countries of the European region, and South-East Europe (SEE) in particular, in spite of existing legislation framework, guaranteeing the non-discrimination, equal opportunities and social inclusion for PwD, the level of implementation of ICT accessibility is low. This is mainly due to lack of mandatory provisions, lack of coordination and harmonization of activities between different stakeholder and lack of funds and awareness about available accessible services and technologies. A case in point are some countries in the European region including (**Albania, Bosnia and Herzegovina, Republic of Serbia and Montenegro**). However, some improvements are evident: accessibility has been defined as a priority in the governments’ agendas in the forthcoming years, NRAs are starting to stimulate policy makers to foster international provisions in their national legislation frameworks and the level of expertise of software services is increasing. NRAs and governmental institutions should play a key role in updating current legislation and promoting ICT accessibility.

For further references to good practices and achievements in policies and regulations in ICT accessibility see **Annex 1**.

2 CHAPTER 2 – Technologies and solutions in ICT accessible ecosystem

2.1 Mobile communication accessibility policy framework

From a policy perspective, mobile operators should not have challenges in providing mobile phone handsets with accessibility features.¹ However, other services such as relay services will require specific policy interventions.

The **Model ICT Accessibility Policy Report** contains practical recommendations on how regulators and other policy actors can implement policies that will help ensure conditions are in place to improve the availability of accessible mobile phones and services. It also contains a Model Code of Conduct for the mobile industry and a set of Model Regulations for regulators.

Policy recommendations include:

- Developing policies in consultation with persons with disabilities;
- Regulators using funding from the universal service / access fund to subsidize the provision of a national relay service by phone operators;
- Regulators working with appropriate emergency services and the mobile phone operators to ensure the availability of equitable access to emergency services for persons with disabilities;
- Mobile phone operators ensuring the availability of affordable and accessibility mobile phones to persons with disabilities;
- Mobile phone operators providing information on these mobile phones, including their compatibility with assistive technologies such as hearing aids;
- Mobile phone operators providing data or SMS only packages to deaf users who may not use voice services.

2.1.1 Accessible mobile phones and services

There are more mobile phones in the world than any other form of ICT. The ITU estimates that there are 7 billion mobile phones in use. Mobile phones vary from simple handsets that receive and make calls and texts, to sophisticated smart phones that enable access to the Internet and other applications. Increasingly, mobile phones are not used just to make and receive a call, but have become the main means by which people access the Internet. For PwD it is important that mobile phones and services contain accessibility features and are compatible with assistive technologies such as hearing aids, and that they can communicate with others and access emergency services via relay services.

The **United Nations Convention on the Rights of Persons with Disabilities**² contains some obligations that require State Parties to ensure equitable access to ICTs for persons with disabilities. These obligations, contained in, *among other things*, Article 4 and 9, have far reaching implications on other fundamental rights enshrined in the Convention such as the right to education, employment, transportation, social and cultural life. Therefore, equivalence of choice and access by persons to mobile phones and services is fundamental to enabling the enjoyment of these rights by persons with disabilities.

In response to this concern, the ITU-D developed a joint report with G3ICT on “**Making Mobile Phones and Services Accessible**”.³ The report, available in the six UN languages, compiles and anal-

¹ See the GARI Database of accessible mobile devices for information on the accessibility features contained in mobile phones currently available on the market; <http://www.mobileaccessibility.info/>.

² <https://www.un.org/development/desa/disabilities/convention-on-the-rights-of-persons-with-disabilities.html>.

³ <http://www.itu.int/en/ITU-D/Digital-Inclusion/Persons-with-Disabilities/Pages/Persons-with-Disabilities.aspx>.

yses different ways by which mainstream accessible mobile phone technologies and services are being implemented in various countries. This includes practical information and case studies which can serve as a foundation for promoting accessible mobile phones and mobile assistive technologies.

2.1.2 Accessibility features on mobile phones

Many modern mobile phones contain features that enable a very wide range of people to use them:

- Simple features in basic mobile phones include a small tactile dot on the “5” key, which enables people with a vision impairment to orient their fingers to find the correct number on the keypad;
- Many phones today use icons instead of nested text menus, making it easier for people with an intellectual disability to use the phone;
- Most smart phones today can read out text on the screen and even take voice commands, enabling people who cannot either see or touch the screen to use the phone.

The accessibility features contained in mobile phones that assist PwD also benefit many people when using mobile phones. The small tactile dot in used by many people to dial without the need to look at the screen. Icon-based interfaces are universally recognisable by people of different languages, and even by children as young as three years of age. Besides, the text-to-speech and voice command functions are increasingly being used by people to have their emails read aloud and to use their phones while on the move.

Many global mobile manufacturers and in-country mobile phone operators already provide phones with in-built accessibility features. It is, however, important that the policy conditions exist in and between countries and regions that support the continued manufacture of accessibility features in mobile phones and their provision by mobile operators. It is also crucial that mobile phone operators provide information on accessibility features for their products and services and encourage and enable persons with disabilities to try out and use their features.

Another important feature of a mobile phone that should be considered is its compatibility with a hearing aid. Many mobile phones are compatible with hearing aid, which means they a) do not interfere or cause a whistling sound when used by a hearing aid user, but b) they also work to enhance the sound from the mobile phone through the person’s hearing aid, enabling them to hear the caller on the other end of the line more clearly. This important feature must be supported by mobile operators.

2.1.3 Mobile applications

Apart for the features that modern mobile phones offer, they also enable the use of applications that are beneficial to PwD. The rise of usable and affordable apps has been of the most remarkable developments in the mobile phone space over the past decade, and many assistive technology apps now exist that enable persons with disabilities to communicate, travel and live more independently.⁴

For further good practices and achievements in mobile applications see **Annex 1**.

2.1.4 Relay services and access to emergency services

Many mobile phone users may have hearing and/or speech difficulties. Whatever their combination or severity of these impairments, it is important for them to communicate with other people via their mobile phone. Of critical importance is the ability to communicate with emergency services in times of emergency or accident.

⁴ See <http://www.distimo.com/> for a list and description of different app stores.

Relay services are human operated services that enable people to make, receive and complete telephone conversations via their phones. Various relay services are in existence today.

A relay service “is simply a way of enabling a deaf person – using whatever modality they choose – to communicate with a hearing person, and vice versa”.⁵

A typical relay service involves a deaf caller communicating with a hearing caller with the assistance of an operator at a relay services centre. The deaf person may potentially communicate with the operator via sign language, text or voice – depending on the sophistication of the relay service provided. The hearing caller on the other end of the call may communicate with the deaf caller by speaking as normal to the operator. The four types of relay services for deaf people are: text relay service; text relay service with voice carry over; captioned telephone relay service; and video relay service.

Relay services are particularly important for persons with disabilities in the case of an emergency or accident to be able to contact the emergency services provider in their country. Other services of importance include access to directory enquiries.

2.2 Trends, requirements, and guidelines for mobile phone accessibility

New trends are constantly being identified, and some of them show that mainstream mobile operating systems such as iOS, Android, Windows and Blackberry offer extensive embedded accessibility features for all types of disabilities with documented Application Programming Interface (API) allowing developers to make their applications accessible. Given the change in the accessibility of devices, key priorities for ITU Members should be to educate developers in taking advantage of the accessibility APIs.

In many cases, it is possible to deal with mobile phones, but the problem is how to deal with elderly people and PwD in case of emergency. In an emergency situation, the spirit may be disturbing and proper operation of the mobile phone may be difficult.

When SOS is emitted in such a state, only the emergency button of the mobile phone is made accessible to a part of the body. By clicking the button in an emergency, the mobile phone and buttons can be accessed wirelessly (giving outgoing trigger), and emergency information and location information can be communicated to family members, police, hospitals or the like. This can be used only by installing application software.

Furthermore, the assistive technology industry is increasingly taking advantage of the large and fast growing usage of the mobile assistive application is growing much faster among seniors and PwD than computer-based assistive applications. Connected wearable devices open the door to an immense field of innovation for seniors and PwD from remote monitoring to enhanced sensorial information and interpretation or real-time localized services.

It has been proved that the Internet of Things coupled with mobile applications presents a considerable potential for new development opportunities enhancing the lives of seniors and PwD. The availability of accessibility features on all mainstream smartphones and tablets make those the natural universal devices for seniors and PwD to access information, communicate, enjoy leisure activities and but also to use those for environment controls.

Major opportunities also include mobile-enabled Smart Homes, Internet of Things for travel and public spaces, and m-Health and well-being applications and services, and emergency and personal safety applications and services. However, the consequences for spectrum and network management of the growing number of Internet-connected “Things” should be considered, which are currently forecasted to reach 25 billion within the next five years. Those issues may include but not be limited

⁵ “Relay services for deaf people”, ITU News June 2011; http://www.itu.int/net/itunews/issues/2011/05/pdf/201105_30.pdf.

to bandwidth, latency, privacy and interferences and blockage of use for Assistive Listening Devices (ALDs) and Short Ranges Devices (SRDs) and other assistive technologies.

However, there are plenty devices that are non-licensed items within this overcrowded spectrum of 2.3-2.4GHz that will be impacted. The challenges in this area are many. For instance, in schools, where many devices are in use at the same time. For example, Wi-Fi, radio microphones, AV equipment, and Bluetooth would be in use simultaneously. This could also include alarm systems and M2M which are all in use in addition to the ALDs connecting the teacher to the pupil directly and cochlear implant systems that are becoming more widespread. Another situation common in many schools and educational establishments is that mobile network transmitters were unwittingly placed on school buildings. If the 2.3-2.4GHz band transmitters are mounted on the school, there is a probability of interference between both base station and user equipment (UE) interference.

Without appropriate criteria to protect these devices in the radio regulations, these devices could be adversely affected. They could even stop working and have negative effects on peoples' lives especially in the case of medical devices and ALDs that aid persons with hearing loss.

The only practical way forward following the requirements of the UN CRPD appears to be the establishment of protected spectrum and status for disability and medical devices.

For further references on good practices and achievements in mobile phone accessibility see **Annex 1**.

For further references on trends, requirements and guidelines utilising data currently available in ITU-D SG1, ITU-T SG 5, ITU-T SG 16, JCA-AHF and other outside sources see useful links in **Annex 2**.

2.2.1 Guidelines and recommendations

Coordination between other ITU-D Study Group 1 and 2 Questions, and the other two ITU Sectors (ITU-T, ITU-R), as well as other relevant international organizations, is inevitable and highly recommended before proceeding to design anything or create standards as there is the need for global interoperability.

Accessibility standards are essential to make it possible for equipment and services to be usable by the broadest range of persons, interoperable and provide the required quality services. In that respect, some recommendations and guidelines were produced by ITU-T and ITU-R Study Group Questions with relation to accessibility. For further references see **Annex 3**.

2.3 Television/video programming accessibility policy framework

Television/video programming accessibility is aimed at all stakeholders: policy makers, regulators, academia, researchers, industry, including the film industry, consumer electronics manufacturers as well as disabled person organizations, to improve accessibility by creating innovative solutions.

Around 80 million people in the European Union are affected by a disability to some degree. Due to the ageing of the European population, the figure is expected to increase to 120 million by 2020. Accessibility is a precondition to their equal participation and active role in society, and it can contribute to ensuring smart, sustainable and inclusive growth.

The model of inclusive societies means accessibility is for all users.⁶ Following the Universal Design model which was taken to the field of media accessibility promotes the “*Media for All*” approach, in line with the motto of PwD “*Nothing about us, without us*”.⁷

⁶ http://www.iso.org/iso/iso_catalogue/catalogue_tc/catalogue_detail.htm?csnumber=51342.

⁷ <http://www.un.org/esa/socdev/enable/iddp2004.htm>.

It is important to understand that accessibility is not an exclusive service for a relatively small section of the population. It must not be forgotten that media access services are also a powerful educational tool for learning languages, for social inclusion, for the population who is at risk of exclusion, for people with autism, with dyslexia, etc. It is for everyone and includes specifically: people with disabilities, the aged, and those with learning disabilities, or people who live in a place with a language different from their own.

Each country has its laws and regulations to increasingly implement accessibility services. Access services quotas are established. How to scale the services to aim at a 100 per cent is a challenge, since issues such as production cost, workflows, technology or real life delivery are not easy to solve. To this aim, ITU and G3ict developed the **Model ICT Accessibility Policy Report**⁸ as a practical guide for ICT policy makers and regulators to transpose the broad ICT and television accessibility requirements of the UN Convention on the Rights of Persons with Disabilities into national law. It also aims to assist policy makers and regulators to build their capacity in identifying the concrete steps they can take to ensure accessible ICTs are widely available for PwD in their countries.

Considering that broadcasting is a highly regulated area, regulators and legislators play a key role in implementing provisions on accessible services as well as in harmonizing national provisions with international standards. In particular, in the digital transition, legislators and regulators are identified as stakeholders that need to have a deep understanding of accessible television services.

2.3.1 Accessibility services

Access services are directly linked to languages and also to translation. It is important to understand the language of the version that needs to have access services, but also the modality of translation since it varies according to the country and the genre. In Europe, there are four dubbing countries (**Italy, Germany, France and Spain**) while some like **Poland** use voice-over and the rest are subtitling countries. The genre also has an impact. For instance, children's programmes cannot be subtitled because young children cannot read, and documentaries, for example, tend to have a voice-over. On the other hand, in the case of a movie in Japanese, to understand the dialogues outside Japan it will be necessary to subtitle it, dub it or have voice-over on it.

Subtitles are used to translate dialogues from one language to another, while captions are used to transcribe the same language. In this case, it will be Japanese into Japanese, adding also sounds annotations and speaker identification. Audio subtitles are used for those with reading difficulties, and sign language is also used for those whose first language is not written, the Deaf community. Audio description⁹ is another access service offering the visual information in a verbal form, in this link you will find the toolkit to on providing, delivering and campaigning for audio description on television and film.

Technologies play an important role in media accessibility. Technologies are responsible for the different workflows that can be applied to offer the same service. For example, subtitles and captions can be generated by stenotype, by velotype, by a software subtitle/caption editor, through language technologies and re-speaking, and finally by automatic subtitle translation and caption transcription. Looking at the available technologies and the different qualities it may be possible to offer accessibility services in most conditions.

The switchover from analog to digital, and now the convergence of broadband and broadcast allow endless opportunities to offer accessibility services on different platforms, different formats, and for the user to personalize the chosen service. Subtitles and captions these days can be tailored to a person's choice of size, contrast, colour and at the top or bottom of the screen. The new connected TV allows for multiple language subtitles, and also for multiple sounds, with audio description and

⁸ [http://www.itu.int/en/ITU-D/Digital-Inclusion/Persons-with-Disabilities/Documents/ICT Accessibility Policy Report.pdf](http://www.itu.int/en/ITU-D/Digital-Inclusion/Persons-with-Disabilities/Documents/ICT%20Accessibility%20Policy%20Report.pdf).

⁹ http://www.itu.int/en/ITU-D/Digital-Inclusion/Persons-with-Disabilities/Documents/International%20Audio%20Description%20Toolkit_updated%202016.pdf.

audio subtitles in multi-language. Sign language can be sent over broadband and seamlessly integrated into the programme, in different screen areas where the size of the signer can be chosen. Workflows have also changed allowing for teleworking and co-working.

Cost seems to be the main factor taken into consideration when offering access services. There are different business models, workflows, and technologies that should be considered. Some countries have shown how crowdsourcing with schools can be an effective way to create audio descriptions or subtitling. Sponsorship of accessible services by the commercial sector, including broadcast and cable networks, programme producers as well as advertisers, can be put forward as a business model that can create market opportunities for e-Accessibility.

In addition to funding and resources, another key limiting factor for broadcasters in offering mainstreamed programming with accessible services is expertise. However, several factors can contribute to increasing expertise including the development of the appropriate capacity building, provision of specific training opportunities for broadcasters and involved parties as well as through opportunities to interchange best practices and experiences.

Another key aspect in increasing the level of accessibility is strengthening the collaboration on setting standards as well developing roadmaps and milestones as compulsory prerequisites for a successful implementation of accessible television services. There are concerns expressed that PwD user needs have not always been considered. For instance, no standard exists that outlines user needs for avatars that can encompass facial expression, body language and other necessary physical cues for accurate communication. This problem can be resolved by joining the efforts of both ITU-D Question 7/1 and ITU-T Question 26/16 on standardizing avatars.

2.4 Trends, requirements, and guidelines for television/video programming accessibility

As more countries switch-over to digital television, it becomes technically feasible to provide closed captioning as opposed to open captions. To follow the audio description in the right way it is acknowledged as important to have proper remote controls for receiving equipment. Therefore, attention should be paid when procuring receiving equipment. Electronic programming guides use icons that would allow a viewer to know that this program has accessible services so icons like “CC” for closed captions and “AD” for audio description. In digital transition, it should be ensured that public broadcasters have adequate funding to provide access services as well as emergency information and public safety announcements. Besides, it is crucial to establish targets and reporting requirements for delivery of access to services.

As far as the issue of accessibility of video on demand services is concerned, in some countries, there is a gap for the users between the description of on-demand services, (television, cinema, DVDs or Blu-ray to describe the accessibility features available). There are projects that address media accessibility possibilities in the new hybrid broadcast broadband TV, and new systems for live captioning which can caption retrospectively pre-recorded programmes. Some of these techniques use speech recognition software.

IPTV accessibility features and those for captions and audio description are probably the easiest to deploy as it is Internet based. Redundancy and dependence on hardware and television sets that become outdated are reduced as everything is included in one international standard as shown in ITU-T standard H.702 2015 on Accessibility profiles for IPTV systems.¹⁰ It is already deployed in **Brazil, Rwanda, and Japan.**

¹⁰ ITU-T H.702: Accessibility profiles for IPTV systems, available at: <https://www.itu.int/ITU-T/recommendations/rec.aspx?id=12648&lang=en>.

For further references on trends, requirements, and guidelines for television/video programming accessibility in line with recommendations of ITU-T Study Group 16, ITU-R Study Group 6 and the Intersector Rapporteur Group Audiovisual Media Accessibility (IRG AVA) see **Annex 2**.

2.5 Good practices and available case studies

According to good practices in the European region, all major national TV stations with a market share larger than 5 per cent have to broadcast programs with sign languages or with captioning. In some countries, main TV channels (such as Public Service Broadcaster of Catalonia) contain about 70 per cent of the accessible content (content with subtitles for different languages, captions) and nearly 90 per cent of subtitling content and audio description are in children's programs.

On the other hand, some developing countries of European region (**Albania, Bosnia and Herzegovina, Serbia and Montenegro**), have a total share of programs less than 1 per cent for PwD. The percentage is slightly higher in news programmes because some informative programmes are translated into sign language. However, those programmes are broadcast daily for a few minutes only or during unsociable hours. Audio films are broadcast once a month during late night hours. In some countries, there are no audio films at all. Almost in all of the countries, there are no programs intended for children with disabilities.

The rights of PwD to access TV/video media content can be achieved only by determining or increasing the mandatory quotas. The programmes should be broadcast in the prime time and should refer to all providers of audiovisual programme content. Besides the issues of quotas, the quality of service (be it web content, closed captions or audio description) remains a challenge. Developing technical standards/guidelines is of high importance.

For further references on good practices and achievements in television/video programming see **Annex 1**.

2.6 Policy approaches to Web accessibility

Websites have become one of the most important forms of communication in the past two decades, providing unprecedented access to news, entertainment, social media, and education and employment opportunities. Increasingly, public sector websites provide critical information and services to citizens. Many people who, in spite of having an Internet connection and Internet capable device, cannot read website content, use web services or interact with a website in any way. Still, many websites throughout the world have not been designed and developed with the accessibility in mind.

Countries that have introduced web accessibility policies focus on making public sector websites accessible, in the first instance, to (or "intending to") expanding these requirements to the private sector in due course.

The **United Nations Convention on the Rights of Persons with Disabilities**¹¹ contains some obligations that require State Parties to ensure equitable access to ICTs for persons with disabilities. These obligations are contained, *among other things*, in Article 4 and 9. The provisions of accessible websites that can be used by PwD as fundamental to the achievement their rights.

The four main principles of web accessibility from the international standards for web accessibility, WCAG 2.0, are:

- *Perceivable*: the information or service on a website is available to a person in whatever modality they need, e.g., 'alt' text to describe images for blind people;

¹¹ <http://www.un.org/development/desa/disabilities/convention-on-the-rights-of-persons-with-disabilities.html>.

- *Operable*: a person can use all features of the website, e.g. buttons are large enough to press using a mouse;
- *Understandable*: a person can understand and use the information, e.g. instructions are clear and simple;
- *Robust*: the website works a range of different devices and with different assistive technologies e.g., screen readers used by blind people.¹²

A key consideration is the scope of websites to be covered by the web accessibility policy. This may include government and public sector websites in the first instance, followed by the sectors of public interest such as banking, e-commerce, private healthcare providers, etc.

Public procurement is a powerful tool that can be used to encourage a market to produce accessible goods and services and to include minimum accessibility requirements in public tenders. ICT goods and services should also receive policy attention, along with the development of specific policies on accessibility.¹³

The **Model ICT Accessibility Policy Report** contains guidance on incorporating measures to improve the accessibility of websites into existing, relevant policies. It also contains a model policy document for countries that have not yet adopted a policy.

The steps to developing and implementing the policy, be it a standalone policy or requirements integrated into an existing policy include some key considerations are:

- *Responsibility*: identifying the government agency responsible for implementing the policy, such as the national regulatory authorities, the agency in charge of e-Government, ICT or customer services across the public sector;
- *Consultation*: making sure persons with disabilities as well as other stakeholders such as in country web developers and IT managers within the public sector, are consulted with during the policy's development;
- *Awareness raising*: ensuring that relevant actors know about the policy;
- *Setting clear goals through standards*: using and referencing the standards commonly accepted by policy makers, disabled person organisations and web developers to set clear goals within the policy;
- *Building capacity*: providing training for relevant staff including IT personnel, staff responsible for publishing content to the website and procurement staff responsible for buying public websites;
- *Monitoring progress*: how to measure conformance and encourage compliance.

2.7 Trends, requirements and guidelines for Web accessibility

The web accessibility policy should bear reference to the international standards for web accessibility, the W3C, **Web Content Accessibility Guidelines (WCAG) 2.0**.

The web accessibility policies should: identify how costs related to the upgrading of public sector websites (financed through central funding related to ICT infrastructure by using the Universal Service Fund); timelines for implementation. This should take into account new website versus updating existing websites. In addition, there should be processes for monitoring compliance of the making of accessible websites within the scope of the policy using the international standards (WCAG 2.0) for new content, and processes for reporting these implantations.

¹² These prinW3C/WAI Web Content Accessibility Guidelines 2.0 (also ISO/IEC 40500:2012): <https://www.w3.org/TR/WCAG20/>.

¹³ The ITU Academy provides free online training on accessible ICT Public Procurement: <https://academy.itu.int/index.php?lang=en>.

In Europe, a proposal for a Web Accessibility Directive is currently being finalised that will require the Member States to ensure that their public websites are accessible.¹⁴ Another, more general Directive called the European Accessibility Act, was announced in December 2015 that, when implemented, will extend the accessibility requirements to online services of ‘public interest’ such as online banking and e-Commerce.¹⁵

In the **United States of America**, for instance, all federal authorities are required to include accessibility as essential features of any ICT they procure, including websites. These regulations, called Section 508 of the Rehabilitation Act 1973 have had a significant impact both the levels of accessibility of websites available to the public, but also the capacity of web development agencies to deliver accessible websites.¹⁶

For further references on good practices and achievements in web accessibility see **Annex 1**.

For further references on trends, requirements and guidelines for Web accessibility recognising ITU-T and W3C see **Annex 3**.

2.8 Accessible ICT public procurement

Public procurement accounts for between 10 and 15 per cent of the GDP of an economy on average.¹⁷

It is increasingly being used by the ITU Member States as a strategic tool to achieve various economic and social goals. The policy on public procurement has a significant impact on the creation of accessible ICTs on the global market and is seen as a solution. The **United Nations Convention on the Rights of Persons with Disabilities** states that State Parties must ensure “their public procurement procedures incorporate accessibility requirements (paragraph 32).

The **United States of America** has developed technical standards on accessible ICTs and has enacted legislation that requires their use by all Federal agencies in the procurement of ICTs. Section 508 of the 1973 Rehabilitation Act are a set of enforceable ICT accessibility standards that Federal agencies must incorporate as a mandatory set of requirement (or technical specification) that suppliers must meet in the procurement of ICTs. Developed by the United States’ Access Board that were embedded into federal procurement regulations in 2001.¹⁸

The first ever European standards on accessible ICTs, EN 301 549 “Accessibility requirements suitable for public procurement of ICT products and services in Europe”, was published in March 2014.¹⁹ This standard was developed by the European Standards Bodies following a request (technically a mandate) by the European Commission. The accessibility requirements contained in EN 301 549 have been harmonised to match as closely as possible those contained in the Section 508 standards.²⁰

¹⁴ <https://ec.europa.eu/digital-agenda/en/web-accessibility>.

¹⁵ http://europa.eu/rapid/press-release_MEMO-15-6148_en.htm.

¹⁶ <https://www.access-board.gov/the-board/laws/rehabilitation-act-of-1973>.

¹⁷ http://www.wto.org/english/tratop_e/gproc_e/gproc_e.htm.

¹⁸ Rehabilitation Act, s 508 (29 USC 794d), as amended by the Workforce Investment Act of 1998 (PL 105-220), 7 August 1998. United States Access Board. 1999. Electronic and information accessibilities standards. Available at <http://www.access-board.gov/sec508/508standards.htm>.

¹⁹ ETSI. 2014. ‘EN 301 549 Accessibility requirements suitable for public procurement of ICT products and services in Europe’, available at: http://www.etsi.org/deliver/etsi_en/301500_301599/301549/01.01.01_60/en_301549v010101p.pdf.

²⁰ The U.S. Access Board is currently aligning the new version of Section 508 549 with EN 302 549 <https://www.access-board.gov/guidelines-and-standards/communications-and-it/about-the-section-508-standards/section-508-standards>.

According to the **Model ICT Accessibility Policy Report** public procurement policies that require public agencies to procure accessible Information Communication Technology (ICT) equipment and services serve two key goals:

- Firstly, by procuring the most accessible ICT equipment and services, government bodies can provide an accessible work environment for its employees and accessible public services for its citizens;
- Secondly, the public procurement of accessible ICTs creates a market for accessible ICTs. Manufacturers and service providers are incentivized to produce accessible ICTs and suppliers to stock accessible ICTs. It generates greater competition drives down costs and promotes a greater availability of accessible ICT products and services in the marketplace.

Accessible ICT policies and practices for public procurement result in:

- Improving the lives of persons with disabilities through ensuring public bodies utilize accessible ICTs in the delivery of public services;
- Providing ICT systems and services to the public that are usable and accessible by the widest range of people possible;
- Creating an accessible employment environment within the public sector;
- Increasing market demand for accessibility features in ICT products and services by leveraging the purchasing power of the government;
- Encouraging industry competition to design, develop and provide more accessible mainstream ICT solutions and, thus, increase the market supply for accessible solutions; and,
- Affecting the market to yield more accessible ICT at lower cost by shifting both the market supply and demand as mentioned above.

2.9 Requirements and guidelines to promote, implement and use public accessible telecommunication and ICT spaces

Many Internet users in developing countries rely on public access to surf the web. Also, commercial and public e-services are increasingly being accessed through the Internet by all categories of citizens for a variety of essential services. Public access is of particular importance in developing countries, especially the least connected countries, where voice, Internet, and broadband penetration rates trail those in developed countries.²¹

In light of the role of public access in providing services to the general public and specifically to persons who do not have individual access to ICT services, service providers and entrepreneurs providing public telephones and public community internet access points should be encouraged to ensure that phones and computers and the facilities that house them are accessible and available on an equal basis to persons with disabilities, and that they are responsive to their needs.

The steps to achieve these objectives include:

- Setting out general principles of ICT accessibility in key policy and legislative provisions related to the provision of public ICT facilities;
- Consulting with persons with disabilities in the policy-making process;
- Making persons with disabilities and organizations of persons with disabilities aware of accessible public ICT access policies, facilities, and services;

²¹ International Telecommunication Union, Measuring the Information Society 2013 at: https://www.itu.int/en/ITU-D/Statistics/Documents/publications/mis2013/MIS2013_without_Annex_4.pdf.

- Adhering to accessible public procurement procedures to ensure that ICT equipment and services procured for public access facilities are accessible;
- Using Universal Service and Access Funds to fund the procurement of AT and to train staff on its use;
- Promoting awareness of accessible public access facilities among persons with disabilities, including use of appropriate signage advertising accessible public access facilities;
- Training staff how to serve customers with disabilities, including on available, accessible ICTs;
- Ensuring that emergency communications provided in public access facilities are accessible for persons with disabilities;
- Setting measurable targets, reporting annually on their implementation and ensuring enforcement of accessibility provisions as appropriate.

2.10 Requirements for Relay Services for the PwD

In the late 1960s, with the introduction of a surplus Teletype writer (TTY) that used an acoustic coupler to transmit real-time text over the voice telephone network was developed in the United States of America by three men who were deaf, opening the door of communication with the telephone for the deaf community. It was later called a textphone, and portable smaller devices were made eliminating the need for huge old surplus teleprinter.

This textphone communication system was extended to create a relay service which was also created in the United States of America by a deaf man that enabled textphone users to contact hearing people without textphones via the telephone. The implementation of voice text and video relays services now exist via the web.

In the developing countries, the introduction of the network system for PwDs to communicate over distances have not yet been uniformly created. It is necessary to introduce the policy, an implementation plan and guidelines of good practices tailored to the usage environment to enable PwD to have a telecommunications system, and that a standard interface between the network and the terminal, is used.

For more information on international standardization trends of relay services, see **Annex 4**.

2.10.1 Accessible emergency services via telecommunications and ICT networks

Persons with disabilities should be able to use their everyday communication means (e.g., terminal equipment and services) for reaching emergency services, and should be able to contact emergency services free of charge, whatever the technology or device they use. Emergency information made available to the public should also be provided in alternative accessible formats such as text messages on mobile phones.

Emergency information made available to the public should also be provided in formats accessible to PwD such as sign language and captioning or text for persons who are deaf and hard of hearing, and audio messages on television/video programming for those with visual disabilities. Where a country does have established a committee or agency to be responsible for accessibility emergency communication, the same objective can be achieved through regular review of existing regulations subject to the public consultation with PwD.

Persons with disabilities ICTs should be able to contact emergency services via ordinary Emergency numbers. As emergency numbers may vary across countries as well as across disabilities, the use of the number “112”, “999” and/or “911” as the common emergency number is encouraged.

Public communications and announcements that are broadcast in natural disaster situations must be made accessible to PwD in appropriate forms of communication, thus leveraging mainstream communication channels. Licensed service providers of video programming must ensure that such announcements and alerts are broadcast in relevant formats accessible to all PwD.

Legislators, policy makers, and ICT regulatory authorities should review their emergency services legislation, policies and regulations to ensure that the needs of PwD are taken into account. This applies to reviewing the needs for ICT services, including the ITU international public telecommunication numbering plan (E164) 23 numbers used for voice services, short codes, and any other applicable numbers. Emergency call centres should be able to receive and respond to SMS text messages as well as calls from relay services to permit emergency calling by people with hearing or speech disabilities.

2.10.2 Standard-based commercial solutions to promote ITU telecommunications and ICT accessibility, including web accessibility

Some standard-based commercial solutions to promote ITU telecommunications and ICT accessibility, including web accessibility include:

VerbaVoice app, cost-effective solutions to remove barriers to spoken communication on television and the Internet. The VerbaVoice app is a communication aid for hearing impaired people, which makes spoken language accessible as live text and/or sign language video. The combined use of the Interpreters Telepresence System (ITS) developed by VerbaVoice for live events and TV broadcast poses further opportunities to provide full inclusion for people with hearing, visual or mobility impairments.

FRED AT SCHOOL (Sub-Ti) is a creative and innovative educational project whose primary goal is to enhance film literacy among young audiences (secondary school students). It is a completely inclusive project, which fully caters for the needs of young persons with sensory impairments. FRED at school is currently implemented in secondary schools in eight European countries and can be extended and customised to different countries and cultures.

Real-Time Text (RTT) (United States of America) is a text-based mode of communication about where each text character appears on the receiving device at roughly the same time it is typed on the sending device character by character, allowing for a conversational flow of communication, simultaneously with voice. RTT is the Internet Protocol (IP)-based, functionally equivalent successor to TTY technology, (which also used real-time text over the PSTN) that makes telephone service accessible to individuals with hearing and/or speech disabilities. ITU-T standard T. 140 is still being used for the new version of RTT.

Accessible Communication for Everyone (ACE) (VTC-Secure, and the FCC United States of America) is a free, cutting-edge solution that helps to solve fundamental communication challenges. With the aim to create an open source, the standards-based software also allows for groups all over the world, such as governments, universities, non-profit organizations, crowdsource communities, and even private individuals to modify, improve, secure and redistribute the software to large numbers of users, while still maintaining interoperability with each other.

HERMES as an alternative and augmentative digital communicator for people with Autistic Spectrum Disorders (ASD) (**Argentine Republic**) The HERMES uses free and open technologies. Project HERMES consists of the development of an augmentative and alternative digital communicator for children and young people with ASD (Autistic Spectrum Disorder) who participate from CEDICA. HERMES serves as a backup tool for communication between the patient and their therapists and complements therapy carried out at CEDICA.

RAICES (Argentine Republic) contributes to teaching and seeks to stimulate children to acquire knowledge through social media. RAICES Project, through its serious social online game proposal, which is meant for children and teenagers, provides an attractive learning scene.

eQUINO (Argentine Republic) is a video game that complements equine-assisted therapies and activities for PwD is being designed specifically with educational goals in mind.

Rules-Based Web Accessibility Analyzer (Argentine Republic): the development of SiMor came about with the intention of providing a free source tool capable of analyzing entire Web sites to verify their compliance with accessibility guidelines established by one of the most important entities, W3C, and inform the developer of the mistakes found and solutions possible, with the goal of facilitating their work in creating accessible content for an inclusive Web.

For further references to good practices and achievements in standard-based commercial solutions to promote ICT accessibility see **Annex 1**.

3 CHAPTER 3 – Accessibility with ICT in education

3.1 Requirements and guidelines to promote and implement accessible e-Education

There is increasingly a link between ICT use and literacy skills since by its very nature information and communication technologies depend on communication abilities. A lot of the content delivered over ICT, especially Internet-based content, remains text-base and the format and content of web pages often demand reading and writing skills. Accessible ICT and Accessibility Tools (AT) can help produce benefits for ICT users with low levels of literacy.

Besides the more commonly used “medical model of disability”, which considers disability “a physical, mental, or psychological condition that limits a person’s activities”, there is a more recent “social model of disability,” which has emerged and is considered a more effective or empowering conceptual framework for promoting the full inclusion of persons with disabilities in society.

Within the social model a disability results when a person who (a) has difficulties reading and writing; (b) attempts to communicate, yet does not understand or speak the national or local language, and (c) has never before operated a phone or computer attempts to use one – with no success.

In all cases, disability has occurred, because the person was not able to interact with his or her environment. Their access to ICTs can be improved through some accessibility tools.

For the elementary class of students, there is a need for learning plan based on long-term education program for the acquisition of basic knowledge. The basic learning need to learn by textbook on text or voice and teaches. Therefore, it is necessary to develop a textbook for basic learning. In this regards, learning program using textbook may have been performed in some countries, so it is valuable to check it from the member’s countries as a first step.

In case of users who have high level communication abilities, they can access to Telecommunication network/ICT tools. But in order to get the skill for job, they must learn the high level skill for developing the products. In this case, it is important that students must learn the skill from the experienced PwD.

3.2 Accessibility tools for people with difficulties mastering reading and writing

There is increasingly a link between ICT use and literacy skills since by its very nature information and communication technologies depend on communication abilities. A lot of the content delivered over ICT, especially Internet-based content, remains text-base and the format and content of web pages often demand reading and writing skills.

The access to ICTs can be improved through some Accessibility Tools (AT) and specifically:

- The use of AT on reading to help by presenting text as speech. AT to support those with difficulty reading helps facilitate decoding, reading fluency, and comprehension.
- The use of AT on writing: some tools help users to circumvent the actual physical task of writing, while others facilitate proper spelling, punctuation, grammar, word usage, and organization. Speech recognition technologies, screen readers, and alternative keyboards may assist persons with difficulty in writing.
- Procurement of equipment, hardware, and software that uses universal design principles: Universal design principals call upon designers to assess the capability demands of their products and minimize the instances where the capability demand of that product exceeds the capabilities of the intended user. The goal is to minimize the opportunity for a social disability to occur in the environment by designing barrier-minimal products.

3.3 Good practices of practical applications for accessible e-education

E-Education and web-based courses offer students with disabilities benefits the convenience and flexibility to accommodate individual needs. In addition to the convenience, online learning offers students with disabilities some benefits in terms of flexibility.

Online courses are increasingly developed with Universal Design for Learning (UDL) principles. This means the information for the course will be presented in multiple ways. In an online class, for example, a reading assignment may already be available in standard text (e.g., as a PDF file) and as an audio file (e.g., MP3). This automatically gives all students the flexibility of reading or hearing the information, saving it for use with assistive learning software, reviewing the file as often as needed, and converting it into study notes. Online courses involve more interaction with media (which needs to be made accessible) like visuals, graphics, and closed-captioned videos.

For further references on good practices and achievements in accessible e-education see **Annex 1**.

3.3.1 Accessible school computer centers

The Swedish education system, SPSM has inspired a majority of Swedish municipalities to organise 'skoldatatek', i.e. School Computer Centres, to ensure that all teachers know how to use ICT in making their teaching accessible to all pupils. It shows how inclusion can be made possible by using alternative tools for pupils with reading difficulties. Alternative tools are in this case ICT tools such as speech synthesis and spell check software. See more at: <http://www.inclusive-education-in-action.org/iea/index.php?menuid=25&reporeid=240>.

Schooling for children with disabilities in **Côte d'Ivoire** has made it necessary to set up specialized institutions such as the *École Ivoirienne pour les Sourds* and the *Institut National pour la Promotion des Aveugles (INIPA)*, located in the commune of Yopougon, along with the private establishments *Plage Blanche* in Deux Plateaux and the NGO *Fraîche Rosée* in Cocody Mermoz. The mission of the *École Ivoirienne pour les Sourds* is to teach deaf children and young people to read and write and provide them with training conducive to facilitating their social integration. The school has a computer room provided by a telephone operator and the pupils receive IT training. The mission of the *Institut National pour la Promotion des Aveugles (INIPA)* is to teach the visually impaired to read and write and provide them with training conducive to facilitating their social integration. The school has made it possible for visually impaired people to pursue advanced studies. Some study in all areas of activity. The school has a computer room provided by a telephone operator and the pupils receive IT training. Open source software is used. *Page Blanche* is a specialized institution in Cocody Deux Plateaux, Abidjan that takes in children and young people with intellectual disabilities. The school introduces the children to the use of IT.

For further references on good practices and achievements in accessible e-education see **Annex 1**.

3.3.2 Learning and setting preferences on class room computers – Basic self-accommodation framework in the United Kingdom

In the United Kingdom, some schools introduced a basic self-accommodation framework during the induction week for new pupils into the school. Using simple self-help materials, pupils were shown how to adjust accessibility features on the Windows PCs to use them more easily and specially to improve screen readability. This allows students to self-identify themselves by going through the Windows accessibility features in the "Ease of Access Centre" questionnaire. When Windows accessibility features were not enough to address all students' individual accessibility needs, it was the student's individual responsibility to self- identify as needing Assistive Technology. See more at: http://www.unesco.org/new/fileadmin/MULTIMEDIA/HQ/CI/CI/pdf/accessible_ict_personalized_learning_2012%20.pdf.

For further references on good practices and achievements in accessible e-Education see **Annex 1**.

3.3.3 Mobile phone strategies to support learning for students with disabilities

This research project provides tips on how mobile phones can offer strategies to engage students in learning in ways that best suit their needs. It covers reading, writing, keeping and making notes, understanding time, planning activities, listening, calculating and using a dictionary and surfing the web. See more at: http://g3ict.org/resource_center/publications_and_reports/p/productCategory_whitepapers/subCat_9.

For further references on good practices and achievements in accessible e-education see **Annex 1**.

3.3.4 Accessibility technologies for e-Learning, speech and language technologies

Speech interface or speech recognition is the next generation interface which makes a computer understand what a person says and also exchanges information in a smooth conversation between a computer and a person. Recently, speech interface has become one of the essential elements in the IT industry such as intelligent robots, telematics, and the digital home, which are promoted by the government. There are PCs and smartphones that have these capabilities. Speech interface or speech recognition is expected to be combined with many application areas such as national defense, medical services, etc. Moreover, speech recognition interface plays a role of core technology for mobile web information services and also is being applied to language education services for conversation training.

The technology recognizes and understands users' speech and generates appropriate responses in limited dialog situations. The core technology does exist and is being used for natural speech recognition interface for information services on mobile devices (smartphones, navigation terminals, etc.) or wearable devices such as smart glasses and smart watches. Using this technology, smartphones already accelerate various information services in mobile environments such as voice search, voice SMS; speech-enabled virtual agent, etc. The conversational speech recognition processing technology has been applied to the high-quality language e-education service system. This system makes assessments on the pronunciation of a student and leads the conversation to help to upgrade speaking skills. Looking at the situation in Korea, the speech analyser, and a recognizer has been optimized to the typical Korean English pronunciation.

The core technology was applied to several commercial products such as GnB smart English and Hodoo English of NCsoft in the **Republic of Korea**. Furthermore, a pilot language e-Education service system was developed at the Electronics and Telecommunications Research Institute (ETRI) called Genie Tutor.

The advanced speech technology could play an important role in the convenient user experience when the users with disabilities are in the learning situation. For example, speech recognition interface provides a convenient interface to the people with no/low vision by speech synthesis.

In **Japan** the area of education is very broad. Access methods are different by the user, so many skill level must be considered. The user who acquires network literacy is possible to proceed to more advanced applications levels by their own efforts.

For further references on good practices and achievements in accessible e-Education see **Annex 1**.

4 CHAPTER 4 – Conclusions and general recommendations

4.1 Key issues to be considered to implement policy and regulatory framework for telecommunications and ICT accessibility for PwD and specific needs in developing countries

- The Universal Service obligation should take into account the needs of persons with disabilities about access to ICTs;
- The Universal Service legal and regulatory framework should include accessibility as an explicit goal for Universal Service and consideration within the Universal Service Fund;
- At all levels of education, the use of accessible ICTs should be promoted by all stakeholders involved in education delivery;
- Any general policies or laws developed or updated that incorporate considerations of accessibility for ICTs should include clear targets and annual reporting on its implementation;
- Involvement of persons with disabilities representatives and related bodies/organizations in the development and implementation of policies, legislation, and regulation, is key to ensuring successful outcomes.

4.2 How to promote accessibility in public ICT spaces, such as telecentres and public pay phones?

- All consultations on the revision and development of ICT policies should be accessible for persons with disabilities;
- Policy development should involve ICT industry (manufacturers and vendors);
- Governments should ensure that all stakeholders including ICT Industry and PwD are informed on new developments in policy and standards related to accessible ICTs;
- Manufacturers and developers should be encouraged to consult with and incorporate the needs of persons with disabilities during the designs and development of technology;
- When related policies are being developed or updated, the following key areas should receive priority consideration:
 - a) Access to education;
 - b) Access to emergency telephone numbers;
 - c) Disaster preparedness/response/recovery systems (e.g., national emergency response plans to incorporate accessibility considerations for PwD).

4.3 How to promote accessibility tools for accessible e-Education, which can be used for people with difficulties mastering reading and writing?

- Promote the procurement of mainstream ICT incorporating accessibility and Assistive Technology for use in education and public areas such as schools, universities, libraries and telecenters;
- Ensure that any initiatives and programmes to procure and provide accessible ICTs for education and training are based on actual needs identified by the consumers through the organizations representing persons with disabilities;
- Ensure that initiatives and programmes to procure and provide accessible ICTs for education and training consider the ongoing maintenance and upgrading of accessible ICTs;
- Ensure that initiatives and programmes to procure and provide accessible ICTs for education and training consider the training of PwD in the use of these ICTs;

- Create a field of study on adaptive IT will empower IT teachers and officials have no competence in regard to accessibility;
- Field of study on adaptive IT is recommended to have:
 - a) The basic tools in this field of study will be identical for persons with disabilities and those without. Other tools may be used, reflecting the specific characteristics of IT for PwD;
 - b) The programs will be based on software, which can be broken down into two categories: ordinary software, and adaptive software and equipment;
 - c) Adaptive software comprises computer programs designed to facilitate the autonomy of users with disabilities, for example: JAWS and NVDA for content accessibility.
- Universities are important allies for mainstreaming progress and education on accessibility issues.

4.4 Key policy considerations for Web accessibility

- All policies should be developed in consultation with Persons with Disabilities (PwD). Policy makers/regulators should ensure that meetings are conducted in an accessible manner, according to ITU guidelines;
- Governments may consider developing standalone policies on web accessibility, or update existing policies to incorporate web accessibility considerations or both. Government agencies responsible for developing and implementing this policy could include those with responsibility for Public procurement, e-Government and ICT policy and strategy, a disability policy implementation, anti-discrimination, consumer protection, education, and training;
- A key consideration is the scope of websites to be covered by the web accessibility policy. This may include government and public sector websites in the first instance, followed by the sectors of public interest such as banking, e-Commerce, private health care providers, etc.;
- The web accessibility policy should reference the international standards for web accessibility, the W3C, Web Content Accessibility Guidelines (WCAG) 2.0;
- Governments can serve as example of web accessibility and it should consider the use of social media as effective tool to spreading information to the public;
- Governments should establish progressive commitments and milestones to achieve web accessibility in governmental web sites.

The Web accessibility policies should:

- Identify how costs related to the upgrading of public sector websites will be financed. An example is through central funding related to ICT infrastructure by using the Universal Service Fund. It is particularly important about the provision of accessibility features such as captioning for government videos published online;
- Include timelines for implementation, taking into account new website versus and consider updating existing websites, and have processes for monitoring compliance of the making of accessible websites within the scope of the policy using the international standards (WCAG 2.0) for new content, and processes for reporting these implantations;
- Be promoted and awareness created about its dispositions within the government, private and web industry sectors.

4.5 Key policy considerations in the area of accessible mobile phones and services

- All policies should be developed in consultation with persons with disabilities;

- Regulators should consider using funding from the universal service/access fund to subsidize provision of a national relay service by phone operators for persons who are unable to hear and use the telephone in the normal way;
- Regulators should ensure that spectrum allocation takes into account the possibility of interference between mobile phone handsets and hearing aids. See the document “[Anticipating the dangers of the unprotected spectrum to Persons with Disabilities](#)”;
- Regulators should work with mobile phone operators and other stakeholders in the development of text relay services and video relay services for sign language for persons with disabilities;
- Regulators should work with appropriate emergency services and the mobile phone operators and mobile phone manufacturers to ensure the availability of equitable access to emergency services for persons with disabilities;
- Regulators should liaise with mobile phone operators and manufacturers to ensure an adequate availability of affordable and accessible mobile phones to persons with disabilities;
- Regulators should liaise with mobile phone operators to ensure adequate provision of information on these mobile phones, including their compatibility with assistive technologies such as hearing aids;
- Mobile phone operators should consider providing data or SMS only packages to deaf users who may do not wish to and cannot use voice services;
- ICT operators and manufactures have a key role to play in promoting the development of accessible services and equipment for PwD and for fostering entrepreneurial innovation in ICT accessibility;
- Promoting open source creation to make accessible apps and reducing their cost, will make such services available and affordable for PwD. When open source is not an alternative, governments should negotiate a nation-wide license.

4.6 Key issues identified by Members in developing policies and services for accessibility to audio-visual media content

- Make accessibility mainstream and inclusive;
- Create an access group and observatory with all agents/stakeholders;
- Establish contact between content providers, telecommunication providers, and broadcasters;
- Create a realistic short term/long term roadmap with all agents;
- Create common assets: technologies and distribution;
- Consider creating new workflows;
- Establish qualities and quantities;
- Establish labelling for services and qualities;
- Establish a good framework policy;
- Lobby for research agenda to include accessibility;
- Make access services commercially profitable;
- Follow existing standardization, to avoid market fragmentation;
- Create related training courses;
- Audiovisual contents are a way of expressing and generating awareness on ICT accessibility.
- Film festivals are an interesting forum to address PwD rights and to disseminate productions and materials developed by PwD.

4.7 Key considerations in the area of public procurement

- A mix of policy and regulation should be progressively implemented to put in place the “regulatory building blocks” (e.g., included but not limited to policy standards, awareness raising) required to ensure that public authorities procure accessible ICTs;
- Accessibility requirements should be based on standards that are agreed on by all stakeholders including policy makers, industry and persons with disability and their representative bodies. Lessons may be learnt (e.g., see experience in the United States of America and the European Union);
- Public procurement policy, legislation, and regulation should be updated in consultation with relevant stakeholders to incorporate accessibility as a principle in public procurement;
- The accessibility requirements referenced in public procurement policy, legislation and regulation should be based on harmonizing and commonly agreed on international standards;
- Initiatives are put in place to promote awareness and capacity building of policy and standards for public procurement officials, industry, and people with disabilities.

4.8 Raising awareness and educating all stakeholders about accessibility policies and technology trends to strengthen advocacy effectiveness

- Accessibility for persons with disabilities should be mainstreamed and thus normalizing its status in an inclusive society;
- There should be an attempt at making access services commercially profitable;
- Accessibility should be included in all standardization since is a basic precondition to avoid market fragmentation;
- Accessibility is a great opportunity to work towards social inclusion and empowerment for everyone;
- Recognition and awards are recommended to promote ICT accessibility and act as incentives to leverage the right to communicate to all.

4.9 Final comments – Food for thought

- Collaboration is crucial for promoting ICT accessibility: including PwD, governments, operators, manufacturers, universities and all related stakeholders: “Nothing about us without us”;
- In ICT accessibility ecosystem all participate and bring our contribution to make it a reality;
- ICTs should be considered as a tool for education and employment of PwD as well as an enabler for social and economic development and independent living;
- Disability is a social condition rather than a medical one;
- Capabilities within end users enable them to use the available accessibility functionalities so they can benefit from web accessibility, equipment and applications;
- Understanding the Disability Market Value is crucial;
- Sharing successful experiences among the countries worldwide is beneficial for PwD;
- Governments should develop ICT Accessibility National Plans on ICT Accessibility for Persons with Disabilities, as well as make their web sites accessible;
- Enlarge the scope of work and adapt accordingly the name of the Q7/1 for the future study cycle (2018-2021) as “*ICT Accessibility for persons with disabilities, including age related disabilities and with specific needs*”;

- Use of ICTs Accessibility for employment opportunities of persons with disabilities;
- Consider IMT-2020 (5G)²² technology for ICT accessibility;
- Ensuring follow up and monitoring results of implementation of ICT accessibility policies, practices and technological solutions empowers all stakeholders in creating inclusive environment for PwD worldwide.

²² IMT-2020 refers to the 5G standardization work at ITU.

Abbreviations and acronyms

Various abbreviations and acronyms are used through the document, they are provided here.

Abbreviation/acronym	Description
AD	Audio Description
ADIE	State Informatics Agency (Agence de l'Informatique de l'État) (Republic of Senegal)
AIGF	Ivorian Agency for Frequency Management (Agence Ivorienne de Gestion des Fréquences) (Republic of Côte d'Ivoire)
ALD	Assistive Listening Device
ANATEL	Brazilian National Telecommunication Agency (Agência Nacional de Telecomunicações) (Federative Republic of Brazil)
APADEA	Argentinian Association of Parents of Autistic Children (Argentine Republic)
API	Application Programming Interface
ASD	Autistic Spectrum Disorders
AT	Accessibility Tools
BDT	Telecommunication Development Bureau
CC	Closed Caption
CEDICA	Centro de Equitación para personas con Discapacidad y Carentiadas (Argentine Republic)
CIC	Communication Intermediation Central
COP	Child online Protection
CRTC	Canadian Radio-television and Telecommunications Commission (Canada)
DCAD	Dynamic Coalition on Accessibility and Disability
DVD	Digital Video Disc
EFHOH	European Federation of Hard of Hearing
ETRI	Electronics and Telecommunications Research Institute (Republic of Korea)
FCC	Federal Communications Commission (United States of America)
FENASCOL	Federación Nacional de Sordos de Colombia (Republic of Colombia)
G3ict	Global Initiative for Inclusive ICTs
GDP	Gross Domestic Product
GHz	Gigahertz
GPS	Global Positioning System
GRA	General Regulation on Accessibility
ICT	Information and Communication Technology

Abbreviation/acronym	Description
IGF	Internet Governance Forum
IMT	International Mobile Telecommunications
INIPA	École Ivoirienne pour les Sourds and the Institut National pour la Promotion des Aveugles (Republic of Côte d'Ivoire)
IP	Internet Protocol
IPTV	Internet Protocol Television
IRG AVA	Intersector Rapporteur Group Audiovisual Media Accessibility
ITS	Interpreters Telepresence System
ITU	International Telecommunication Union
ITU-D	ITU Telecommunication Development Sector
ITU-R	ITU Radiocommunication Sector
ITU-T	ITU Telecommunication Standardization Sector
JCA-AHF	Joint Coordination Activity on Accessibility and Human Factors
M2M	Machine to Machine
MIMP	Women and Vulnerable Population Ministry (Ministerio de la Mujer y Poblaciones Vulnerables) (Peru)
MinTIC	Ministerio de Tecnologías de la Información y Comunicaciones (Republic of Colombia)
MoU	Memorandum of Understanding
NGO	Non-Governmental Organization
NRA	National Regulatory Authority
PAW	Web Accessibility Point (Punto de Accesibilidad Web)
PEAT	Partnership on Employment & Accessible Technology (United States of America)
PSAP	Personal Sound Amplification Product
PSTN	Public Switched Telephone Network
PwD	Persons with Disabilities
QoS	Quality of Service
RTT	Real-Time Test
SEE	South-East Europe
SMS	Short Message Service
SSRD	Short Ranges Devices
TRS	Telecommunication Relay Service

Abbreviation/acronym	Description
TSAG	Telecommunication Standards Advisory Group
TTY	Teletype Writer
UAS	Universal Service and Access
UDL	Universal Design for Learning
UE	User Equipment
UN	United Nations
UN CRPD	United Nations Convention on the Rights of Persons with Disabilities
UNESCO	United Nations Educational, Scientific, and Cultural Organization
USF	Universal Service Fund
VRS	Video Relay Service
W3C	World Wide Web Consortium
WCAG	Web Content Accessibility Guidelines
WFD	World Federation of the Deaf
WHO	World Health Organization
WIPO	World Intellectual Property Organisation
WP	Working Party
WSIS	World Summit on the Information Society
WTDC	World Telecommunication Development Conference

Annexes

Annex 1: Good practices and achievements in ICT Accessibility worldwide

Annex 1 presents developments and improvements in ICT accessibility worldwide. The available good practices and achievements in ICT accessibility have been divided into sections following the Model ICT Accessibility Policy Report and are presented in alphabetical order. The identified good practices could serve as a potential sources of inspiration to be shared and replicated among the countries and related stakeholders worldwide to achieve an inclusive society.

1 ICT accessibility topics

1.1 Legal policy and regulatory frameworks

Benin: As is the case in many developing countries, the Law on electronic communications and posts include a provision to promote digital access for PwD, but its implementation is low. There are social categories for which Universal digital access should be guaranteed by the State according to Law, but in order to comply, a policy must be developed and applied for access to electronic communications for PwD.

Bosnia and Herzegovina: There is a lack of legally binding provisions, lack of funds and insufficient awareness about existing accessible services and technologies. NRAs are starting to stimulate policy makers to foster international provisions in their national legislation frameworks, and the level of expertise of software services is increasing.

Brazil: The National Telecommunication Agency (ANATEL) published the General Regulation on Accessibility – GRA (Resolution nº 677/2016 – ANATEL) which defines rights and obligations for consumers and companies, respectively, gathering rules that already existed in several Resolutions as well, and aiming to promote a reasonable balance on the market, by defining lighter obligations to smaller operators. The GRA aims to remove barriers faced by PwD and to achieve an inclusive society. The new regulation enables impaired consumers to have the same treatment that other consumers receive, empowering them with new ICTs accessible functionalities and technologies.

For more information: <http://www.anatel.gov.br/institucional/>.

Brazil: Members of Telecommunication operators, Associations and ANATEL, make part of the RGA group, which guides the implementation of Resolution nº 667/2016's rules by promoting discussions on solutions and standards for PwD.

Côte d'Ivoire has about 3,400,700 people living with a disability (WHO) and ratified the Convention on the Rights of Persons with Disabilities on 10 January 2014. Côte d'Ivoire committed itself to a process of making telecommunication/ICT s accessible. Its Telecommunications/ICT policy is an inclusive one. The policy for the digital economy and the legal and institutional frameworks take account of PwD. The bodies responsible for implementing the policy are the regulator ARTCI, for asymmetric regulation, the National Universal Service Agency, for universal service aspects, the Ivorian Agency for Frequency Management (AIGF), for frequency management, and the Ministry of the Digital Economy, as regards development of policy and legislation for the Government.

Côte d'Ivoire included in its regulatory framework provisions relating to access to telecommunication/ICT services by persons with disabilities in the licence conditions of mobile telephony operators. The licence conditions of telephone operators stipulate that they are bound to comply with the international treaties and agreements signed or ratified by the State of Côte d'Ivoire regarding telecommunications/ICTs. Within the framework of universal service, ARTCI (Côte d'Ivoire's telecommunication/ICT regulatory authority) can, at the request of the ministry responsible for telecommunications/ICTs,

oblige operators with significant market power to offer end users with low incomes or specific social needs different rates or tariff options or formulas from normal commercial operating conditions.

Guinea considers the problem of ICT accessibility by drawing up a plan for the inclusion of the PwD. The education was identified as key for PwD inclusion in the society as well as taking advantage of new technologies. However, there is not yet a specific law enabling employment or access to ICT of PwD. It is envisaged that having technologies in national language will enable educational programs to be implementing for PwD efficiently and thus contribute to combating poverty and ensure inclusion of PwD. In that respect, there is a need to raise awareness about the benefit of such programmes to all levels.

Kenya: The legislative landscape has been changing over the years to respond to the challenges. The Government of Kenya through its NRA initiated the projects aimed at providing access to ICT for PwD. Regulatory licencing tools are imposed by the NRA to ensure that the requirements and interests of PwD are fully addressed. In promoting its mandate in ensuring Universal access to communication services and facilities, the NRA supported the establishment of ICT centres in learning institutions for PwD.

Mali lacks accurate statistics on the number of people with disabilities, the nature of their specific needs and the underlying causal factors. Both in urban and rural areas, PwD are without access to information and communication technologies. The relevant Ministry and the NRA take reasonable and proportionate measures, in particular in defining the public network access and interconnection conditions to enable all users to communicate freely within a framework of fair and equal competition, as well as acknowledging that access to service and equipment to accommodate the needs of PwD should be provided nationally.

Senegal marks significant progress with the aim to stop discrimination and improve the lives of PwD, and particularly regarding mobility, access to health and education services. A “Centre for Disabled People in the Workplace” (CHAT) is part of the State Informatics Agency (ADIE) with a focus on the digital divide and support social exclusion.

Mexico: The Mexican government has published the web content accessibility guidelines to be followed by public agencies and state companies. The document contains the principles and technical aspects that should be followed to ensure that the 7 per cent of Mexicans that have any type of disability have access to all information and public services. The Mexican Government’s new online portal was launched in 2015 and is committed to have all of its content accessible to PwD.

Mexico: The Federal Telecommunications Institute will publish in December 2016 the accessibility guidelines to be followed by telecommunication operators. These guidelines define accessibility aspects relating to customer service, public phones and websites. These guidelines represent an important effort from the government to promote digital inclusion in the private sector. Telecommunication operators will have to: publish contracts, tariffs and billing in digital accessible formats, produce catalogues of equipments with accessibility functionalities, accessible public phone booths, customer service with accessibility measures, accessible websites (WCAG 2.0 AA), and promote for the benefit of all users.

Republic of Korea guarantees ICT accessibility is to people with disabilities including old people to use products, systems, services and facilities regardless of their physical or technical difficulties. In achieving this, in Korea the focus is equally on government’s role to prepare legal system for ICT accessibility, standardization strategy for the ability of the society and efforts, such as providing trainings, consulting and promoting to ensure participation of other that stakeholders other than public sector.

United States of America: With the collaboration of IBM, UMass Boston and the Worcester Polytechnic Institute, this research sums up to current World Wide Web Consortium’s (W3C) work to produce accessibility standards for persons with cognitive and physical disabilities. For more information:

<http://digitalinclusionnewslog.itu.int/2016/09/19/umass-medical-school-researches-text-simplification-to-make-websites-more-accessible-for-persons-with-cognitive-disabilities/>.

United States of America: Several lawsuits have been filed in the USA against major organizations due to the lack of accessibility features on their websites. In response, the Perkins Access initiative consists on providing support for educational institutions to comply with federal digital accessibility regulations. Based on the support of a group of tech experts with different disabilities, Perkins organization generates digital assets' assessments and offers solutions for adapting institutional websites to the most recent regulatory standards.

For more information: <http://digitalinclusionnewslog.itu.int/2016/03/22/perkins-access-to-support-educational-institutions-for-complying-with-us-federal-accessibility-regulation/>.

Canada: 911 is Canada's National emergency line. Canadians who have a hearing or speech disability and who have registered can now send a text message 9-1-1 in the case of an emergency. This is done by first placing a voice call to 9-1-1 – this is to ensure operators can locate the individual making the 9-1-1 calls. The 9-1-1 operator, upon not receiving a vocal response, will check for the phone number in the database of text-to-9-1-1 users. The 9-1-1 operator will then send a text to the phone number who made the 9-1-1 call, beginning their interaction. In this way, regardless of the person's abilities, all Canadians are able to access this service that is critical for health and safety.

For more information: <http://digitalinclusionnewslog.itu.int/2016/03/03/accessible-text-to-911-service-to-support-people-with-hearing-disabilities-in-ottawa/>.

Japan: proposes two methods in regard to accessibility of services destinations in emergencies for PwD: one is directly intended to operate the mobile phone/smartphone and how to access the emergency center, while the other is cut out a part of the operation unit of the mobile phone, with a button in the vicinity of the ornaments of the body, is a method of pressing the button in the emergency situations.

1.2 Promotion of public access

Argentina: The government of San Luis province in Argentina announced its new digital inclusion campaign that will target senior members from the community. The "Algarrobo-Abuelo" campaign is part of the digital plan of San Luis 3.0 that seeks to digitalize the community's public services. It will also provide personalized support to teach seniors how to use their new devices. For example, through a sub initiative called "Nube de Plata", pensioners from the province will conform a network of retired volunteers to support teach their peers digital literacy skills.

Brazil: Receiving a telecommunication document in an accessible format from the operators became possible after the new regulation adoption. As requested by an impaired consumer, operators must send, at no costs, a copy of the contract, service plan offer, billing document, among other documents, in Braille or other accessible format, to visually impaired people (RGA's Article 8º, I).

Canada: Maayan Ziv, a student from Ryerson University that lives with muscular dystrophy, has developed an app that shows accessible locations worldwide. This has been very well received by wheelchair users and is also an invaluable database for public authorities and other parties concerned to pinpoint areas that need improvement. So far, 93 cities and 1629 places have been pinned.

For more information: <http://digitalinclusionnewslog.itu.int/2015/12/08/mapping-app-to-pin-point-accessible-locations/>.

Colombia: The government of Colombia acquired a 4 year-term license of JAWS (screen reader) and a license for MAGIC (screen magnifier) that is available to any person in Colombia that is blind or has low vision. Training is included and the government is providing digital literary courses for the use of this software. As part of this project, technical support as well as installation in libraries, in kiosks (ViveDigital) and other locations, is provided. This program enables PwD to access to screen reader

and magnifier that would not be affordable otherwise. Moreover, this project targets a train the trainers' course for 50 persons with visual disability to ensure that this knowledge will be expanded. Creation of capabilities is a cornerstone of the program where more than 5,000 persons have been trained in the appropriation of ICT by PwD and elderly.

For more information: www.vivedigital.gov.co/convertic.

Colombia: Ayudapps is a project to develop technological solutions that respond to the needs of PwD and help them in their daily life. The project has several stages. In the first stage of the project any person could present or explain what type of barrier they encounter and what the needs are. The second stage invites developers to present their proposed solutions to address the need and eliminate the barrier. At the end the best project is selected. This initiative is led by the Ministerio de Tecnologías de la Información y Comunicaciones (MinTIC).

For more information: <https://apps.co/inscripciones/convocatoria/ayudapps-2015/>.

Colombia: MappAcc is an application that enables a person with a disability to know beforehand the level of accessibility of places, products and services. MappAcc allows a person with disability to evaluate the level of accessibility of a place. Once the user accesses MappAcc it geographically place him and will display categories (e.g., hotel, restaurant, hospital) with a checklist indicating the level of accessibility of the selected items. Such information will certainly be useful for another user. MappAcc seeks that in the long run, there may be an evaluation overtime as to whether a certain place has improved in accessibility and if so, a certification may be granted.

For more information: <http://mappaccessible.com>.

In **Japan**, the area of education is very broad. Access methods are different by the user, so many skill level must be considered. The user who acquires network literacy is possible to proceed to more advanced applications levels by their own efforts.

Kazakhstan: Development of wireless telephony has considerably improved the ability of people with disabilities to function in. Blind and visually impaired people no longer need to find a payphone, and wheelchair users no longer have to struggle with inaccessible phone kiosks. Text messaging for service subscribers has made life easier for those with impaired hearing. Also, both elderly and persons with disabilities can use simplified emergency call procedures.

Latin America: "Launching People – Mixed Talents" is a Samsung program to get Millennials engaged in generating ideas and solutions for promoting digital inclusion of children in Latin America. The overall concept consists in combining the skills of young people from multiple backgrounds, to combine their ideas with guidance from experts in the technology and education fields. For more information: <http://digitalinclusionnewslog.itu.int/2016/06/01/creative-marathon-to-promote-children-digital-inclusion-in-latin-america/>.

Peru: The Women and Vulnerable Population Ministry (MIMP) from Peru, with the support of the National Council for PwD (CONADIS) and the Centre for Prevention of Drug Abuse (Cedro) signed an agreement to provide digital and financial training for PwD. This collaboration seeks to strengthen the digital skills of PwD. Beneficiaries will receive free training related to diverse software by using accessibility tools for persons with visual and hearing impairments. For more information: <http://digitalinclusionnewslog.itu.int/2016/06/22/peruvian-women-and-vulnerable-population-ministry-to-support-digital-inclusion-for-persons-with-disabilities/>.

Republic of Korea: The core technology was applied to several commercial products such as GnP smart English and Hodoo English of NCsoft in the **Republic of Korea**. Furthermore, a pilot language e-Education service system was developed at the Electronics and Telecommunications Research Institute (ETRI) called Genie Tutor.

Sweden: The Swedish education system, SPSM has inspired a majority of Swedish municipalities to organise 'skoldatatek', i.e. School Computer Centres, to ensure that all teachers know how to use ICT in making their teaching accessible to all pupils. It shows how inclusion can be made possible by using alternative tools for pupils with reading difficulties. Alternative tools are in this case ICT tools such as speech synthesis and spell check software. See more at: <http://www.inclusive-education-in-action.org/iea/index.php?menuid=25&reporeid=240>.

United Kingdom: in the United Kingdom, some schools introduced a basic self-accommodation framework during the induction week for new pupils into the school. Using simple self-help materials, pupils were shown how to adjust accessibility features on the Windows PCs to use them more easily and specially to improve screen readability. This allows students to self-identify themselves by going through the Windows accessibility features in the "Ease of Access Centre" questionnaire. When Windows accessibility features were not enough to address all students' individual accessibility needs, it was the student's individual responsibility to self- identify as needing Assistive Technology.

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

United States of America: According to an article published by the Huffttington Post in April 2016, coding may generate important benefits particularly for students with learning disabilities. Some of the main reasons for this are that programming skills provide these students with the opportunity to strengthen their proficiency in areas such as organization, higher order thinking, self-esteem, socialization and teamwork. Coding skills offer solutions by building confidence and empowering them. For example, the New York based organization Tech Kids Unlimited was created in 2009 to empower digital natives through the use of ICT tools. Another similar organization provides technical training to students with autism with the purpose of supporting them to fulfil their goals.

For more information: <http://digitalinclusionnewslog.itu.int/2016/05/14/programming-and-computer-science-to-better-prepare-students-with-disabilities/>.

United States of America: The United States' Department of Labour with the support of the Partnership on Employment & Accessible Technology (PEAT) launched TalentWorks, a free online resource that provides guidance for organizations to ensure that their web-based job applications and recruiting processes are accessible for PwD. Building a platform to provide accessibility guidance for employers may potentially improve hiring processes thus leading to a more diverse and inclusive workforce. Considering that most of the recruitment processes have recently moved online, this sort of initiative is necessary to promote equal opportunities to access the labour market. For more information: <http://digitalinclusionnewslog.itu.int/2016/04/22/talentworks-online-tool-to-guide-accessible-e-recruitment-practices/>.

United States of America: Bookshare is a digital platform initiated by Benetech a non-profit organization engaged in using technology to address social challenges. Under the sponsorship of the U.S. Department of Education, Office of Special Education Programs, the "Bookshare and Innovation for Education" initiative offers more than 390,000 free titles for American students who have visual impairments, physical or learning disabilities.

For more information: <http://digitalinclusionnewslog.itu.int/2016/03/09/bookshare-free-accessible-online-library-for-us-students/>.

United States of America: A team of researchers at the University of Michigan is developing a prototype for a new Kindle-style full-page Braille display that would allow users to access content on a full page at the same time, instead of reading one line at a time. The new device works through a pneumatic system instead of an electronic one, with a display made of tiny bubbles that could be filled with air or liquid to become Braille characters.

For more information: <http://digitalinclusionnewslog.itu.int/2016/01/28/new-full-page-braille-reader-under-development/>.

United States of America: Caltech, the California Institute of Technology, developed a wearable gadget named vOICE Device aimed at helping blind people experience the surrounding environment as it translates images into sound. The gadget has the shape of sunglasses and transforms the images captured by its attached camera into associated sounds via a computer algorithm.

For more information: <http://digitalinclusionnewslog.itu.int/2016/02/01/a-new-gadget-to-help-the-vision-impaired/>.

United States of America: NavCog uses Bluetooth beacons strategically placed indoors to collect the data needed and generate a topology map that will guide the app user around universities, laboratories or even at home. In simple words, this works similarly to a GPS, but for indoors. IBM Research teamed up with Carnegie Mellon University to develop NavCog and made its platform open source so developers from around the world can contribute to the project.

For more information: <http://digitalinclusionnewslog.itu.int/2015/11/18/an-indoors-navigation-system-for-the-visually-impaired/>.

1.3 Mobile communications accessibility

Argentine Republic: Argentinian company FDV Solutions is working in two digital inclusion projects called Nahual and DANE. The DANE project started in 2013 with the support of organizations such as the Argentinian Association of Parents of Autistic Children (APADEA) and the Argentinian Association for Down Syndrome. Its main objective is to create apps to promote ICT inclusion for PwD, with the support of experts in education, students and volunteers. One example is “Juguemos Todos” app, which was designed to enable persons with Down Syndrome to utilize information technologies.

For more information: <http://digitalinclusionnewslog.itu.int/2016/06/16/nahual-and-dane-projects-to-promote-digital-inclusion-in-argentina/>.

Argentina: **HERMES** as an alternative and augmentative digital communicator for people with Autistic Spectrum Disorders (ASD). The HERMES uses free and open technologies. Project HERMES consists of the development of an augmentative and alternative digital communicator for children and young people with ASD (Autistic Spectrum Disorder) who participate from CEDICA. HERMES serves as a backup tool for communication between the patient and their therapists and complements therapy carried out at CEDICA.

Argentina: The **RAICES** contributes to teaching and seeks to stimulate children to acquire knowledge through social media. RAICES Project, through its serious social online game proposal, which is meant for children and teenagers, provides an attractive learning scene.

Argentina: **eQUINO** is a video game that complements equine-assisted therapies and activities for PwD is being designed specifically with educational goals in mind.

Argentina: **Rule-Based Web Accessibility Intensive Analyzer:** the development of SiMor came about with the intention of providing a free source tool capable of analyzing entire Web sites to verify their compliance with accessibility guidelines established by one of the most important entities, W3C, and inform the developer of the mistakes found and solutions possible, with the goal of facilitating their work in creating accessible content for an inclusive Web.

Brazil: Hand Talk is a smartphone app developed to improve social interaction and facilitate independence for deaf mobile users. This app presents an animated avatar named Hugo who converts speech into sign language, acting as a personal sign language interpreter for deaf mobile users. Hand Talk won the 2015 Accessible Mobile Applications Contest, an ITU Regional Competition for the Americas, which judged creativity, development and user experience of the app.

For more information: <http://digitalinclusionnewslog.itu.int/2016/10/04/a-mobile-app-gives-deaf-people-a-sign-language-interpreter-they-can-take-anywhere/>.

Brazil: The operators must publicize accessibility features for hearing impaired (like subtitles and messages options), for visually impaired (like screen reader, audio description, beeps, scanner, text-to-speech), for motor impaired (like voice recognition, voice reply, autotext) and for cognitive impaired (like voice recognition, text prediction), according to RGA's Article 9º.

Brazil: The GRA establishes that there must be channels for accessible communication by Internet, with professional interpreters talking in Libras (the Brazilian language of hearing impaired people) to assist people with hearing impairments (RGA's Article 8º, VI).

Brazil: Fixed and Mobile Telephony companies must offer a Communication and Intermediation Central (CIC) with interpreters in Libras for persons with hearing disabilities, able to receive video calls, besides message communication. The service will be free of charge and available twenty-four hours a day (RGA's Article 14).

Mexico: Towi is a technological platform meant to develop the learning abilities of children with disabilities through videogames in a computer or tablet. The platform initially assesses the cognitive profile of the child taking into account a test of the child and a questionnaire answered by her parents. This initial assessment allows that each child has her own route based on her requirements. The platform collects different metrics as response time, number of achievements, types of errors, level of accurateness, etcetera. Such information may also be consulted by parents, teachers and other professionals. Towi platform has undergone scientific validation, which provides elements for having it as a tool for assessing children's cognitive status. Among the advantages is that the platform reduces time of testing and is automated. Towi was created by students from Universidad Panamericana within a Microsoft contest (Imagine Cup). Further support for Towi App was provided by Wayra, an entrepreneur initiative of Telefonica. Currently Towi is being assessed by a group of experts in neurological and psychiatry sciences.

For more information: <http://www.towi.com.mx>.

Mexico: In alliance with the Mobile Manufacturers Forum, the Federal Telecommunications Institute from Mexico created a website where the users can find mobile handsets with accessibility functionalities according with their needs.

For more information: <http://movilesaccesibles.ift.org.mx>.

United States of America: Apple released a new website promoting the different accessibility features embedded on some of its main products. The Apple Accessibility website shows a set of videos explaining how different devices can be used by PwD. The website is divided into five main sections targeting vision, hearing, mobility and other disabilities. It also includes a section for learning needs and inclusive education.

For more information: <http://digitalinclusionnewslog.itu.int/2016/11/15/new-website-promotes-apple-accessibility-features/>.

United States of America: Google launched in March 2016 a tool to help Android developers create more inclusive apps. The new Accessibility Scanner checks applications and suggests potential improvements to suit the needs of the users, such as enlarging touch targets, changing colours and other things. The tool is easy to use and it only requires clicking a button to search through the app and find gaps for accessibility improvements. Since the Accessibility Scanner does not require any technical skills, it is recommended for developers who may wish to check if their designs are accessible. It is also suitable for users to perform scans that will indicate the level of accessibility of the application and thus, the user may further request where necessary its access in an accessible format.

For more information: <http://digitalinclusionnewslog.itu.int/2016/04/05/new-accessibility-scanner-for-android-app-developers/>.

United States of America: Accessible Communication for Everyone (ACE) (VTC-Secure, and the FCC United States) is a free, cutting-edge solution that helps to solve fundamental communication challenges. With the aim to create an open source, the standards-based software also allows for groups all over the world, such as governments, universities, non-profit organizations, crowdsource communities, and even private individuals to modify, improve, secure and redistribute the software to large numbers of users, while still maintaining interoperability with each other.

1.4 Television/video programming accessibility

Brazil: Film Festival devoted to films and audio-visual contents in connection with disabilities. In 2015 the Film Festival received many films regarding autism, persons with Down syndrome and intellectual impairments. Consequently, the theme for 2015 was autonomy and the possibility of independent living. Assim Vivemos is accessible both from a physical perspective to the forum and also through audio description, closed caption. The debates during the festival, were provided with sign language interpretation. Assim Vivemos is organized by the Ministério da Cultura from Brazil with the sponsorship of *Banco do Brasil*.

For more information: www.assimvivemos.com.br.

Canada: The Broadcasting Accessibility Fund is a unique independent program approved by the Canadian Radio-television and Telecommunications Commission (CRTC) in 2012. Its main role is to “support and fund innovative projects that provide platform-neutral solutions to promote accessibility of all broadcasting content in Canada”. The Fund announced an award of \$723,500 dollars in grants to be divided between seven projects on accessibility broadcasting chosen by the Board of Directors. By investing in these initiatives, the Canadian government aimed at promoting innovative and cost-effective solutions that use technology to ensure equal content access for PwD.

For more information: <http://digitalinclusionnewslog.itu.int/2016/02/09/broadcasting-accessibility-fund-enables-inclusive-access-to-audiovisual-contents-in-canada/>.

Since 1995, the **Canadian Radio-television and Telecommunications Commission** (CRTC) has mandated some level of closed captioning. In 2007 that requirement became 100 per cent operational in English and French-language programming. In 2011 and 2012, quality standards for closed captioning in French and English programming, respectively, were put into place. Since 2001, certain amounts of described video – the narrated description of a program’s main visual elements, such as settings, costumes, and body language – has been required. As of September 2019, the amount of described video that will be available to Canadians is expected to increase significantly.

Brazil/Canada/Colombia/United States of America: There are several film festivals around the world for portraying disability culture, promoting films in the most accessible way, delivering films produced by PwD. Examples of such festivals are: Canada Calgary’s “Picture This”, Brazil, Assim Vivemos, New York’s “Sprout” festival and “Smartic” and “Inclucine” in Colombia. All of them foster the creation of content and short films by PwD.

For more information: <http://otherfilmfestival.com/>.

Colombia: “*El Movimiento*” is a non-for-profit project that produces audio-visual contents that are accessible. Persons with different types of disabilities are involved along the production process. For example, blind persons and persons with low vision participate in the verbalization of dialogues and other non-visual elements to provide also audio description. Persons with hearing disabilities are involved in filming as camerapersons and also help in translating into sign language all the audio elements of the movies.

For more information: <https://www.facebook.com/El-Movimiento-914281131998845/>.

Colombia: “*Cine para Todos*” uses an application named WhatsCine. Through the use of tablets and glasses the app allows a person with visual or hearing disability, to enjoy a movie jointly with family

and friends. This project provides audio description in Spanish, which enables persons with visual impairments to listen all the key visual elements of the movie. The movies also have subtitles in Spanish to benefit persons with a hearing disabilities. "Cine para Todos" is free in selected days and makes available staff for PwD assistance if required. This project was launched by the Ministerio TIC, Fundación Saldarriaga Concha, a non-for-profit organization, and Cine Colombia.

For more information: www.vivedigital.gov.co/cineparatodos.

Colombia: The relay centre takes advantage of several ICTs in order to provide different communication services to deaf, hard of hearing and persons with language disabilities in Colombia. Since 2001 the relay centre has evolved and currently provides: (1) relay services by means of a chat either through text or video; (2) online service of translation from and to sign language through a device with Internet connection and speakers; (3) a tool and a forum that purports to enable Colombians to appropriate ICTs both through sign language and written language; and (4) training to be a sign language interpreter. The relay center is operated by the Federación Nacional de Sordos de Colombia (FENASCOL) sponsored by the Ministerio de Tecnologías de la Información y las Comunicaciones (MinTIC). For more information: www.centroderelevo.gov.co.

Germany: VerbaVoice app, cost-effective solutions to remove barriers to spoken communication on television and the Internet. The VerbaVoice app is a communication aid for hearing impaired people, which makes spoken language accessible as live text and /or sign language video. The combined use of the Interpreters Telepresence System (ITS) developed by VerbaVoice for live events and TV broadcast poses further opportunities to provide full inclusion for people with hearing, visual or mobility impairments.

Japan developed profiles for IPTV (Internet Protocol TV) in line with ITU-T H.702 standard. This software is included in a separate "set of box" and can provide open and close captioning, change colour of captions and backgrounds, include sign language interpretation in an additional window, as well as captioning in up to three languages.

United States of America: In order to provide users with accessible Television contents, the United States' Federal Communications Commission (FCC) adopted a series of amendments to its Closed Captioning rules for televised video programming. The document recognizes which institutions are responsible for the delivery of the captions, provides guidance for implementation and explains the accountability mechanisms.

For more information: <http://digitalinclusionnewslog.itu.int/2016/04/13/closed-captioning-improvements-to-provide-accessible-video-programming-in-us/>.

1.5 Web accessibility

Argentine Republic: The Ministry of Seniors from Buenos Aires, Argentina in collaboration with the Ministry of Smart City organized an "Ideatón" event with the purpose of providing seniors with digital skills. A group of seniors were in charge of guiding the working teams to enhance and evaluate the solutions. All of the teams presented their ideas to a jury and the best ones were selected to be further developed with the support of the government.

For more information: <http://digitalinclusionnewslog.itu.int/2016/10/24/algarrobo-abuelo-will-provide-access-to-digital-technologies-for-seniors-in-san-luis-argentina/> and <http://digitalinclusionnewslog.itu.int/2016/06/23/argentinas-ideaton-to-promote-accessible-design-for-enabling-seniors-to-go-digital/>.

Argentine Republic, Uruguay, United States of America and Mexico: Web accessibility is impossible to achieve if developers and content creators do not know how to implement the web content accessibility standards. Universities and organizations in Argentina, Uruguay and the United States of America are offering training in web accessibility related issues.

Brazil: The Brazilian Web Accessibility Recognition Program, Todos@Web, seeks to increase awareness of the need of PwD to access websites by encouraging website developers and by granting awards to individuals and enterprises. There are three categories for awards under this program, namely, (i) for individuals/enterprises that implement actions to promote web accessibility, (ii) for web projects that follow W3C standards and are creative and usable, and (iii) for apps and assistive technologies developed for non-profit and with open code. This project is led by the Brazilian Comitê Gestor da Internet in partnership with W3C Brazil and other Government entities. For more information: <http://www.ceweb.br>.

Brazil: The RGA's article 8º requires that all information provided by the operators in their websites, as well as in any other communication channel, must be in an accessible format, showing functionalities like text-to-speech, large print, apps for translation, among others. ANATEL requested operators to use World Wide Web Consortium (W3C)'s standard for accessibility on web site.

Chile: The Chilean government presented in March 2015 the "Technical Norm about State Systems and Web Sites." The main objective of this regulation is to standardize the creation of accessible systems and web pages that allow PwD to equally interact with public services. It also requires government web sites to be designed and developed to guarantee full accessibility.

For more information: <http://digitalinclusionnewslog.itu.int/2016/03/10/web-accessibility-ruling-for-government-institutions-in-chile/>.

Colombia: The government of Colombia has been training web developers in Web Content Accessibility Guidelines and is revising the accessibility of more than 500 websites.

Costa Rica is one of the first countries to be trained by ITU-D on how to develop web accessibility policies and accessible websites, within a capacity building model that also includes creation of a specific fund for promoting the appropriation of ICTs by persons with disabilities. Beside, policy makers also participated at the training to ensure that Costa Rica government websites are accessible for ALL, including persons with disabilities.

Ecuador: The Ecuadorian government together with the Universidad Politécnica Salesiana developed an accessibility analyzer an online free tool that helps to identify accessibility problems in websites according to the Web Content Accessibility Guidelines.

For more information: <http://observatorioweb.ups.edu.ec/oaw/index.jsf>.

Mexico: In November 2015, at the "Accessible Americas II: Information and Communication for ALL" event in Medellin, the International Telecommunication Union (ITU) provided regional leaders with training on web accessibility policies. The workshop encouraged eliminating the barriers faced by PwD when accessing webpages. The policy framework suggested by ITU is to support governments in developing accessible digital platforms to provide equal services for PwD. Recommendations include: follow international web accessibility standards; Identify and evaluating government websites and train web designers and encouraging private entities to elaborate accessible content. To encourage such developments Telefonica Mexico and start up accelerator Wayra have partnered with HearColors to teach Mexican developers how to create accessible web content.

Latest Mexican developments: <http://digitalinclusionnewslog.itu.int/2015/12/15/latest-mexican-developments-on-accessibility-and-icts/>.

Mexico: Web accessibility points (Puntos de Accesibilidad Web, PAW) is a project that creates laboratories in universities whereby students are first introduced to digital inclusion. Then students are trained with a special methodology so that they are able to perform website assessments pursuant to W3C accessibility standards. The first laboratory was opened at the Instituto Tecnológico Autónomo de México in November 2015, the second opened at the UNAM in November 2016, the biggest public university in Mexico. This project has been created and is being implemented by HearColors, which is an entity who aims to promote accessible websites through different actions and projects.

For more information: www.hearcolors.com.mx.

Spain is one of the most outstanding countries in Europe in terms of accessibility of public sector portals and websites. In order to ensure that all its citizens, regardless of disability or age, enjoy full access to e-services provided by the public administration, Spain over the last few years, by implementing laws and standards and through appropriate policy follow-up and evaluation measures, has created the right scenario for promoting the use of ICTs based on the principles of accessibility, non-discrimination, usability and “design for all”.

United States of America: Real-time text (RTT) is a text-based mode of communication about where each text character appears on the receiving device at roughly the same time it is typed on the sending device character by character, allowing for a conversational flow of communication, simultaneously with voice. RTT is the Internet Protocol (IP)-based, functionally equivalent successor to TTY technology, (which also used real-time text over the PSTN) that makes telephone service accessible to individuals with hearing and/or speech disabilities. ITU-T standard T. 140 is still being used for the new version of RTT.

United States of America: During the last International Technology and Persons with Disability Conference in 2016, different companies presented their solutions for targeting the needs of PwD. Some of the new products that were presented included the Orbit Reader, which is a note taker with an eight-dot display where users can type. Other options were BrailleNote Touch by HumanWare that provides a touchscreen that determines where the user’s fingers are on the screen and figures out the dot combination the user inputs.

United States of America: Web Accessibility Toolkit for Research Libraries project aims at helping research libraries achieving digital accessibility by connecting research libraries with tools, peoples and examples. The project commits to making digital resources usable and accessible in research libraries. The toolkit provides explanation of standards, best practices, principles, as well as a step-by-step process to making an institution accessible. The toolkit was developed by a program of the Library of Congress in partnership with the Institute of Museum and Library Services. (www.accessibility.arl.org).

United States of America: The Social Media Accessibility Policy Toolkit intends to help government agencies evaluate the accessibility of their social media programs, identifying areas for improvement, and provides an environment to share ideas and recommendations. This toolkit is a joint effort by US government agencies, which is enriched by collaborators and users both from public and private sector that share best practices for social media accessibility for public service. The toolkit provides reference to main social media, tips, examples and best practices. The toolkit is a living document, which enables it to be easily updated.

For more information: <https://www.digitalgov.gov/resources/improving-the-accessibility-of-social-media-in-government/>.

United States of America: Facebook uses artificial intelligence to address the needs of PwD. Facebook’s automatic alternative text (Alt text) or image descriptions are generated with object recognition technology that determines the main objects that appear in a picture. This list is read to the users when they watch images on their newsfeeds: “Image may contain people, smiling, outdoors”.

For more information: <http://digitalinclusionnewslog.itu.int/2016/04/19/facebook-uses-artificial-intelligence-to-address-the-needs-of-persons-with-vision-disabilities/>.

United States of America: According to Twitter’s blogpost from March 29, 2016, a new accessibility feature has been added to the application in order to “empower customers and publishers to make images on Twitter accessible to the widest possible audience.” This new functionality allows users to add descriptive information or alternative text (alt text) to the images they tweet so that it can be picked up by mobile assistive technologies that support persons with vision disabilities.

For more information: <http://digitalinclusionnewslog.itu.int/2016/04/18/new-feature-in-twitter-for-persons-with-vision-disabilities/>.

1.6 Accessible ICT public procurement

Brazil and **Mexico**: The Mexican Public Function Ministry, in charge of all the procurement policies, has signed a Memorandum of Understanding (MoU) with G3ict to incorporate accessibility obligations in the government procurement policies. Brazil, specifically the Sao Paulo Government, has also been working closely with this organization.

1.7 Other ICT accessibility projects

Argentina developed a digital library Tiflolibros (one of four digital libraries in the world as stated by the UN) for people with visual impairment through cellular devices. Tiflolibros ensures access only for users with a visual impairment. Tiflolibros users can access the database of books and obtain the desired titles and then listen to them on their mobile phones.

Brazil: ANATEL will disclose a comparative classification of the operators, according to their actions for promoting accessibility. A performance index will be created by ANATEL aiming to improve telecommunication services for PwD (RGA's Art. 32).

Colombia: Ayudas para Todos is an accessible assistive technology provided by a non-for-profit organization, which is committed towards providing accessible assistive technologies for different types of disabilities, at a very low cost. This project identifies a need of a person with disability and provides an alternative solution to commercially available technologies, using ordinary and low cost materials. It also delivers training to schools, communities and interested groups to demonstrate how assistive technologies may be created by anyone and at a very low cost and may provide the needed usable device to the PwD. "Ayudas para Todos" website shares for free over 10,000 resources meant to enable PwD perform their activities without barriers. It also shows how to access and use open source software. This project has received support from public institutions and operators. For more information: www.ayudasparatodos.org.

Côte d'Ivoire: Schooling for children with disabilities in **Côte d'Ivoire** has made it necessary to set up specialized institutions such as the *École Ivoirienne pour les Sourds* and the *Institut National pour la Promotion des Aveugles (INIPA)*, located in the commune of Yopougon, along with the private establishments *Plage Blanche* in Deux Plateaux and the NGO *Fraîche Rosée* in Cocody Mermoz. The mission of the *École Ivoirienne pour les Sourds* is to teach deaf children and young people to read and write and provide them with training conducive to facilitating their social integration. The school has a computer room provided by a telephone operator and the pupils receive IT training. The mission of the *Institut National pour la Promotion des Aveugles (INIPA)* is to teach the visually impaired to read and write and provide them with training conducive to facilitating their social integration. The school has made it possible for visually impaired people to pursue advanced studies. Some study in all areas of activity. The school has a computer room provided by a telephone operator and the pupils receive IT training. Open source software is used. *Page Blanche* is a specialized institution in Cocody Deux Plateaux, Abidjan, which takes in children and young people with intellectual disabilities. The school introduces the children to the use of IT.

United Kingdom: "FRED AT SCHOOL" (Sub-Ti) is a creative and innovative educational project whose primary goal is to enhance film literacy among young audiences (secondary school students). It is a completely inclusive project, which fully caters for the needs of young persons with sensory impairments. FRED at school is currently implemented in secondary schools in eight European countries and can be extended and customised to different countries and cultures.

United States of America: Through ICanConnect.org persons with certain disabilities and low income can acquire assistive technology.

United States of America: Cooperative Understanding promotes the cross-combination of ideas, cultures, backgrounds, and perspectives, while empowering employees of all different abilities to achieve meaningful success. It brings about a strengths-minded corporate culture that appreciates and values all employees for what they contribute to the team, without scrutinizing how they perform their work. Achieving “Harmony at Work” through “Cooperative Understanding” is conducive to diversity, inclusion, productivity, and innovation as it focuses on what works well and continuously builds on those successes to make all aspects of the organization work even better for everyone.

For more information: <http://www.helixopp.com/cooperative-understanding.html>.

Annex 2: Resources and tools

Available resources and tools for ensuring promotion and implementation of telecommunications and ICT accessibility policies, strategies and guidelines:

- Model ICT Accessibility Policy Report – (Arabic, Chinese, English, French, Russian, Spanish, e-book version) – Accessibility of PDF report checked and edited by BarrierBreak.
- Making mobile phones and services accessible.
- Making TV Accessible.
- Online training for Public Procurement Products and Services (available through ITU Academy) <https://www.itu.int/en/ITU-D/Regional-Presence/Europe/Pages/Events/2015/OnlineTraining/OnlinetrainingonPublicProcurementofaccessibleICTproductsandservices.aspx>.
- On-line training course on Audio-Visual Media accessibility (available through ITU Academy) <https://academy.itu.int/index.php?lang=en>.
- G3ict: e-Accessibility Policy Toolkit for PwD <http://www.e-accessibilitytoolkit.org/>.

Additional sources on accessibility for enabling an inclusive society

a) Accessibility Resolutions

- 1) ITU Plenipotentiary Conference Resolution 175 (Rev. Busan, 2014).
- 2) ITU Plenipotentiary Conference Resolution 144 (Rev. Busan, 2014).
- 3) ITU-T WTSR Resolution 70 (Rev. Hammamet, 2016) –Telecommunication/information and communication technology accessibility for PwD.
- 4) ITU-D WTDC Resolution 58 (Rev. Dubai, 2014) – Telecommunication/information and communication technology accessibility for persons with disabilities, including persons with age-related disabilities.
- 5) ITU-R Resolution 67 Geneva 2015 of RA, Recommendation ITU-R M.1076 - Wireless communication systems for persons with impaired hearing.

b) Accessibility terms and definitions

- 1) ITU-T F.791: Accessibility terms and definitions.

c) Guidelines

- 1) Accessibility guidelines
 - ITU-T Recommendation F.790: Telecommunications accessibility guidelines for older persons and PwD.
- 2) Guidelines for supporting remote participation in meetings for all - technical paper ITU-T 2015 – FSTP-ACC-RemPart – Guidelines for supporting remote participation in meetings for all.
- 3) Guidelines for accessible meetings – technical paper
 - ITU-T 2015 – FSTP-AM – Guidelines for accessible meetings.
- 4) Accessibility check List-technical paper
 - ITU-T 2006 – FSTP-TACL – Telecommunications Accessibility Checklist (Guide for addressing accessibility in standards).
- 5) Accessibility profiles for IPTV systems recommendations
 - ITU-T H.702: Accessibility profiles for IPTV systems.

d) Useful links

- 1) ITU Useful links: <http://www.itu.int/en/action/accessibility/Pages/hlmd2013.aspx>.
- 2) ITU-D: <http://www.itu.int/en/ITU-D/Digital-Inclusion/Persons-with-Disabilities/Pages/Persons-with-Disabilities.aspx>.
- 3) ITU-T: <http://www.itu.int/en/ITU-T/accessibility/Pages/default.aspx> and <http://www.itu.int/en/ITU-T/studygroups/2017-2020/16/Pages/default.aspx>.
- 4) ITU-R: <https://www.itu.int/net/ITU-R/index.asp?category=information&mlink=disabilities-divide&lang=en>.
- 5) ITU-T Recommendation V.18: Operational and interworking requirements for DCEs operating in the text telephone mode.
- 6) ITU-R Resolution 67: Telecommunication/ICT accessibility for PwD and persons with specific needs.
- 7) ITU-T Recommendation F.790: Telecommunications accessibility guidelines for older persons and PwD.
- 8) Resolution ITU-R 9-5: Liaison and collaboration with other relevant organizations, in particular, ISO and IEC.
- 9) ITU-R Question 254/5: Operation of short-range radiocommunication public access system supporting hearing aid systems.
- 10) ITU-T Recommendation F.703: Multimedia conversational services.
- 11) Technical Paper ITU-T FSTP.ACC-RemPart "Guidelines for supporting remote participation in meetings for all".
- 12) Third Party Captioning and Copyright: https://www.google.ba/search?q=Third+Party+Captioning+and+Copyright+white+paper&ie=utf-8&oe=utf-8&client=firefox-b&gws_rd=cr&ei=ikmkV-eHFcGtaeCukMAI.

Annex 3: Accessibility related to other ITU groups and ITU-D cooperation with other organisations

ITU Council Working Groups – During the Council Working Groups accessibility was recognized and included in the Group on Child online Protection (COP), and the WSIS Forum 2015. For Child Online Protection, the Council Resolution 1316 was changed to include children with disabilities. Study group Q7/1 “Access to telecommunication/ICT services by PwD and with specific needs” closely coordinates its activities with Study group Q4/2 “Human factors related issues for improvement of the quality of life through international telecommunications”, Study group Q1/12 “ SG 12 work programme and QoS/QoE coordination in the ITU”, Study group Q26/16 Accessibility to Multimedia systems and services, as well as with JCA-AHF.

Joint Coordination Activity on Accessibility and Human Factors (JCA-AHF) – The JCA-AHF coordinates the accessibility work in all the sectors, ITU-T, ITU-R and ITU-D, advises the ITU Secretariat, establishes and maintains contacts outside group including the UN, other UN agencies, other standards bodies, SDOs and NGO’s regarding accessibility work to assist, educate raise awareness and prevent duplication of work. It operates under the ITU-T Telecommunication Standards Advisory Group (TSAG).

Cooperation with other organizations

World Federation of the Deaf (WFD) – It discusses the needs of people who are deaf on a global basis and specifically sign language, deaf and deaf-blind education, deaf teachers and deaf interpretation of children books and remote captioning in the classroom.

European Disability Forum – an umbrella for European disability NGOs, plays a crucial role in accessibility policy advocacy. In its work, the Forum applies a “*twin track*” approach which refers to having to work both on disability-specific legislation and regulation as well as with mainstreaming accessibility. Advocacy is also underway for the Sustainable Development Goals that will be on the agenda until 2030 with the aim to have a disability into those goals.

European Federation of Hard of Hearing (EFHOH) – It is a non-profit European non-governmental organization consisting of/for hard of hearing and late deafened people, parent organizations and professional organizations at a European level in dialogue with the European Union, the Members of the European Parliament, and other European authorities.

European Commission – Horizon 2020 – a work programme for the years 2016-2017 in the area of information and communication technologies concerning accessibility, development and advancement of accessibility solutions specifically for Converging Media and Content. It may include technologies for captioning, sign language, and descriptive language, an automatic graph representation of characters, automatic translation, and adaptation, and personalized setup in an accessibility scenario.

The Global Initiative for Inclusive ICTs (G3ict) – an active member of ITU-D and ITU-T submitted a whitepaper to WIPO on the reasons that the third party is captioning had the same validity for the deaf community as the WIPO Marrakesh Treaty did for the blind community re the ability to listen to books and publications without violating copyrights.

Dynamic Coalition on Accessibility and Disability (DCAD) and **Internet Governance Forum (IGF)** –DCAD facilitates interaction and ensures that ICT accessibility is included in the key debates around Internet Governance to build a future where all sectors of the global community have equal access to the Information Society.

World Health Organization (WHO)’s ‘Make Listening Safe’ initiative is one of the activities of the WHO initiative is to get the manufacturers of these devices on board to create good listening practices and have a common vision for the promotion of safe listening habits amongst users. ITU-T Q.26/16 (Accessibility to Multimedia systems and services), has partnered with WHO to create new standards that might help reduce the threat of hearing loss.

Global Initiative for Inclusive Information and Communications Technologies (G3ICT) to ITU-R Working Party 5D (WP 5D) (IMT System) – In the area of accessibility it raises awareness that certain spectrums can become overloaded especially those that are Short Range Devices (SRDs) and that can subsequently cause malfunctions by interference and even stop working due to blockage to their use, which can cause hardship to PwD who use Assistive Listening Devices (ALDs).

Annex 4: Technology trends of relay services, international standardization trends in line with ITU-T

When performing communication service between transmission and reception through the network, to ensure interoperability between them, there is a need for a consistent the common interface. International standardization could make it possible to connect the different manufacturers' equipment and services as well as eventually making it possible for international relay services.

ITU-T Study Group 16 is the Lead Study Group on Accessibility and Multimedia Systems and Applications, is responsible for work on Accessibility standardization for PWDs. There are two types of processes for writing accessible standardization. One is creating accessibility standards that stand alone for the sole purpose of accessibility, and the other is writing standards that mainstream Accessibility Features into all standards that need to have access created for Persons for persons with disabilities

In Q26/16 "Accessibility to Multimedia Systems and Services", continues ITU-T's international in standardization work on accessibility which was originally pioneered in the 1990s in CCITT SG17 with the first Accessibility standard called ITU-T V.18. This Recommendation f harmonizes the various protocols of different the text phones to allow back to back communication in previously incompatible textphones thus providing the possibility of international communication if V.18 was placed in the gateways to give transparently to the user interoperability. Sadly, service providers did not implement this standard except Great Britain in its Relay Service Platform

Since 2000, SG16 g has been working with multimedia and to have standardization include accessibility features. The role of the ITU-T SG16 Q26/16 (Accessibility to Multimedia systems and services) has continued to the present day to expand the work on accessibility based on a "multi-media systems and services". Also, through the JCA-AHF (Joint Coordination Activity on Accessibility and Human Factors) which establishes cooperation in all standardization work all other Study Groups in the ITU-T but also with the Study Groups, of ITU-D and ITU-R., JCA-AHF also has the mandate to work with outside groups like, ISO / IEC JTC1, CENLEC, ETSI, and other UN Agencies and various disability organizations.

Challenge for the relay services

- 1) In the relay service, from being relayed by a person or a machine in the network, ensuring the transparency of information is important. The service provider, rather than being considered a third party for relay service call, it is necessary that the transmission pipe.
- 2) In the Business Operators and Interpreters, a guarantee of confidentiality of the call, preventing leakage of personal information, it is important.
- 3) The introduction of the IP access to the relay service, consideration should be given to the pre-registration system from the fact that easy to induce the unauthorized use.
- 4) Sign language interpreters to ensure the quality, the need for training, to cope with the increase of traffic, consideration of a system that the sign language interpreter can be secured 24 hours (for example the avatar, the introduction of the anime). At the time of introduction in France, there is a case where there was the use of the 30,000 call in the business time zone. Sign language interpreters to ensure the quality, the need for training, to cope with the increase of traffic, consideration of a system that the sign language interpreter can be secured 24 hours (for example the avatar, the introduction of the anime). At the time of introduction in France, there is a case where there was the use of the 30,000 call in the business time zone. This issue will be solved by "Sign Language CG" developed by the NHK Broadcasting Technology Research Institute. In this technology, one word is taken with the actual sign language movement (motion capture) converted into computer graphics (CG) is. Currently about 7,000 words are created and. 90% of sign language were comprehensible at evaluation test. Furthermore, as an extension of Recommendation F. 703, future direction was indicated in textual in the network, dialogue system between different sign languages that media exchanges (voice, sign language, Braille, etc.) are performed on terminals for transmission and reception.

5) For the introduction of video relay services, following points are necessary.

- Ensure the band at the time of broadband services;
- Ensure interoperability of devices;
- Terminal is valid signal for a particular call;
- It is possible to specify a particular type of relay service.

As a necessary technology of video relay services for deaf, touch screen, text function, visual alarm function, high-quality video display function are required.

6) On the introduction of the video relay service

- Lack of upstream band at the time of broadband services;
- Interoperability of the device;
- Terminal is useful signal for a particular call;
- It is possible to specify a particular type of relay service;
- Touch screen, text function as a technology necessary for the video relay service of deaf, visual alarm, high-quality video, etc.

7) Other

- Relay service to call the operator without special prefix of emergency;
- Funding for accessibility services development for the deaf;
- Relay services SMS and Instant Messaging technology during the system delay, but also including QoS related the performance evaluation or the like.

The relay system such as TRS and VRS used to communicate with PwDs are currently studied regarding standardization in ITU-T SG16.

With regards to voice communication, video communication, facsimile communication, in the telecommunications digital transmission system, **Japan** is aiming at achieving a high-speed, high-quality communication by redundancy compression coding and low error rate of the information signal. Meanwhile, the conversion of the information media in the ICT accessibility is transmitted by converting the semantic content of the information itself. Currently, the conversation between those with hearing disabilities it is carried out at a relay service by text or video through the interpreter in the middle of the communication link (TRS/VRS). Therefore, by converting the sign language operation to the audio or text (or vice versa), it is necessary to match the receiving function of the communication partner. Such relays services and mechanisms have already been implemented as separate systems in some countries beside Japan.

In regard to accessibility of services destinations in emergencies for PwD, **Japan** proposes two methods: one is directly intended to operate the mobile phone/smartphone and how to access the emergency center, while the other is cut out a part of the operation unit of the mobile phone, with a button in the vicinity of the ornaments of the body, is a method of pressing the button in the emergency situations.

Annex 5: List of contributions received for consideration by Question 7/1 during the 2014-2017 study period

These are the contributions received for consideration by Question 7/1.

Question 7/1 contributions for Rapporteur Group and Study Group meetings

Web	Received	Source	Title
1/469	2017-03-17	Japan	Proposal on the Question for access to telecommunication/ICT services for ageing persons
1/443	2017-01-16	Rapporteurs for Question 7/1	Report of the Rapporteur Group meeting on Question 7/1, Geneva, 16 January 2017
1/430	2017-02-14	Côte d'Ivoire (Republic of)	Provisions relating to access to telecommunication/ICT services by persons with disabilities in the licence conditions of mobile telephony operators in Côte d'Ivoire
1/422	2017-02-14	BDT Focal Point for Question 7/1	Report on BDT Activities since the last Rapporteurs Group on Q7/1 meeting
1/418 [OR]	2017-02-10	Rapporteur for Question 7/1	Final Report for Question 7/1
1/401	2017-01-31	Spain	Accessibility: A reality in Spain's e-Administration
1/397 Ann.1	2017-01-31	Centre for Internet and Society (CIS) (India)	Accessible ICTs for persons with disabilities: Addressing preparedness
RGQ/305	2016-12-08	Senegal (Republic of)	Accès des personnes handicapées et des personnes ayant des besoins particuliers aux services de télécommunication/TIC
RGQ/304 Ann.1	2016-12-08	BDT Focal Point for Question 7/1	Good practices and achievements in ICT Accessibility in the Americas Region (Guidelines and Recommendations)
RGQ/293	2016-11-25	Japan	Refinement for the draft final Report of Q7/1 on accessibility
RGQ/289	2016-11-24	Côte d'Ivoire (Republic of)	Using telecommunications/ICTs to provide autonomy to persons with disabilities in Côte d'Ivoire
RGQ/285	2016-11-24	BDT Focal Point for Question Q7/1	Report on BDT activities since the last Question 7/1 meeting
RGQ/271 [OR]	2016-11-14	Rapporteur for Question 7/1	Draft Final Report for Question 7/1
1/369	2016-09-07	Korea (Republic of)	ICT Accessibility for people with disabilities in Korea
1/367	2016-09-07	Universidad Nacional de La Plata (Argentine Republic)	Project HERMES: An alternative and augmentative digital communicator for people with ASD (Autistic Spectrum Disorders)

Web	Received	Source	Title
1/366	2016-09-07	Universidad Nacional de La Plata (Argentine Republic)	eQUINO: a Videogame that complements equine-Assisted therapies and activities for persons with disabilities
1/338	2016-08-05	Mexico	Intercambio de información sobre indicadores relativos al acceso de las personas con discapacidad a los servicios de telecomunicaciones y TIC
1/335	2016-08-05	Brazil (Federative Republic of)	General Regulation on Accessibility Rights of Telecom Services
1/328	2016-08-05	G3ict	Addition to the Question 7 report section Cooperation with other organizations under Third Party Captions, and Copyright
1/326	2016-08-05	Côte d'Ivoire (Republic of)	Accès des personnes en situation de handicap aux télécommunication/TIC en Côte d'Ivoire
1/315	2016-08-05	Japan	Requirements at the time of emergency
1/314	2016-08-05	Japan	Requirements for the persons with disabilities in the International Telecommunication system
1/299	2016-08-04	BDT Focal Point for Question 7/1	Report on BDT activities, event and meetings in area of ICT accessibility
1/272	2016-07-22	Guinea (Republic of)	Methodological approach for rehabilitating disabled people through information and communication technologies (ICTs): the case of Guinea
1/269	2016-07-20	Kenya (Republic of)	ICTs for persons with disabilities initiatives in Kenya
1/261 [OR]	2016-07-08	Rapporteurs for Question 7/1	Draft Report of Question 7/1
1/247	2016-04-04	Rapporteurs for Question 7/1	Report of the Rapporteur Group meeting on Question 7/1, Geneva, 4 April 2016
RGQ/184	2016-03-07	Universidad Nacional de la Plata	eQUINO: a Videogame that complements equine-Assisted therapies and activities for persons with disabilities
RGQ/183	2016-03-07	Universidad Nacional de la Plata	RAICES: a serious game to give new value to native cultures in Argentina
RGQ/174	2016-03-04	Universidad Nacional de La Plata	Project HERMES: An alternative and augmentative digital communicator for people with ASD (Autistic Spectrum Disorders)
RGQ/173	2016-03-04	Universidad Nacional de La Plata	Rule-Based Web Accessibility Intensive Analyzer
RGQ/150	2016-02-16	Telecommunication Development Bureau	Making ICTs and mobile phones accessible for PwD

Web	Received	Source	Title
RGQ/144 +Ann.1	2016-02-16	BDT Focal Point for Question 7/1	Television/video programming accessibility policy framework
RGQ/143 +Ann.1	2016-02-16	BDT Focal Point for Question 7/1	Web accessibility policy framework
RGQ/142	2016-02-16	Mali (Republic of)	Access to ICTs by persons with disabilities
RGQ/140 +Ann.1	2016-02-15	BDT Focal Point for Question 7/1	Accessible mobile phones and service
RGQ/135	2016-02-05	BDT Focal Point for Question 7/1	Report on BDT activities, event and meetings in area of ICT accessibility
RGQ/132	2016-01-29	Senegal (Republic of)	Access to telecommunication/ICT services by persons with disabilities and persons with specific needs
RGQ/131 +Ann.1	2016-01-21	Mali (Republic of)	Access to ITCs for persons with disabilities
RGQ/123	2015-09-11	Mexico	Actions to benefit telecommunication service users in Mexico
1/226 +Ann.1	2015-09-02	AT&T	Accessible Communications and Real-Time Text (RTT)
1/222 +Ann.1	2015-09-01	Japan	Proposal for ensuring interoperability for Accessibility
1/205	2015-08-26	Intel Corporation	ICT in education for persons with disabilities and with specific needs
1/204	2015-08-25	Korea (Republic of)	ITU-T and Other SDO's Standardization Activities on e-Learning, Speech and Language Technologies Related with Accessibility
1/185 +Ann.1-2	2015-08-10	BDT Focal Point for Question 7/1	Fred at school
1/184 +Ann.1	2015-08-07	BDT Focal Point for Question 7/1	Broadcast and beyond: Live access services anywhere, through HbbTV and LiveCap Glasses
1/180 +Ann.1	2015-07-24	G3ict	Contribution of G3ict - The Global Initiative for Inclusive Information and Communications Technologies to the Working Party 5D (WP 5D) – IMT System
1/179	2015-08-03	United States of America	ICTs, Employment, and Persons with Disabilities
1/178	2015-08-03	United States of America	USA National Deaf-Blind Equipment Distribution Program
1/173	2015-07-31	BDT Focal Point for Question 7/1	Advancing communication technology for those with disabilities

Web	Received	Source	Title
1/152	2015-07-29	BDT Focal Point on Question 7/1	BDT Report to the Study Group 1 Question 7 "Access to telecommunication/ICT services by persons with disabilities and with specific needs"
1/143	2015-07-24	G3ict	Evolution of accessibility features available on mobile devices as presented at the M-Enabling Summit 2015 in Washington, DC
1/135	2015-07-20	Bosnia and Herzegovina	Information on the Expert Group Meeting on the "Accessible TV in Converged ICT Ecosystem: Emerging trends, challenges and opportunities"
1/119 +Ann.1	2015-06-23	G3ict	G3ict third party captioning and copyright
1/118 +Ann.1	2015-06-23	G3ict	DCAD Accessibility Guidelines 2014, accessibility and disability in IGF meetings
1/117	2015-07-13	G3ict	Protection in Spectrum Management for Assistive Listening Devices (ALDs) for persons with disabilities and medical Short Range Devices (SRDs)
1/107	2015-05-07	Rapporteurs for Question 7/1	Report of the Rapporteur Group Meeting on Question 7/1, Geneva, 13 April 2015
1/94	2015-04-09	Japan	Education accessibility
RGQ/108	2015-04-01	Intel Corporation	Reflection of "ICT in education" chapters in the reports
RGQ/103 +Ann.1	2015-03-31	G3ICT	G3ict third party captioning and copyright
RGQ/102 +Ann.1	2015-03-31	G3ICT	DCAD Accessibility Guidelines 2014, accessibility and disability in IGF meetings
RGQ/101	2015-03-31	G3ICT	Protection in Spectrum Management for Assistive Listening Devices (ALDs) for persons with disabilities and medical Short Range Devices (SRDs)
RGQ/96	2015-03-30	BDT Focal Point for Question 7/1	ICT accessibility regulations in Mexico's telecom reform
RGQ/91	2015-03-25	Korea (Republic of)	Accessibility aspects of language education based on speech/NLP (Natural Language Processing) technology
RGQ/54 +Ann.1	2015-02-26	BDT Focal Point for Question 7/1	Overview (Part 3) – Public procurement, including commercial best practices
RGQ/53 +Ann.1-2	2015-02-26	BDT Focal Point for Question 7/1	Overview (Part 2) – Which accessibility tools can be used for people with difficulties mastering reading and writing; and Practical applications for accessible e-education

Web	Received	Source	Title
RGQ/52 +Ann.1	2015-02-26	BDT Focal Point for Question 7/1	Overview (Part 1) – Necessary changes to existing legislation to promote ICT accessibility, and how to promote accessibility in public ICT spaces, such as telecentres and public pay phones
RGQ/47	2015-02-26	Bosnia and Herzegovina	Challenges in achieving ICT accessibility policy for persons with disabilities and specific needs in Bosnia and Herzegovina
RGQ/25	2015-02-05	BDT Focal Point for Question 7/1	Report on meetings, events and activities on ICT Accessibility for PWD since last Study Group meeting on Question7/1 held in September 2014, including future activities planned
RGQ/24	2015-02-05	Mali (Republic of)	Revised draft work plan for Question 7/1
RGQ/13	2014-12-15	Rapporteurs for Question 7/1	Draft work plan for Question 7/1
1/24 +Ann.1	2014-07-24	BDT Focal Point for Question 7/1	BDT Report on accessibility activities

Liaison Statements

Web	Received	Source	Title
1/460	2017-03-17	ITU-T JCA-AHF	Liaison Statement from ITU-T JCA-AHF to ITU-D SG1 on recent meeting reports of Joint Coordination Activity on Accessibility and Human Factors (JCA-AHF)
1/456	2017-03-17	ITU-T JCA-AHF	Liaison Statement from ITU-T JCA-AHF to ITU-D SG1 on Call for voluntary contributions to the ITU Accessibility Fund
1/411	2017-02-14	ITU-T/ITU-R Inter-Sector Rapporteur Group	Liaison Statement from ITU IRG-AVA to ITU-D SG1 Question 7/1 on collaboration
1/410	2017-02-08	ITU-T Study Group 16	Liaison Statement from ITU-T SG16 to ITU-D SG1 Question 7/1 on paper on the potential risk of using “Personal Sound Amplification Products” (PSAPs)
1/409	2017-02-08	ITU-T Study Group 16	Liaison Statement from ITU-T SG16 to ITU-D SG1 Question 7/1 on easy access tool for emergency situations
RGQ/266	2016-10-31	ITU-T Study Group 2	Liaison Statement from ITU-T SG2 to ITU-D SG1 Question 7/1 on accessibility contributions
RGQ/263	2016-10-31	ITU-T Study Group 2	Liaison Statement from ITU-T SG2 to ITU-D SG1 Question 7/1 on accessibility contributions
RGQ/258	2016-10-31	ITU-T/ITU-R Inter-Sector Rapporteur Group on, Audio Visual Media Accessibility (IRG-AVA)	Liaison Statement from ITU IRG-AVA to ITU-D SG2 on requirements for the application of the UNCRPD for media services for all (ITU-T FG-AVA Technical Report, Part 14)

Web	Received	Source	Title
1/286	2016-07-29	ITU-T JCA-AHF	Liaison statement from ITU-T JCA-AHF Chairman to ITU-D SG1 on JCA-AHF recent meeting report
RGQ/168	2016-02-19	CWG- Internet Secretariat	Liaison Statement on the results of the CWG-Internet open consultation on "Access to the Internet for Persons with Disabilities and specific needs"
RGQ/141	2016-02-12	ITU-T JCA-AHF	Liaison Statement from ITU-T JCA-AHF to ITU-D SG1 on JCA-AHF recent meetings reports
RGQ/136	2016-02-04	ITU-T Study Group 2	Liaison statement from ITU-T SG2 to ITU-D SG1 Q7/1 on Accessibility Contributions
RGQ/129	2016-11-04	ITU-T Study Group 16	Liaison statement from ITU-T SG16 to ITU-D SG1 Q7/1 on other newly completed work on accessibility
1/202	2015-08-24	ITU-T JCA-AHF	Liaison Statement from ITU-T JCA-AHF, Chairman to ITU-D SGs on Draft meeting report of Joint Coordination Activity on Accessibility and Human Factors (JCA-AHF) in Geneva on 17 June 2015
1/120	2015-06-23	ITU-R Study Groups- Working Party 1B	Liaison Statement from ITU-R WP1B to ITU-D Study Group 1 on Working document towards a preliminary draft new report ITU-R SM on Innovative regulatory tools
RGQ/105	2015-03-31	ITU-T JCA-AHF	Liaison Statement from ITU-T JCA-AHF to ITU-D Study Group 1 on the Draft meeting report of JCA-AHF held in Geneva on 18 February 2015
RGQ/104	2015-03-31	ITU-T JCA-AHF	Liaison Statement from ITU-T JCA-AHF to ITU-D Study Group 1 on Cybersecurity/security on the Internet for persons with disabilities
1/28	2014-07-16	ITU-T Study Group 16	Liaison Statement from ITU-T Study Group 16 to ITU-D Study Group 1 Question 7/1 on Draft ITU-T F.ACC-Term
1/13	2014-05-05	ITU-R Study Group 5	Information on Question ITU-R 254-5
1/7	2013-10-03	ITU-T JCA-AHF	Liaison Statement from ITU-T JCA-AHF to ITU-D SG1 and SG2 on draft revision of Recommendation ITU-R M.107
1/6	2013-10-02	ITU-T JCA-AHF	Liaison Statement from ITU-T JCA-AHF to ITU-D SG1 and SG2 on draft revision of Recommendation ITU-R M.1076 "Wireless communication systems for persons with impaired hearing"

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