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Information and communications technologies for the inclusion and empowerment of persons with disabilities in Latin America and the Caribbean

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for the inclusion and empowerment of persons
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and the Caribbean**

Heidi Ullmann
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This document has been prepared by Heidi Ullmann, Social Affairs Officer of the Social Development Division, Economic Commission for Latin America and the Caribbean (ECLAC), Francis Jones, Population Affairs Officer of the Social Development Unit, ECLAC subregional headquarters for the Caribbean, Robert Williams, former Associate Information Management Officer, ECLAC subregional headquarters for the Caribbean, and Deirdre Williams, Consultant, ECLAC subregional headquarters for the Caribbean in the framework of the activities of the project ECLAC/GIZ project. The authors wish to thank Daniela Trucco for her valuable comments and Agostina Coll, a United Nations Volunteer, for translating the document into Spanish.

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Abstract

This paper examines the ways in which Information and Communications Technologies (ICT) can promote greater inclusion of persons with disabilities. It characterizes the patterns of ICT use among persons with disabilities in Latin America and the Caribbean and proposes recommendations and strategies to expand access to and use of ICT among persons with disabilities in the region in order to harness the potential of these tools to promote greater inclusion. Our investigation is based on mixed methods that include the analysis of census data, complemented by interviews, bibliographic review and online searches of legislation, policies and programmes to promote ICT use among persons with disabilities.

We find that, even after accounting for age differences between persons with and without disabilities, the use of Internet among persons with disabilities lags behind that of persons without disabilities. There are also inequalities within the population with disabilities. These gaps are especially acute for those with lower levels of education, those out of work, older persons with disabilities and those with certain types of disabilities, namely difficulties in remembering/concentrating and communicating/speaking. In view of these gaps, and in light of their responsibilities as signatories to the Convention on the Rights of Persons with Disabilities, governments in the region must take steps to close this digital divide.

Introduction

The 2030 Agenda for Sustainable Development makes an explicit call to “leave no one behind” in the path to development. This ambitious Agenda that was adopted by United Nations Member States in September of 2015 recognizes the need to promote the social, economic and political inclusion of persons with disabilities, and several of the Sustainable Development Goals refer specifically to the situation of this population. Yet, in our societies, persons with disabilities are prevented from fully enjoying their human rights, and participating equally in all aspects of society.

Persons with disabilities face disproportionately greater poverty, lack of opportunity and access to education and employment, and the denial of political and social rights due to the persistence of attitudinal, physical, social and institutional barriers. These barriers not only adversely affect persons with disabilities, but they also constitute a serious impediment for mainstreaming a rights-based perspective in society and development. It is also important to note from the outset that the concept of disability has evolved in recent decades, from one that focused on individual deficiencies to one that recognizes that restrictions in participation experienced by this population are a result of the interaction between their physical, sensorial, cognitive and mental limitations and societal and environmental barriers. In this study we employ a rights-based approach to disability, in line with the Convention on the Rights of Persons with Disabilities (United Nations, 2006).

In parallel, the changes associated with the rise of the digital and information society have profoundly transformed the way in which people in the region interact with each other. Information and communications technologies (ICT) are constantly evolving. Indeed, attempting to delimit a definition of ICT is not especially useful given the rapid rate of change in this area. However, for the purposes of this investigation, ICT refers to any information and communication device or application and its content. This definition encompasses a wide range of access technologies, such as radio, television, mobile phones, computers and network software and hard ware (ITU, 2013).¹

As noted by the United Nations Economic Commission for Latin America and the Caribbean (ECLAC), between 2003 and 2015 —just a little over a decade— the number of Internet users in the region more than doubled to comprise 54.4% of the population (ECLAC, 2016a). Moreover, reports indicate that among those who use Internet, people from Latin America and the Caribbean engage more,

¹ For the purposes of this discussion we also include Assistive Technologies, such as hearing aids, visual aids, and specialized computer software and hardware that increase mobility, hearing, vision, or communication capacities. These Assistive Technologies are specifically intended to increase functional capacity and inclusion among persons with disabilities.

on average, in social media than users in other regions of the world. (ECLAC, 2016b). Nevertheless, the evidence also indicates that access to Internet and the use of digital media is not evenly distributed within and between the countries of the region, which leads to the conclusion that the potential benefits of ICT use are not equally distributed among different populations. This uneven access, as well as other economic and social inequalities, can be exacerbated if there are no adequate policies to guarantee digital access and benefits to all sectors of society.

From this perspective, we argue that while ICT present a great potential for the reduction of social and economic inequalities for persons with disabilities, they can also exacerbate pre-existing economic or social inequalities that this population experiences or even create new ones. Thus, public policies must promote the positive role of new technologies to create opportunities that advance the inclusion of all persons with disabilities in all spheres of daily life.

This paper aims to reflect on the ways in which ICT can promote greater inclusion of persons with disabilities, to characterize the patterns of ICT use among persons with disabilities in Latin America and the Caribbean and to propose recommendations and strategies to expand access to and use of ICT among persons with disabilities in the region. Our investigation is based on mixed methods that include the analysis of census data, bibliographic review and online searches of legislation, policies and programmes to promote ICT use among persons with disabilities.² In the spirit of “nothing about us without us” – a slogan that speaks to the importance of including persons with disabilities in research and the process of policy making with respect to disability-related issues – the study is complimented by a set of interviews with persons with disabilities, including several in leadership roles of non-governmental organizations (NGOs) focused on advocacy and support for the community of persons with disabilities. In addition, a questionnaire was sent to disability-related organizations within the Caribbean, and the responses to this questionnaire are incorporated as part of this investigation (see Annex 1).

The document is structured in seven sections. First, we discuss the socio-demographic characteristics of the population with disabilities in Latin America and the Caribbean. Next, we reflect on the ways in which ICT can promote inclusion and empowerment among persons with disabilities, centring the analysis among those with visual, hearing and dexterity impairments. We then present a statistical overview of ICT usage and access among persons with disabilities, contrasting this access and use with that of the population without disabilities. We also consider access to ICT and ICT use within the population with disabilities by socio-demographic characteristics, such as sex, age, level of education, work status, and type of disability. In sections five and six of the document we review the international, regional, and national frameworks to promote ICT use and access among those with disabilities, as well as policies and programmes in the region designed to achieve this end. In view of the entire investigation, we close by providing recommendations to expand ICT access and use among persons with disabilities in Latin America and the Caribbean.

² With respect to the bibliographic search, where possible we include studies that are specific to the Latin America and Caribbean region. However, due to a dearth of information for some areas, evidence from studies that were conducted in other regions of the world are included. Additionally, for some sections of the document, the emphasis is placed either on the Caribbean or on Latin America. This responds to the availability of information – either quantitative or qualitative - and the time constraints that were involved in preparing this document.

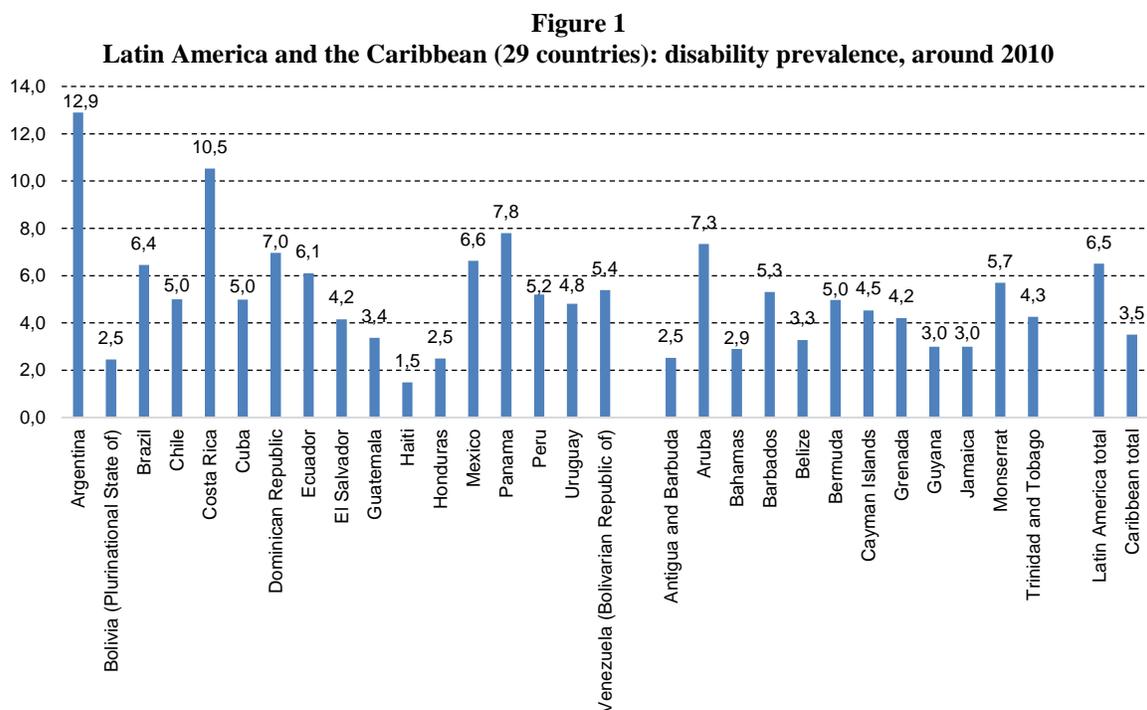
I. Disability in Latin America and the Caribbean

Over the last two decades, the rights of persons with disabilities have gained ground in the regional policy agenda. Many countries in Latin America and the Caribbean have made important strides towards protecting and promoting the rights and inclusion of persons with disabilities. For example, all 19 Latin American countries and 11 Caribbean countries have ratified the Convention on the Rights of Persons with Disabilities (CRPD). Countries in the region have sought to implement the CRPD through the adoption of national-level legislation, the establishment of national institutes and councils and the implementation of strategies, policies and programmes (Ullmann, 2017).

It is estimated that approximately 7 per cent of people in Latin America and the Caribbean are living with a disability, representing over 34.5 million people.³ The population with a disability is diverse, not only due to the different types of disabilities they experience and their severity but also to the interaction between the disability status and other factors, such as age, gender, race/ethnicity, place of residence and socioeconomic status. Although disability is generally associated with disadvantage, it is important to note that not all persons with disabilities experience the same degree of disadvantage and exclusion (WHO and World Bank, 2011).

Quantifying the population with disabilities in the region is a complex task due to methodological differences among the countries in data collection and analysis. As a result, investigating the socio-demographic characteristics of this population, measuring its evolution and especially making comparisons across countries is difficult. Across the region, available data suggests a wide variability in the prevalence of disabilities – ranging from 1.5 per cent prevalence in Haiti, to 12.9 per cent prevalence in Argentina (see figure 1). While some of this divergence can be explained by the age structure of a country and other factors, the relative impact of these factors is heavily outweighed by differences in the way disability is measured from country to country.

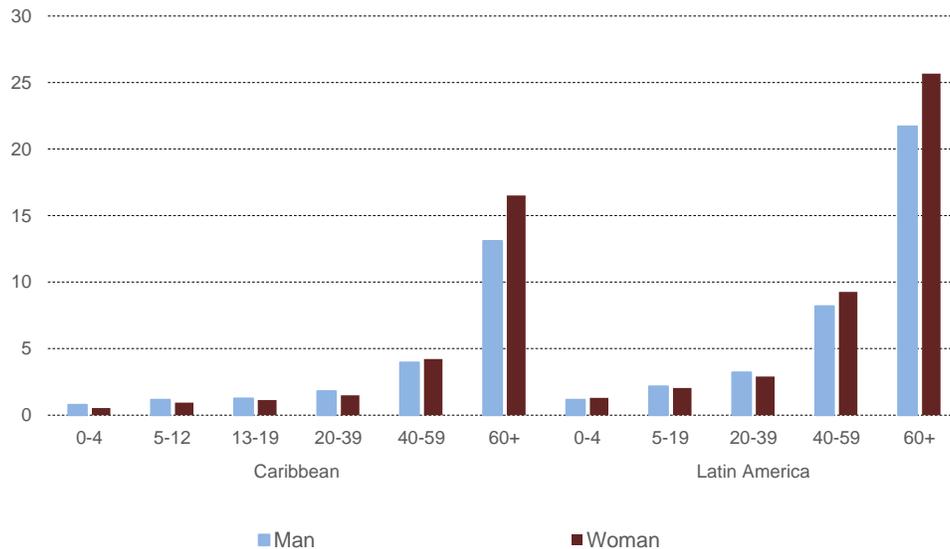
³ With respect to the bibliographic search, where possible we include studies that are specific to the Latin America and Caribbean region. However, due to a dearth of information for some areas, evidence from studies that were conducted in other regions of the world are included. Additionally, for some sections of the document, the emphasis is placed either on the Caribbean or on Latin America. This responds to the availability of information – either quantitative or qualitative - and the time constraints that were involved in preparing this document.



Source: For Latin America: Argentina Population and Housing Census, 2010; Plur. State of Bolivia Population and Housing Census, 2012; Brazil Population and Housing Census, 2010; Chile Encuesta de Caracterización Socioeconómica Nacional, 2011; Costa Rica Population and Housing Census, 2011; Cuba Population and Housing Census, 2012; Dominican Republic Encuesta Nacional de Hogares de Propósitos Múltiples, 2013; Ecuador Population and Housing Census, 2010; El Salvador Population and Housing Census, 2007; Haiti Population and Housing Census, 2003; Guatemala Population and Housing Census, 2005; Honduras Population and Housing Census, 2013; Mexico Encuesta Nacional de Ingresos y Gastos de los Hogares, 2012; Panama Population and Housing Census, 2010; Peru Primera Encuesta Nacional Especializada Sobre Discapacidad, 2012; Uruguay Population and Housing Census, 2011; Bol. Rep. of Venezuela Population and Housing Census, 2011. For the Caribbean data are from the Population and Housing Censuses 2010 round for: Antigua and Barbuda, Aruba, Bahamas, Barbados, Belize, Bermuda, Cayman Islands, Grenada, Guyana, Jamaica, Montserrat, Trinidad and Tobago. Note: For countries applying the Washington Group questions, only those responding “a lot of difficulty” and “cannot do at all” are categorized as having a disability.

Figure 2 reflects that, in many countries and in the regional aggregate, women have a higher prevalence of disability than men, a trend that increases with age. This feminization of disability at the older ages is due partly to the fact that women have a greater life expectancy, which increases the possibility of having a disability caused by an accident or a chronic illness. It is also true that women live the later stages of their life in a context of greater economic vulnerability, which further increases the risk that any impairment of health will become a disability due to a lack of resources that prevents them from paying for support services and technical assistance necessary to lessen the impact of the limitations acquired with age (ECLAC, 2014).

Figure 2
Latin America and the Caribbean (26 countries): disability prevalence by age and sex, around 2010
(Percentages, simple average for the regions)



Source: For Latin America: Argentina Population and Housing Census, 2010; Plur. State of Bolivia Population and Housing Census, 2012; Brazil Population and Housing Census, 2010; Chile Encuesta de Caracterización Socioeconómica Nacional, 2011; Costa Rica Population and Housing, Census 2011; Cuba Population and Housing Census, 2012; Dominican Republic Encuesta Nacional de Hogares de Propósitos Múltiples, 2013; Ecuador Population and Housing Census, 2010; Honduras Population and Housing Census, 2013; Mexico Encuesta Nacional de Ingresos y Gastos de los Hogares, 2012; Panama Population and Housing Census, 2010; Peru Primera Encuesta Nacional Especializada Sobre Discapacidad, 2012; Uruguay Population and Housing Census, 2011; Venezuela Population and Housing Census, 2011. For the Caribbean data are from the Population and Housing Censuses 2010 round for: Antigua and Barbuda, Aruba, Bahamas, Barbados, Belize, Bermuda, Cayman Islands, Grenada, Guyana, Jamaica, Montserrat, Trinidad and Tobago. Note: For countries applying the Washington Group questions, only those responding “a lot of difficulty” and “cannot do at all” are categorized as having a disability.

A. The socioeconomic profile of the population with a disability in Latin America and the Caribbean

Persons with disabilities are often excluded from the economic, social, political and cultural spheres. Opportunities for education and employment, two key pillars of economic and social inclusion are often limited for persons with disabilities, particularly for those belonging to poorer households, those living in rural areas, those belonging to indigenous groups, afrodescendants and women.

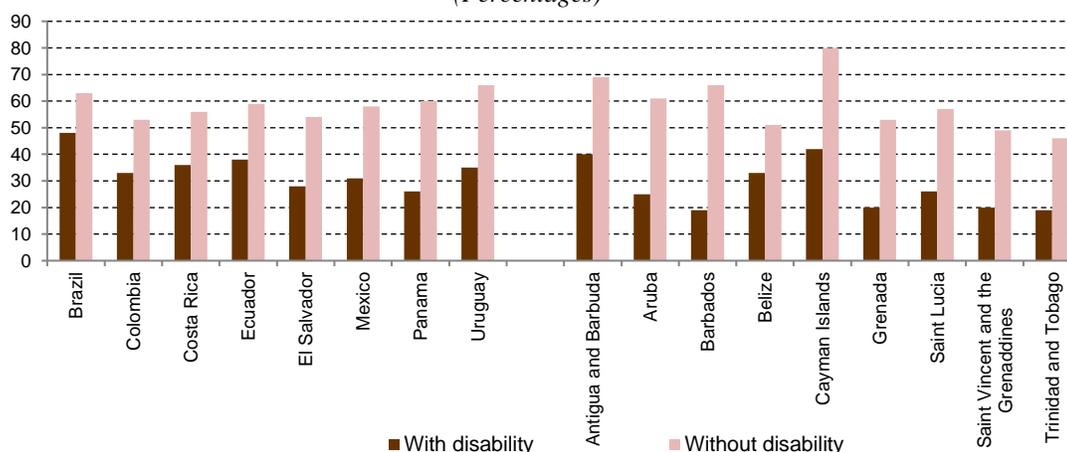
Education is an area in which persons with disabilities face barriers to participation and this can have both economic and social impacts throughout the life course. Exclusion from the education sphere is the result of at least four types of barriers: attitudinal barriers on the part of the administration, teachers, parents and other students; barriers in the school environment (for example because school curricula are not adapted to the needs of students with disabilities); affordability barriers; and physical and communicational barriers.

Another dimension where troubling gaps are observed is in the area of labour market inclusion. Despite the fact that countries in the region have progressively adopted legislation, including quota laws, to promote the inclusion of persons with disabilities in the workforce, persons with disabilities still face formidable challenges in accessing opportunities in the labour market.

As illustrated in figure 3, the rate of economic participation among persons with disabilities is commonly between half and two-thirds what it is for persons without disabilities. There are at least three

aspects which contribute to this situation. First, as persons with disabilities are often marginalized from formal education and training, as mentioned above, they do not obtain the necessary skills to enter the labour market. Even when persons with disabilities are able to complete their studies, a lack of physical accessibility in public transportation and reasonable accommodation in the workplace may prevent them from joining the labour market. Finally, negative attitudes on the part of employers regarding persons with disabilities are another formidable barrier to labour market insertion. It should be noted that women with disabilities are more likely than men with disabilities to be excluded from the labour market.

Figure 3
Latin America and the Caribbean (17 countries): economically active population among those 15 years of age and older by disability status, around 2010
(Percentages)



Source: ECLAC, 2012.

Evidence from the region suggests that persons with disabilities tend to be employed in low-level, low paying occupations (see for example ILO, 2013), which adversely affects their ability to secure a minimum standard of living and access to social protection mechanisms, but also has implications for their well-being during subsequent stages of the life course. Given this scenario, it is not surprising that persons with disabilities are over-represented among the region's poor population.

The double exclusion from two key pillars of inclusion – education and employment - can reinforce each other, and limit the participation of persons with disabilities in other spheres of society, such as political participation. Within this generalized context of exclusion, it is important to note that often, the type of disability that is experienced and the severity of disability are important determinants of the level of inclusion persons with disabilities can achieve, which clearly should not be the case (ECLAC, 2014). It is also necessary to consider the situation of persons with disabilities who face multiple and intersecting forms of discrimination, such as women with disabilities, persons with disabilities who reside in rural areas and indigenous persons with disabilities.

II. Empowering persons with disabilities through the use of Information and Communications Technologies

A. ICT as a tool for empowerment and inclusion

A 2008 ECLAC study on disability in the Caribbean noted, “contemporary perspectives on disability hold that disability does not originate with an individual’s physical or mental health, but in the societal restrictions faced as a consequence thereof.” Thus, a major thrust of research and discussion in the context of the situation of persons with disabilities is to recognise that it is the societal restrictions and barriers that generate the disability and limit the possibilities of full participation.

The objective then is two-fold – on the one hand to provide tools and empower persons with disabilities to promote their participation on an equal basis with others and on the other hand to eliminate the barriers in society so that this participation can truly occur. Information and communications technologies offer tools to advance towards both of these objectives.

Information and communication technologies can empower all of us. Paradoxically, they may do this by making us all invisible, all the same, all equal. All signals are reduced to one code which may be reconstituted as a sound, an image or a movement. The signal can be received in a manner which gets past the barrier of a disability. In this way, a person who is blind can understand a printed text when it is presented in an audio format, a person who is deaf can interpret the spoken word when it is transcribed, and a person who is mobility impaired can use telepresence to take part in activities that would otherwise be quite difficult to access. The use of technology allows the person to bypass their physical or sensorial limitation and, by doing so, it includes and empowers. More profoundly, ICT should be viewed not only as providing information and communication, but as tools that modify human action and make new actions possible (Toboso, 2011). These transformations give rise to a new form of social organization: the information society (Castells, 1996).

There are myriad ways in which ICT can assist and empower persons with disabilities (see table 1). Different types of technologies can foster greater access to information, products and services, including inclusive mobile and other devices, and Internet. Access to information and knowledge can enable people to make better decisions and choices in different spheres of their lives. Through these technologies, people are able to express these decisions and to exercise their right to freedom of expression and opinion. ICT can also facilitate access to health services, to education and training as well as to work. They can promote greater

participation of persons with disabilities in political and public life as well as in cultural, recreational, leisure and sport activities. Thus, ICT significantly improve social and economic integration of persons with disabilities in society by enlarging the range of activities available to them, and their ability to participate in a wider range of activities in society and by amplifying their voice. In turn, by promoting the inclusion of persons with disabilities in multiple dimensions of society, ICT can also give greater visibility to persons with disabilities and the positive contributions they can make to our societies.

Internet in particular not only facilitates access to information and information sharing, but also it offers opportunities for participating in education and training, employment seeking and employment, e-health tools, access to government and public services as well as to consumer and commercial services, such as shopping and banking services (ITU, 2013). Mobile devices can have a positive impact on independent living while simultaneously promoting greater interconnectedness between persons with disabilities and those in their lives. Mobile phones, for example, provide constant means of communication, either through calls or through messaging services. Through Internet persons with disabilities can virtually “visit” sites of cultural interest that might otherwise be inaccessible.

Table 1
Technologies that have a potential impact for the inclusion of persons with disabilities

Type of technology	Potential uses for persons with disabilities
Internet	Websites: online education and training courses, social networking, shopping, banking and other services Telework Telemedicine and e-health
Mobile devices and services	Smartphone and tablets SMS Emergency services in voice, text and sign languages mHealth applications
TV and services	Interactive multimedia services and applications Access services: text subtitles, audio subtitles, descriptive video Sign language interpreting Sign language interpretation over the web
Software and apps	Chat systems Accessibility software: screen reading, voice to text, screen typing Accessible e-books and e-documents Apps for special education and recreation
Emerging ICT	Smart homes Wearables Artificial intelligence Speech to text, text to speech, text/speech to sign language

Source: ITU, 2013.

There have also been efforts to identify which technologies could have the most positive impact on inclusion in various dimensions (see table 2). In general, websites and mobile devices seem to have the greatest potential across the different dimensions of inclusion considered.

Table 2
Ranking of various ICT for persons with disabilities

	Websites	Mobile device	TV	Radio	Other
Healthcare	3.3	3.1	2.9	2.5	2.7
Primary education	3.0	2.6	2.8	2.3	2.9
Secondary education	3.4	3.0	2.7	2.3	2.8
Tertiary, professional, lifelong education	3.7	3.4	2.9	2.4	2.8
Employment	3.7	3.3	2.5	2.2	2.7
Independent living	3.4	4.6	2.8	2.4	2.8
Government services	3.5	3.0	3.0	2.3	2.6
Participation: Political/public life	3.3	3.1	2.7	2.5	2.6

Source: UNESCO, 2013. Scale: 5 = Most important, 1 = Least important. The highest score for each life category is highlighted in blue. Scores lower than 3 are greyed out.

ICT can therefore be an equalizing factor in education and employment and expand opportunities for inclusion in other spheres. However, it is important to note that ICT hold potential, not only for their instrumental value – in overcoming barriers and expanding opportunities for participation of persons with disabilities - but also for perhaps less tangible but equally important aspects of personal development and realization, such as identity formation, increased control of social situations, overcoming the stigma of disability, and feelings of security (see for example, Chib and Jiang, 2014). Some examples are highlighted below.

Networks for individual and collective empowerment

Technology facilitates networking among people with disabilities. This allows the exchange of information with others, which can help to forge connections and a united voice for advocacy and activism about issues that concern them, and to generate and broadcast a narrative based on their own perspective on what it means to live with a disability. For example, a respondent from Antigua reported a reliance on older forms of technology (Skype and email), with little mention of more recent forms of social media. This may be the result of a reluctance to switch from a trusted and familiar platform, or a fear that the new technology may be difficult to learn and cumbersome to manage. This respondent noted that, at all events, the decision by the majority was to continue to use the familiar technology for meetings. An interviewee in Saint Lucia mentioned her membership of a regional WhatsApp group of IT teachers of students with disabilities, but also described the difficulty of arranging local meetings of a newly formed Women’s Arm of the Saint Lucia Blind Welfare Association. In this case virtual meetings are not yet an accepted procedure in the local context.

There are also examples of communication and sharing of information dealing with disability-specific ICT. This has generally been through institutions set up to assist persons with a particular disability, for example visual impairment. One example is the Caribbean Council for the Blind (CCB), established in 1967. In 1998 the Council was extended by the addition of a Foundation for Eye Care in the Caribbean – Eyecare Caribbean – which is active in several countries of the region. The institution works to empower and support the inclusion of individuals with a visual impairment in all aspects of society. Access to ICT assistive technology is part of the institution’s role, albeit a relatively minor one.

Networks for assessment of disability and support

One survey respondent expressed concern about the need for assessment of disability. This is particularly important among children for whom disabilities may be undiagnosed or misdiagnosed, and for whom timely intervention and stimulation may be critical. The respondent cited the importance of the availability of assessment to support a policy of “mainstreaming” in the education system. The networking capabilities of ICT may be used to make arrangements for such assessment. There is a need for improved communication across the region among the various groups serving people with different disabilities. This need can also be satisfied by an ICT networking solution.

Nonetheless, given the nature of the different limitations that are experienced, it is not especially useful to discuss the implications of ICT for persons with disabilities as a generic group, as the specific barriers experienced and thus the potential ICT tools to overcome these barriers differ (MacDonald and Clayton, 2012). With this in mind, we next explore how ICT can promote inclusion depending on the specific type of disability that is experienced.

B. ICT for people with blindness or visual impairments

In September 2001, the first student with serious visual impairment enrolled to study at the Sir Arthur Lewis Community College in Saint Lucia. With her came an amanuensis whose car boot was invariably full of the piles of printed Braille which were the student's textbooks. In fact, the textbook for just one subject, at 992 pages of text, filled the boot and spilled over onto the back seat. This is to illustrate just one of the benefits that ICT has to offer in overcoming barriers in an important area – education – which it is making accessible for people with visual impairment. Today, that same book could 'disappear' onto the hard drive of a laptop computer and be available on demand to the student through screen reading software or an automated Braille device.

According to World Health Organization (WHO) estimates, in 2010 more than 26 million people in the region of the Americas have a visual impairment, and 3.2 million were blind (WHO, 2010). In the region, the incidence of blindness and visual impairment increases with age, such that adults over 60 years of age have the highest prevalence of sight-related limitations (ECLAC, 2012). Sight can be lost over the course of a lifetime because of accidents, or through medical conditions such as cataracts, glaucoma, or macular degeneration. Thus, access to quality healthcare services can have a significant impact on the level of blindness. This is one reason that 90% of the world's visually impaired live in low-income settings (WHO, 2017).

There are a number of ICT-based solutions that can be used to assist people who are blind. The expansion of general-purpose computing has enabled a broad range of services for the blind and visually impaired, and which have shown marked improvement in recent years. For example, screen reader software is now built into commercial operating systems, including Windows and Macintosh. On Windows in particular, there was previously a reliance on third-party screen reader software, such as JAWS, which is an effective programme, but subject to an expensive updating process that at times may not have been compatible with the existing operating system.

However, the role of personal computers as the primary general-purpose computing device has been eroded by new generations of mobile devices. In particular, smartphones, and the apps that run on them, hold significant potential for making day-to-day tasks easier for blind people to accomplish. For example, one can use the camera on a smartphone, in combination with printed-out QR codes,⁴ for assistance in identifying items around the house. A valuable use case for this is in picking out clothing; if various pants and shirts are labelled with QR codes, these can be scanned with a smartphone, which will provide an audio indication of the colour of clothing items as they are being picked out from the closet.

The KNFB Reader app provides a text reading capability using a smartphone. It can take a picture of text on a sheet of paper and use optical character recognition (OCR) to convert it to an audio file that the user can listen to. While previously this functionality had been available through the use of a flatbed scanner attached to a personal computer, the miniaturization of the smartphone now allows blind people to carry one around in their pocket. A limitation of this product is that the accuracy of its interpretations of text is dependent on having a high-resolution camera on the phone. Thus, while a high-end iPhone with a sophisticated camera can do an effective job at OCR, an inexpensive Android device with a low-quality camera can make mistakes, resulting in poor-quality audio.

Tap Tap See is a smartphone app that blind persons can use to take a picture of something and have it automatically recognized. This process can be slow in some cases, depending on the quality of the

⁴ A QR code is a machine-readable optical label that contains information about the item to which it is attached.

Internet connection. Video Remote Assistance (VRA) and other apps use human volunteers to help guide blind people, through the real-time use of the camera on a smartphone. Again, this is a service that requires a responsive Internet connection and a significant amount of bandwidth to be effective. A major problem is that there is a lot of ignorance about the existence of these tools, and of other resources available to support people's daily lives. Indeed, one of the interview respondents indicated that the VRA app would be very useful, but that she was not previously aware of its existence. One organization working to resolve this problem is The Blind Way Forward, in Trinidad and Tobago. With initial support from a government grant, the organization distributes MP3 players to the blind that contain an audiobook which explains what resources are available and how tasks may be accomplished using these resources.

Another barrier to the adoption of these solutions is cost. However, in many cases, these prices are being reduced as the landscape of offerings shifts from specially-designed assistive equipment to general-purpose ICT that has been adapted to meet a particular need. This decline in cost reflects both a maturation of the technology, as well as savings made possible as some of the more expensive features of the device have been offloaded to a more general-purpose device – the personal computer.

Box 1

Joselyn's experience

When she left the Sir Arthur Lewis Community College to attend the University of the West Indies at St Augustine in Trinidad, Joselyn (not her real name), one of the study interviewees, she found herself very much dependent on ICT and on the electricity needed for it to run. "Braille is sometimes very handy!" She has a "talking watch" but would like to have a Braille watch so that, for example in an examination, she could check the time privately. She is glad that Braille has regained popularity, as it will help visually impaired students learn how to spell. However, the cost of the equipment presents a major financial challenge, and Braille documents are very bulky.

She currently uses a computer with JAWS and Open Book. At university she used to scan books page by page so that they could be processed by the screen reader. However cumbersome, this gave her access and independence; she didn't need someone to read to her all the time, and could choose her own time to study. She finds the JAWS software very expensive because of the frequent upgrades and updates. There is also frequently a compatibility problem between the upgrade and the operating system of her computer. She is unaware of other ICT solutions which might be useful. Often, she cannot afford what is available.

When asked about what she would really like to have, she spoke of the KNFB reader, which works by using the phone camera to take a picture and then reads the text back to the user. This would greatly improve her efficiency and productivity. It would be particularly useful for something like the agenda of a conference which is often provided only in print form. She also pointed out that Digicel has no audio signal to report credit balance – there is only a text message to the screen which is inaccessible to the visually impaired user (C&W/Flow has both audio and video for this function).

She belongs to a WhatsApp group for Caribbean IT teachers for the blind and visually impaired. Her ambition is to work as a consultant to help develop programmes to better the lives of persons with disabilities.

She spoke wistfully of the difference between having a disability in a small country in the developing world and having a disability "in one of the big countries, where the person with a disability will find life cheaper and easier with more legislation and more opportunities."

Box 2

Colour blindness

Colour blindness is a type of visual impairment that occurs as a result of a fault in the colour-sensing cone cells on the retina of the eye. It is a genetic condition that is significantly more common among men than among women.

Though many people with colour blindness often find that the condition does not provide a major hindrance to their ability to carry out most day-to-day activities, there are specific concerns regarding the interaction between colour blindness and the use of ICT. Specifically, developers of websites and apps can inadvertently create new barriers to access if they are not conscientious about how colour and contrast are used to specify meaning within the context of a user interface. The common practice of showing status text in red, yellow, or green is an example of a user interface pattern that may not be accessible to people who are colour blind, unless additional visual cues are also used to convey status information.

C. ICT for people with hearing difficulties

Hearing loss is a condition that affects one's capacity to interpret audible communication. Though an array of rich, expressive sign languages have been developed that enable deaf people to communicate, these languages are not in widespread use outside the deaf community, and there remains a significant interpretation barrier between spoken language and signed language. This can be overcome through the use of human interpreters, though technology is increasingly able to provide assistance in this area. For example, Video Relay Services (VRS) enable persons who are deaf to make a video connection with an on-call sign language interpreter, who, in turn, can place a phone call on their behalf, acting as an intermediary to a discussion between someone who is deaf and someone who is not.

While the spoken word poses the most obvious challenge to communication for the hearing impaired, there are additional concerns that extend to the ways in which machines communicate with people. Audible alerts, such as buzzers, bells, and sirens may not be detected by the hearing impaired without additional cues, such as noticeable vibrations or flashing lights. There is a variety of means to ensure that systems which provide information through audible means can also support access to those who cannot hear. There is a need to ensure that these methods are incorporated into consumer devices or systems created for public access. This is less of a technical challenge than one of legislation, public policy and awareness.

1. Digital transcription technology

Digital technology helps members of the deaf community to engage in unmediated interactions with non-hearing-impaired persons. The advent of the Internet, most notably, has increased the immediacy of text-based communications, which had previously been bound to slower media, such as print, or pen-and-paper. Instant messaging services and e-mails offer perfect examples in this regard.

Written text on the Internet – supplemented with images – and text messages on mobile phones offer unprecedented information access to deaf people, as compared to earlier, sound-reliant communication technologies such as radio, television and the telephone. These technologies are enabling the hearing impaired to become active participants in a global conversation, as opposed to being passive recipients of a broad range of media. The rise of social networking has facilitated social inclusion to the extent that differences in hearing ability need not be a barrier to online relationships between those that are deaf and those that are not. There has also been an increase in conveying nuanced meaning through the visual cues of emoticons and emojis, which condense in a simple image a sentiment or emotion that can be readily interpreted by persons with hearing limitations.

However, online communications are evolving in a direction that is less text-centric than it used to be. The past decade has seen the rising prominence of video, with Netflix and YouTube being two of the largest consumers of Internet bandwidth in the region. Audio content has also greatly expanded – not just through music, but through podcasts, which in many cases provide invaluable information to specialty audiences. Video and audio-based chat is increasingly popular, and is becoming an important means of social interaction, for example through social media or on-line video games. There is even a new generation of Internet connected-devices – such as the Amazon Echo and Google's Home device – through which interaction is almost entirely speech based.

In keeping with the Internet becoming far less text-centric, it is now important to ensure that the hearing-impaired do not become excluded from full participation in online activities. In many cases, technology exists that can enable access for the deaf to audio-based content, but it will take sustained effort and conscientiousness to ensure that it can be effectively used in the context of Latin America and the Caribbean.

The provision of text-versions of podcasts and the transcription of video files into text, which enable services such as closed captioning of Internet videos, offer good examples of inclusive solutions for the hearing impaired. Transcription services can be carried out either by a human or by software. While transcriptions carried out by humans are of better quality, software-generated transcripts can be

delivered in real time, at low cost on a virtually unlimited scale. Sometimes a hybrid approach can be used, in which the software takes a first pass at transcription, later to be verified by a human. Once produced, the text can be placed alongside the multimedia file from which it was generated – perhaps accessible through a link on the media player itself. These are services which can provide value to the hearing as well as the hearing impaired.

These processes are already taking place, to some extent. For example, YouTube has the ability to auto-generate closed-captions from the speech in a video, and encourages those who post videos to edit these captions for clarity and to remove any transcription mistakes. However, while the software for speech-to-text process tends to be somewhat effective in transcribing dialog spoken in some British or American accents, the language models used tend to be poorly adapted to other accents, including those from Caribbean countries. Thus, transcription of locally-produced content in Caribbean countries faces additional challenges that can serve as a barrier to access for deaf audiences. This problem may become more acute with the rise of real-time auto-captioning technology, which would otherwise be of great value in supporting the accessibility of video-conferences or on-line voice-based interaction.

Though voice recognition software, such as Dragon NaturallySpeaking, can be trained to recognize voice commands and dictation from a single individual, the development of more general-purpose acoustic models for voice recognition is a significantly more difficult task. But it is also a task that has become easier in recent years, due to advances in machine learning-based artificial intelligence technologies. These technologies enable tools that can be used to automate significant portions of the acoustic model development process, such as through Microsoft's Custom Recognition Intelligent Services (CRIS).

However, even the most advanced artificial intelligence system cannot build an acoustic model for voice recognition without a large volume of data to inform the process, in the form of audio files paired with existing transcriptions that have already been done by humans. While this type of data is available in sufficient quantity to develop models corresponding to accents that are common on a global scale, small Caribbean countries will likely find it difficult to assemble an adequately sized corpus of existing audio and transcripts.

Thus, there is a need for concerted effort to transcribe Caribbean voices and voices in various accents of Spanish for the purpose of providing feedstock to the development of acoustic models. This may be accomplished as part of an ongoing effort to provide closed-captioning for video content. Still, transcriptions of newscasts alone may not be sufficient, as the voices one hears in the media can be quite different from what one hears in shops or in the street. Indeed, to support effective auto-transcribing, there may be a need to construct more than one acoustic model for each Latin American and Caribbean country, as accents within countries can vary by geography, ethnicity, and social class.

Taken from a broad perspective, the issue of how to accommodate the hearing impaired reflects several important truths concerning the use of technology for promoting the inclusion of persons with disabilities. The first is that the landscape is evolving very quickly; ten years ago, YouTube was a brand-new phenomenon and the web was still mostly a quiet place. Further, the machine learning technology of the time would have been very much unequal to the task of comparing sound to audio transcripts and using that to build a model through which conversations could be effectively auto-captioned in real time. A second truth is that Latin American and Caribbean countries have characteristics that distinguish them from other parts of the world, and thus have a set of concerns, including limited scale and high linguistic diversity, that can limit the capacity of systems for the accommodation of the disabled to adapt to a rapidly evolving technological landscape.

A third truth is that, despite the speed of change, and despite the barriers that exist, these obstacles can be overcome. Even as new problems emerge, ICT is bringing new solutions to the table. With the support of the public sector, the business community, technologists, social workers, volunteers, family members, and, of course, by drawing upon their own resources, persons with disabilities can be empowered by ICT to prosper as active and contributing members of society. The exclusion of persons with disabilities is a social problem, more than a technical one, but ICT access for those with disabilities

is worthy of special attention because of the contribution it can make to overcoming the discrimination that people with disability face in, for example, education and employment, as well as civic, community and family life.

D. ICT for persons with mobility or dexterity impairments

The technological tools for persons with mobility or dexterity impairments are varied, including hardware, such as adapted keyboards and mouses, microphones, web cameras, and other ergonomic accessories, as well as software, such as voice recognition, auto-text, and sensitive touch screen keyboards software. These devices facilitate communication and the use of computers and mobile phones, for this and other purposes.

For example, the use of mobile phones among persons with mobility limitations has been found to overcome social barriers and provide a greater degree of mobility, increased sense of control in social interactions and opportunities to escape the stigma of disability by the reconstruction of a mediated image (Chib and Jiang, 2014). Finally, a range of assistive technologies in the area of prosthetics are also being developed to facilitate mobility. These new prosthetics include customizable controls, which enables the prosthetic to be tailored to the wearer's individual needs and sensory feedback mechanisms, which enables the wearer to make adjustments to the strength and pressure being applied for a specific task.

E. ICT for persons with cognitive and mental disabilities

Persons with cognitive limitations are often the most excluded. Persons with these limitations may experience a range of difficulties, including remembering, paying attention, difficulties with reading and comprehension, and with communication. ICT have the potential to facilitate online social relationships, promoting personal narrative and identity construction, reducing stigma, increasing self-determination, and involvement in advocacy for those with cognitive and mental disabilities (see for instance Chadwick et al., 2013). For example, for those with autism the Internet can provide a space to access information and services, without the need for face-to-face interactions (Pinchevski and Durham, 2015). Research also suggests that ICT can promote cultural participation through music among those with cognitive disabilities (Adkins et al., 2012).

An important point to consider with respect to ICT for this population relates to the link between ICT accessibility and literacy. As persons with disabilities, particularly those with cognitive disabilities, in Latin America and the Caribbean tend to have lower levels of literacy than the general population (see for example Samaniego, 2009), it is important that ICT include a clear and simple interface, instruction manuals that are written in non-technical terms and incorporate pictorial displays.

Another relevant aspect relates to the institutionalized population with cognitive and mental disabilities. On the one hand, we have scarce information about this population in general and with respect to ICT use specifically, as the main data gathering instruments, such as population and housing censuses do not collect this information on the institutionalized population. Research has found that for those who reside in these settings, support from staff or others is an important determinant of ICT use (Ramsten, 2016).

F. ICT for children and youth with disabilities

It is also important to consider the impact of ICT on other specific populations with disabilities. The use of ICT among children and youth with disabilities acquires a special relevance in light of the centrality of ICT in the everyday lives of children and youth generally, and the possibilities that ICT offer this group in terms of online social interaction, which is a key element in their social interactions and identity

formation process. By using ICT for social interactions, youth with disabilities are just “ordinary” adolescents, on par with their peers (UNICEF, 2017; Söderstrom, 2013). Nonetheless, authors have concluded that “Children with disabilities have found it difficult to realize their rights in the digital age. There has been a growing sense of the need to carefully consider and weight real issues of vulnerability, support, and safety against the long overdue rights of children that might flourish with digital cultures and technologies. This remains greatly contested, but also needs to be extended to include children with disabilities as a heterogeneous population” (Alper and Goggin, 2017).

ICT have also been cited as a key element in empowering Caribbean youth with visual disabilities and supporting them in increasing their knowledge of political issues and finding their political voice. Waller states that “ICT have contributed to the ability of visually impaired Caribbean citizens to access and participate in the democratic space in two specific ways. First, these technologically mediated channels provided a key source of political knowledge for visually impaired Caribbean youth, a source other than traditional communications media. Second, they vastly expanded the scope of political talk ... (which is a form of political participation)” (Waller, 2016 pg. 21).

In sum, ICT provides a range of opportunities, depending on the type of disability, that helps users overcome barriers related to their motor, speech, visual and hearing impairments (Lidström and Hemmingsson, 2014). Given its centrality in our societies, a lack of access to ICT can be considered another dimension of social inequality experienced by persons with disabilities. As ITU notes “In today’s world, with the ubiquitous impact of ICT across all sectors of activities in all countries, no one should be excluded...being excluded ...implies being shut out not only from the information society, but also from accessing essential public services, as well as from the opportunity of living an independent life” (ITU, 2013, page vi).

Despite this, a series of barriers to fully harness the potential of ICT for the population with disabilities have been identified. The factors that influence ICT usage can operate at the micro level (such as individual characteristics, including age, sex, ethnicity, socioeconomic status, education level), at the meso level (including community-level factors, such as rural/urban residence) and at the macro level (such as the country’s level of socioeconomic development, technology infrastructure, governmental policy, culture) (Doh and Stough, 2010). The challenges that have been identified are also present at each of these levels. These challenges include the cost of technologies, a lack of awareness of what ICT can do to facilitate inclusion and of the specific technologies themselves, lack of normative frameworks or policies to foster the widespread availability of ICT and a failure to implement laws or policies that do exist in this area. Other challenges relate to sector-specific challenges (e.g. to expand the use of ICT in the education or health sectors) (ITU, 2013). In addition to these, attitudinal barriers regarding ICT by persons with disabilities and their family members (Gutierrez and Martorell, 2010) as well as a lack of digital skills inhibit ICT use.

A final challenge relates to the availability of information to characterize ICT use and its evolution among persons with disabilities. Indeed, a first step to bridging the digital divide that affects the population with disabilities in Latin America and the Caribbean, such that they may harness the potential of ICT as a tool for social inclusion and personal development, is to determine the magnitude of this divide. With this in mind, in the next section, we present a statistical portrait of ICT use among persons with disabilities in the region.

III. The digital divide: access to and use of ICT among persons with disabilities

Despite the various ways in which ICT tools can be used to improve the quality of life and inclusion of persons with disabilities, as described in the previous section, the extent to which persons with disabilities in Latin America and the Caribbean have awareness of, access to, and use, ICT is unclear.

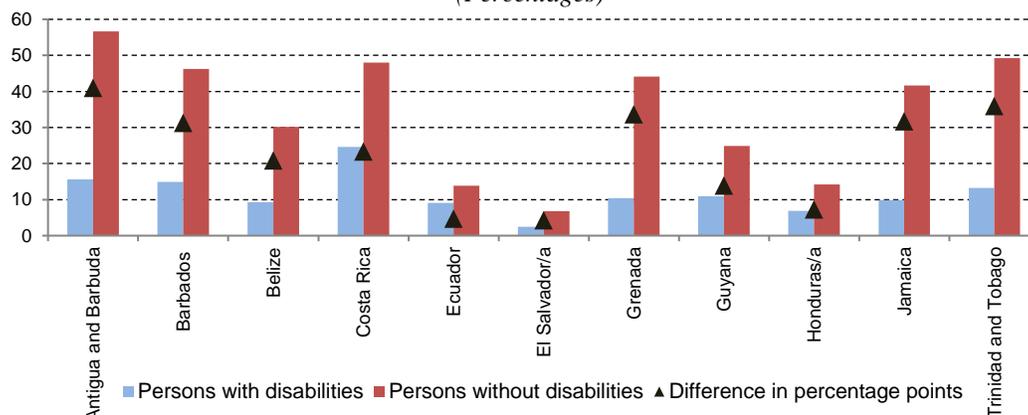
In this section we present a statistical portrait of ICT use among persons with disabilities in the region based on data from the most recent census rounds from 14 countries of the region.⁵ There are many perspectives from which to analyse ICT use and given the growing interest in ICT in the region, standardized modules have been developed and incorporated, which facilitate comparisons across censuses.⁶ Most censuses from countries in the region contain household-level information on ICT availability, typically, whether the household has a cellular phone, a computer, and an Internet connection. Some countries also gather information on individual-level ICT access and usage, such as each household member's use of cellular phones, computer and Internet. For the purposes of this analysis we examine access to and use of Internet at the individual-level. With respect to disability, we distinguish between persons with disabilities and those without disabilities. For those countries that apply the Washington Group questions and distinguish between levels of severity of the disability, only those responding, "a lot of difficulty" or "cannot do at all" are categorized as having a disability. We also analyse ICT use by type of disability considering limitations in the following domains: visual, hearing, walking, remembering concentrating, self-care, communication, and upper extremities.

Two important trends can be observed from figure 4 that presents Internet use by disability status. First, there are important gaps in Internet usage among the countries of the region. For example, while over 50% of those without disabilities in Antigua and Barbuda report using Internet, less than 7% of those without disabilities in El Salvador do so. A second trend is that across all countries, persons with disabilities report using Internet less than those without disabilities. The gaps range from 4.4 percentage points in El Salvador to over 40 percentage points in Antigua and Barbuda.

⁵ Countries: Antigua and Barbuda (2011); Barbados (2010); Belize (2010); Costa Rica (2011); Dominican Republic (2010); Ecuador (2010); El Salvador (2007); Grenada (2011); Guyana (2012); Honduras (2013); Jamaica (2011); Mexico (2010); Trinidad and Tobago (2011); Uruguay (2011).

⁶ Since 2003 ECLAC has been working towards the design and establishment of a harmonized methodological framework for measuring ICT, in coordination with the National Statistics Offices and other producers of official statistics in a Partnership for measuring ICT for development. In addition, there is an Observatory for the Information Society in Latin America and the Caribbean (OSILAC) which supports ICT measurement in the region.

Figure 4
Latin America and the Caribbean (11 countries): use of Internet by disability status, around 2010
(Percentages)

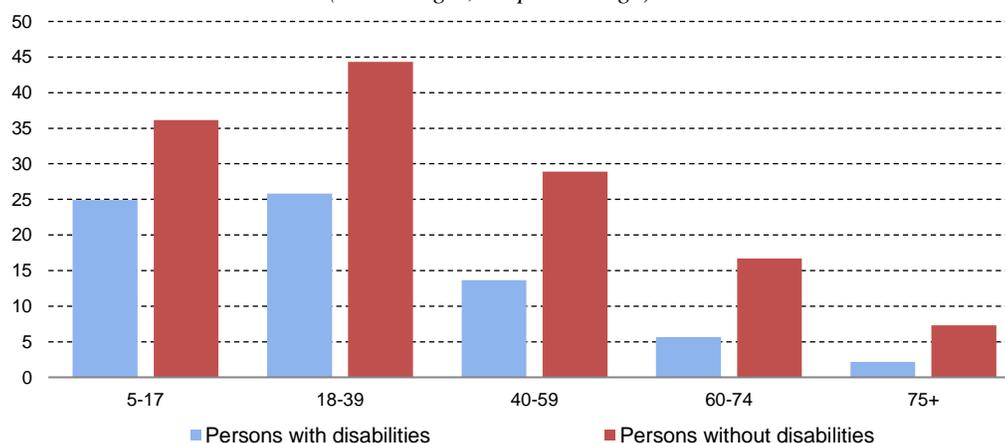


Source: Economic Commission for Latin America and the Caribbean based on special tabulations of census data from: Antigua and Barbuda (2011); Barbados (2010); Belize (2010); Costa Rica (2011); Ecuador (2010); El Salvador (2007); Grenada (2011); Guyana (2012); Honduras (2013); Jamaica (2011); Trinidad and Tobago (2011).

^a For Honduras and El Salvador, the census inquires about having an email account. This variable used as a proxy for using Internet. This proxy likely underestimates the percentage of persons who use Internet, as those with an email account most probably use Internet, but not all those who use Internet have an email account.

There is a well-established age digital divide in the region (Sunkel and Ullmann, forthcoming), whereby use of Internet is concentrated among the younger generations. And indeed, this is the case both in the population with and that without disabilities (see figure 5). Both for persons with and persons without disabilities Internet use decreases with age. And the greatest gaps by disability status are seen at the upper ends of the age distribution. For example, only 2.2% of adults 75 years and over with disabilities use Internet compared to 7.3% of adults 75 years and over without disabilities, a three-fold difference.

Figure 5
Latin America and the Caribbean (11 countries): use of Internet by disability status and age, around 2010
(Percentages, simple average)

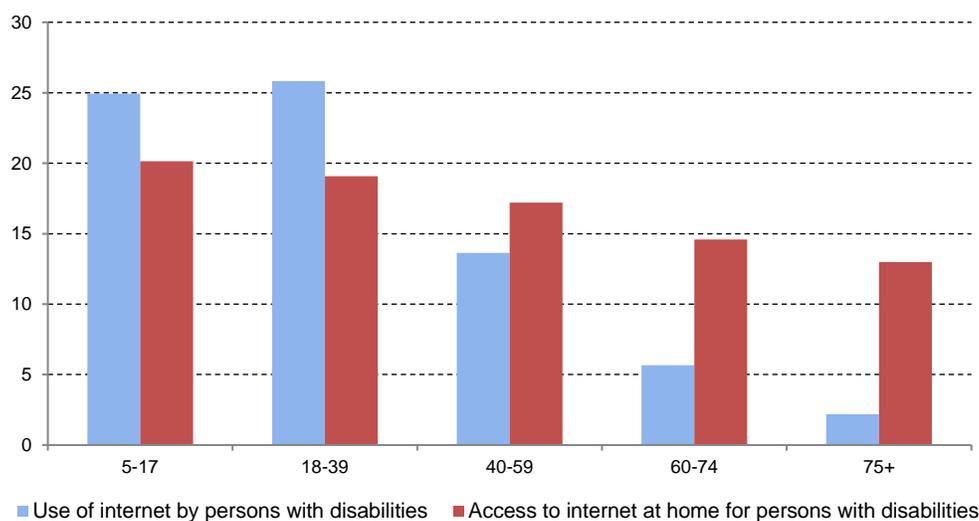


Source: Economic Commission for Latin America and the Caribbean based on special tabulations of census data from: Antigua and Barbuda (2011); Barbados (2010); Belize (2010); Costa Rica (2011); Ecuador (2010); El Salvador (2007); Grenada (2011); Guyana (2012); Honduras (2013); Jamaica (2011); Trinidad and Tobago (2011).

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Countries that gather both access and use information allow for an interesting comparison (see figure 6). Overall, a higher percentage of younger persons with disabilities (those under the age of 40) use Internet than have Internet access at home (through broadband connection), whereas for adults aged 40 and above with disabilities it is more common to have access at home than to report Internet use. These patterns suggest that for the younger generation of persons with disabilities, use of Internet is not constrained by not having connectivity at home, which may reflect the rising use of smart phones and other portable devices that have Internet connectivity, or the use of Internet in public places by younger generations (Sunkel and Ullmann, forthcoming). The data also illustrate quite clearly that having Internet access for older adults with disabilities does not equate with Internet use. Finally, the age differences are much more pronounced for use than access. This is because Internet access is a household characteristic, likely to be related to household income, whereas use of the Internet, is a characteristic of individuals marked by a strong age-related digital divide.

Figure 6
Latin America and the Caribbean (11 countries): use of and access to the Internet by persons with disability by age, around 2010
(Percentages, simple average)

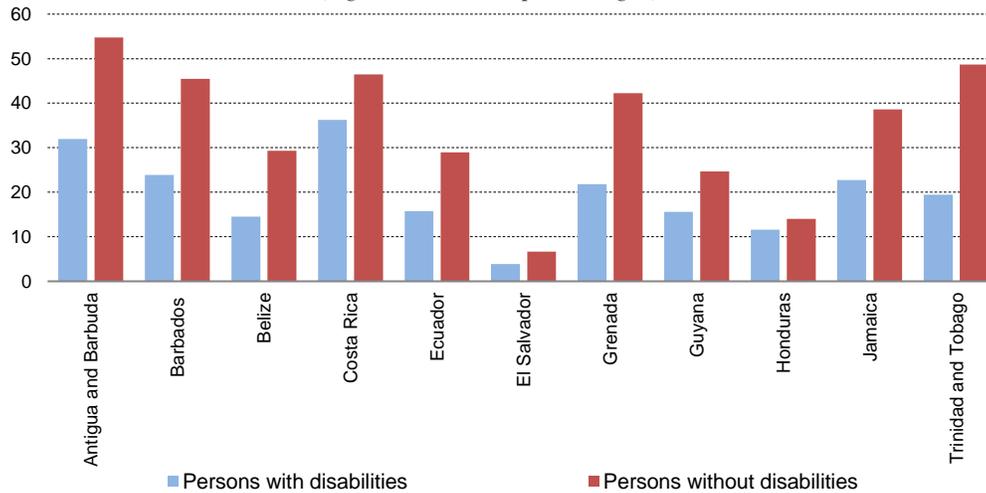


Source: Economic Commission for Latin America and the Caribbean based on special tabulations of census data from: Antigua and Barbuda (2011); Barbados (2010); Belize (2010); Costa Rica (2011); Ecuador (2010); El Salvador (2007); Grenada (2011); Guyana (2012); Honduras (2013); Jamaica (2011); Trinidad and Tobago (2011).

^a For Honduras and El Salvador, the census inquires about having an email account. This variable used as a proxy for using Internet. This proxy likely underestimates the percentage of persons who use Internet, as those with an email account most probably use Internet, but not all those who use Internet have an email account.

Figures 5 and 6 clearly illustrate that Internet use is strongly correlated with age. It is also true that disability is strongly correlated with age, as the prevalence of disability increases with age (ECLAC, 2012). Therefore, the estimates presented in the subsequent tables have been age-standardised (using the age structure of the total national population as the standard) so that the relationship between disability and Internet use can be examined independent of age effects. We see that after we account for these age effects, the gaps in Internet use for those with and without disabilities are reduced but persist (see figure 7).

Figure 7
Latin America and the Caribbean (11 countries): use of Internet by disability status
(Age-standardized percentages)

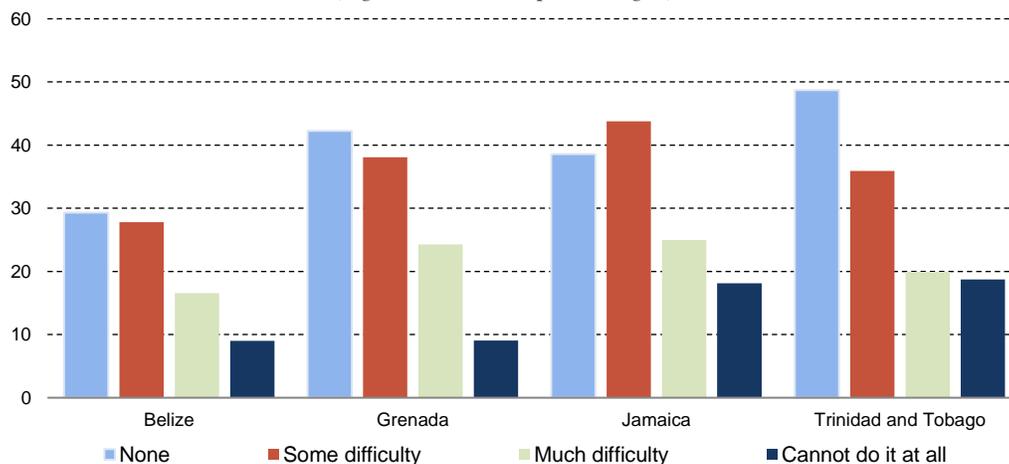


Source: Economic Commission for Latin America and the Caribbean based on special tabulations of census data from: Antigua and Barbuda (2011); Barbados (2010); Belize (2010); Costa Rica (2011); Ecuador (2010); El Salvador (2007); Grenada (2011); Guyana (2012); Honduras (2013); Jamaica (2011); Trinidad and Tobago (2011).

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In countries that gather information on the level of severity of the limitation, there is a clear gradient in ICT use among persons with disabilities depending on the severity level they experience (see figure 8). Indeed, those with ‘some difficulty’ report using Internet in similar percentages as those without disability, while a notable drop in use is observed among those with ‘a lot’ of difficulty with even lower levels of use among those who cannot do the activity at all. This suggests that efforts to expand ICT use among those with disabilities should focus on those with more severe limitations.

Figure 8
The Caribbean (4 countries): use of Internet by severity of the limitation for persons aged 5 and over, around 2010
(Age-standardized percentages)



Source: Economic Commission for Latin America and the Caribbean based on special tabulations of census data from: Belize (2010); Grenada (2011); Jamaica (2011); Trinidad and Tobago (2011).

In addition to the level of severity, the use of Internet in the population with disabilities also varies by the type of disability that a person experiences (see table 3). Internet use tends to be highest among those with visual disabilities, followed by mobility (walking) and hearing limitations. ICT use tends to be lowest among those with remembering/concentrating limitations and those who have disabilities associated with communication. The gaps by type of disability in some cases are quite striking. For example, while 15% of Costa Ricans with a difficulty remembering/concentrating use Internet, the figure is three times as high for those with visual impairments. In Jamaica, 36% of those with visual disabilities use Internet compared with only 6% of those with difficulties communicating/speaking, a six-fold difference.

Table 3
Use of Internet by type of disability for persons aged 5 and over
(Age-standardized percentages)

	Type of disability						
	Seeing	Hearing	Walking	Remembering/ concentrating	Self-care	Upper extremities	Communicating/ speaking
Antigua and Barbuda	49	24	27	16	12	20	7
Barbados	27	28	29		10	28	10
Belize	24	15	11	7	7	11	6
Costa Rica	47	31	27	15		26	17
Ecuador	21	17	14	5			
El Salvador /a	10	3	3	0	2	3	1
Grenada	31	15	20	11	11	19	7
Guyana	28	12	12			9	6
Honduras /a	23	7	8		5	7	4
Jamaica	36	20	15	7	7	14	6
Trinidad and Tobago	27	22	20	13		18	10

Source: Economic Commission for Latin America and the Caribbean based on special tabulations of census data from: Antigua and Barbuda (2011); Barbados (2010); Belize (2010); Costa Rica (2011); Ecuador (2010); El Salvador (2007); Grenada (2011); Guyana (2012); Honduras (2013); Jamaica (2011); Trinidad and Tobago (2011).

^a For Honduras and El Salvador, the census inquires about having an email account. This variable used as a proxy for using Internet. This proxy likely underestimates the percentage of persons who use Internet, as those with an email account most probably use Internet, but not all those who use Internet have an email account.

As the previous table suggests, the population of persons with disabilities is not homogeneous with respect to Internet use. It is therefore important to explore other socio-demographic characteristics that may influence Internet use in this population. Table 4 presents use of, and access, to Internet by disability and sex. Consistent with what has been reported so far in the analysis, the population without disabilities has greater access to, and usage of Internet than the population with disabilities, irrespective of sex. The gaps between men and women are more pronounced for use of Internet, rather than access,

both in the population with and without disabilities. And between men and women, Internet use tends to be similar or slightly higher among women than men, independent of disability status.

Table 4
Latin America and the Caribbean (11 countries for use, 14 for access): use of and access to Internet by disability status and sex, around 2010
(Age-standardized percentages)

	Access to Internet at home					Use of Internet			
	With disability					With disability			
	Male	Female	Male	Female		Male	Female	Male	Female
Antigua and Barbuda	30.3	33.4	44.5	46.5	Antigua and Barbuda	25.7	38.2	51.9	57.5
Barbados	42.8	46.2	54.1	59.5	Barbados	21.0	27.5	42.4	48.4
Belize	7.2	8.9	13.4	14.4	Belize	13.8	15.5	29.2	29.3
Costa Rica	28.6	30.4	25.5	28.7	Costa Rica	35.9	36.8	39.0	45.8
Ecuador	8.9	9.9	41.4	45.1	Ecuador	15.7	15.8	23.0	26.2
El Salvador	2.3	2.8	3.8	3.9	El Salvador ^a	3.9	4.0	7.5	6.0
Grenada	16.0	16.9	35.2	36.2	Grenada	19.0	24.4	35.7	41.8
Guyana	17.4	21.4	8.6	9.5	Guyana	13.7	17.7	46.5	50.9
Honduras	6.9	8.3	8.9	9.8	Honduras ^a	10.5	13.0	13.7	14.4
Trinidad and Tobago	24.7	28.4	10.4	10.8	Trinidad and Tobago	18.2	21.2	30.1	27.9
Bolivia (Plur. State of)	12.3	13.0	21.6	25.4	Jamaica	18.6	27.0	13.3	14.1
Dominican Republic	14.4	16.4	47.8	48.3					
Mexico	23.2	23.6	14.3	14.6					
Uruguay	28.7	31.1	14.1	14.7					

Source: Economic Commission for Latin America and the Caribbean based on special tabulations of census data from: Antigua and Barbuda (2011); Barbados (2010); Belize (2010); Bolivia (2012); Costa Rica (2011); Dominican Republic (2010); Ecuador (2010);); El Salvador (2007); Grenada (2011); Guyana (2012); Honduras (2013); Jamaica (2011); Mexico (2010); Trinidad and Tobago (2011); Uruguay (2011).

^a For Honduras and El Salvador, the census inquires about having an email account. This variable used as a proxy for using Internet. This proxy likely underestimates the percentage of persons who use Internet, as those with an email account most probably use Internet, but not all those who use Internet have an email account.

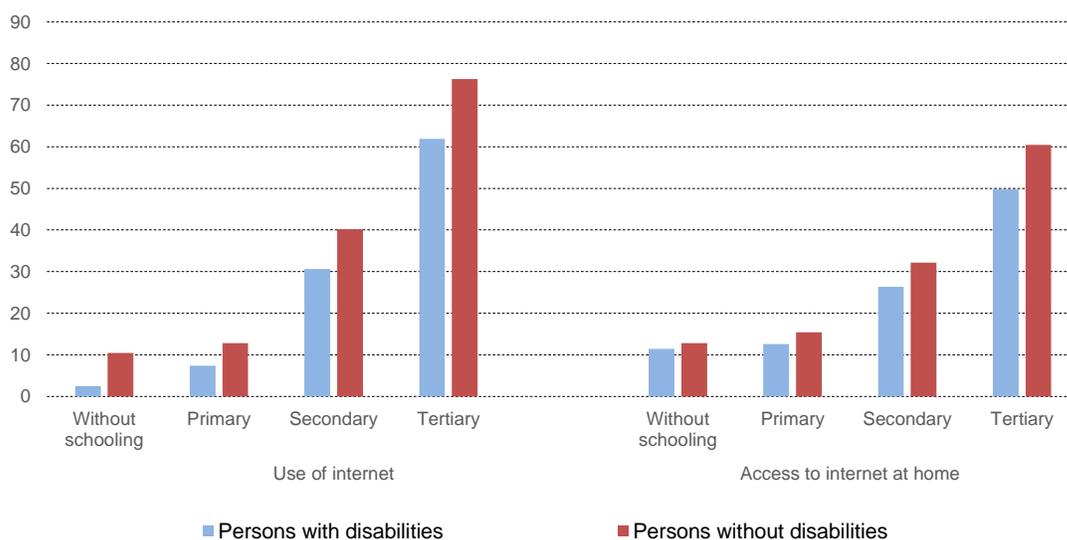
The level of education is another relevant characteristic to examine. Education level may be associated with use of, and access, to the Internet through two discrete mechanisms. First, education confers essential skills and abilities that are needed to exploit the Internet. Second, education is associated with income level, which facilitates access to computers, cellular phones and Internet

connectivity at home. Consequently, Internet use is strongly correlated with level of education both for those with and without disabilities (see figure 9). In addition, the difference in the level of Internet use between those with and those without disabilities is lower for those with higher levels of education. In other words, just under 62% of persons with disabilities who achieved tertiary level education report using Internet, and for the population with this same level of education without disabilities the figure is 76%, a difference of 23%. In contrast the difference in Internet use by disability status for those without schooling is over 400% higher.

Figure 9

Latin America and the Caribbean (11 countries for use, 14 for access): use of and access to Internet by disability status and level of education, around 2010

(Age-standardized percentages, simple average)

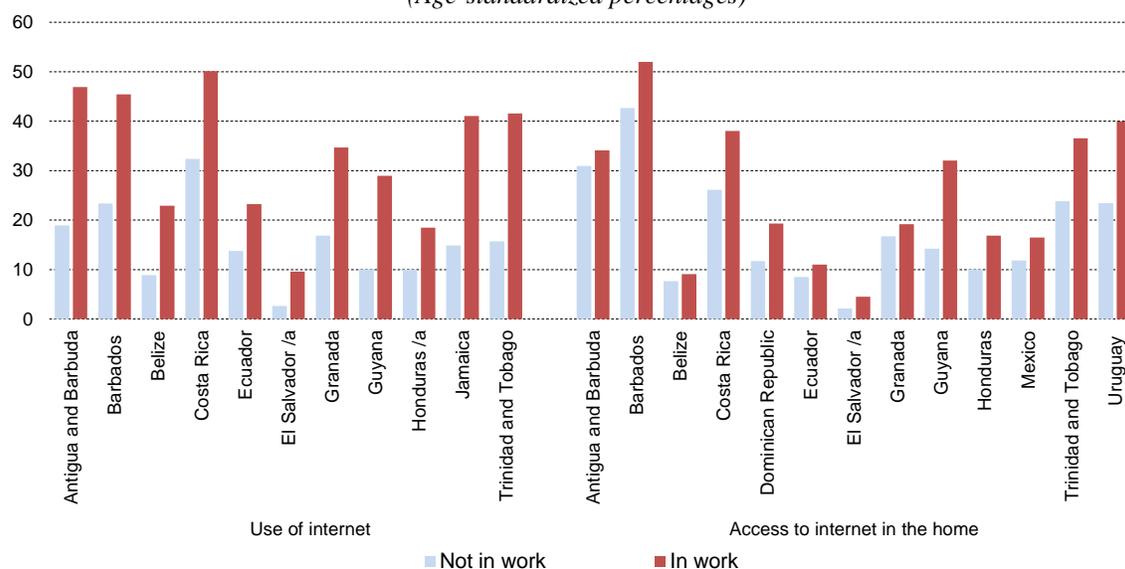


Source: Economic Commission for Latin America and the Caribbean based on special tabulations of census data from: Antigua and Barbuda (2011); Barbados (2010); Belize (2010); Costa Rica (2011); Dominican Republic (2010); Ecuador (2010); El Salvador (2007); Grenada (2011); Guyana (2012); Honduras (2013); Jamaica (2011); Mexico (2010); Trinidad and Tobago (2011); Uruguay (2011).

^a For Honduras and El Salvador, the census inquires about having an email account. This variable used as a proxy for using Internet. This proxy likely underestimates the percentage of persons who use Internet, as those with an email account most probably use Internet, but not all those who use Internet have an email account.

Whether an individual is in work also likely influences their use of Internet. As with education level, being in work is likely to be associated with higher income, and as stated previously this may increase the likelihood that an individual will have the financial resources to access and use computers and cellular phones. Some individuals may also be required to use Internet while at work. And indeed, for working-aged persons with disabilities (18 to 59 years of age) Internet use and access to the Internet at home are higher for those in work, compared to those not in work (see figure 10).

Figure 10
Latin America and the Caribbean (11 countries for use, 13 for access): use of Internet by persons aged 18-59 with disabilities by employment status, around 2010
(Age-standardized percentages)



Source: Economic Commission for Latin America and the Caribbean based on special tabulations of census data from: Antigua and Barbuda (2011); Barbados (2010); Belize (2010); Costa Rica (2011); Dominican Republic (2010); Ecuador (2010); El Salvador (2007); Grenada (2011); Guyana (2012); Honduras (2013); Jamaica (2011); Mexico (2010); Trinidad and Tobago (2011); Uruguay (2011).

^a For Honduras and El Salvador, the census inquires about having an email account. This variable used as a proxy for using Internet. This proxy likely underestimates the percentage of persons who use Internet, as those with an email account most probably use Internet, but not all those who use Internet have an email account.

In summary, even after accounting for age differences between the population with and without disabilities, the use of Internet among persons with disabilities lags behind. There are also important inequalities within the population with disabilities. These gaps are especially acute for those with lower levels of education, those out of work, older persons with disabilities and those with certain types of disabilities, namely difficulties in remembering/concentrating and communicating/speaking. In view of these gaps and inequalities in access to, and use of, the Internet within the population with disabilities and between the population with and without disabilities, governments in the region must take steps to close this digital divide.

IV. Inclusive ICT, human rights and other international and regional policy frameworks

As mentioned previously, the existence of a normative framework and policies can promote availability of accessible ICT for persons with disabilities. These laws and policies can regulate and enforce accessibility requirements and standards, for example, requiring manufacturers to incorporate accessibility features or require that they modify the existing design; they can also be instrumental in the dissemination of accessible ICT for persons with disabilities, including supporting service delivery infrastructure, funding schemes to subsidize the development and distribution of accessible ICT, and influencing market prices of these technologies (Samant, 2013). More broadly speaking, the existence of laws enshrining the right to access to ICT among persons with disabilities can help to generate demands among the population with disabilities and civil society organizations for the progressive fulfilment of those rights.

A. ICT and the Convention on the Rights of Persons with Disabilities

The United Nations Convention on the Rights of Persons with Disabilities (CRPD) is the universal human rights treaty that addresses the rights and dignity of persons with disabilities in a comprehensive way. Almost all independent governments in the region have signed the treaty, and all non-independent territories of the region are bound to the treaty through their status as dependencies of States that have ratified it.

States Parties to the Convention are obligated to implement measures to protect and promote the rights set out in the text of the treaty, and to prepare regular reports on progress made toward achieving its goals. Given that several portions of the Convention pertain specifically to issues of accessibility and use of ICT to support persons with disabilities, the treaty can be used as a legal mandate for the implementation of programmes focused on expanding access to ICT for those who have a disability. It can be used, for example, to expand the mandate of Universal Service Funds to provide more direct support to the ICT needs of persons with disabilities (Global Initiative for Inclusive Information and Communication Technologies, 2011).

Box 3
Provisions of the Convention on the Rights of Persons with Disabilities (CRPD)
which are related to ICT

The Preamble of the CRPD recognizes the importance of access to ICT in enabling persons with disabilities “to fully enjoy all human rights and fundamental freedoms.”

Article 2 defines a number of concepts, including “communication”- which includes access to multimedia and to accessible information and communication technology. It also defines “reasonable accommodation”, which includes modifications and adjustments that do not constitute a “disproportionate or undue burden.” In this regard, Article 2 states that denial of reasonable accommodation is considered to be “discrimination on the basis of disability.” Thus, these definitions, in conjunction with Article 5 – which concerns equality and non-discrimination - establish a right to reasonable accommodation that includes access to multimedia and to ICT.

Article 4 compels States Parties to “promote the availability and use of new technologies, including information and communications technologies [...] suitable for persons with disabilities, giving priority to technologies at an affordable cost.” It also states that, in developing and implementing policies, “States Parties shall closely consult with and actively involve persons with disabilities, including children with disabilities, through their representative organizations.” Thus, governments have a duty to include disability-related organizations as part of the policy development process regarding the promotion of ICT.

Article 9 of the treaty may be most relevant to ICT, insofar as it speaks directly to the issue of accessibility. It states that “States Parties shall take appropriate measures to ensure to persons with disabilities access, on an equal basis with others [...] to information and communications technologies and systems [...] open or provided to the public. These measures, which shall include the identification and elimination of obstacles and barriers to accessibility, shall apply to [...] information, communications and other services, including electronic services and emergency services.” Thus, all public-facing services – such as e-government websites, for example – need to be built in a manner that provides equal access to information for persons with disabilities.

Article 9 also obliges States Parties to:

- Promote [...] appropriate forms of assistance and support to persons with disabilities to ensure their access to information;
- Promote access for persons with disabilities to new information and communications technologies and systems, including the Internet;
- Promote the design, development, production and distribution of accessible information and communications technologies and systems at an early stage, so that these technologies and systems become accessible at minimum cost.

Article 21 of the CRPD concerns the rights of persons with disabilities to “freedom of expression and opinion, and access to information,” and entails the “freedom to seek, receive, and impart information and ideas on an equal basis with others and through all forms of communication of their choice.” It states that governments should “provide information of interest to the general public to persons with disabilities in accessible formats and technologies,” and urge private entities – including providers of Internet-based services – to do the same.

In addition, ICT applications have the potential to assist and empower persons with disabilities in other areas of rights enshrined in the CRPD, such as:

1. Facilitating inclusive education systems and life-long learning (Article 24);
2. Facilitating the right to work, on equal basis to others, for people with disabilities (Article 27);
3. Facilitating participation in political and public life (Article 29);
4. Facilitating participation in cultural life, recreation, leisure and sport (Article 30); and
5. Facilitating cooperation in accessing scientific and technical knowledge (Article 32) aiming towards solutions that are affordable to all (reasonable access, universal design).

Source: United Nations CRPD 2006.

The reporting obligations of States Parties are covered in Article 35, which mandates that countries should report on their progress on meeting the obligations of the treaty within two years after its entry into force, and thereafter submit status reports at least once every four years. Of the 11 CARICOM countries that have ratified the Convention, only Haiti is listed as having submitted such a report to the United Nations Secretariat. The absence of this information is detrimental to the understanding of disability in the Caribbean subregion. The situation is more encouraging in Latin America, where to the present date, 18 countries have submitted reports to the Committee on the Rights of Persons with Disabilities.⁷

⁷ These countries are: Argentina, Plurinational State of Bolivia, Brazil, Chile, Colombia, Costa Rica, Cuba, Dominican Republic, Ecuador, El Salvador, Guatemala, Honduras, Mexico, Panama, Paraguay, Peru, Uruguay, and the Bolivarian Republic of Venezuela. These figures reflect the information available through October 2017.

In the past, representatives of small countries have complained of “reporting fatigue” in relation to the collection of information to be reported to various treaties and international bodies. However, United Nations human rights treaties have a special status, forming as they do the basis of international human rights law. Moreover, Caribbean governments have clearly indicated that priority attention should be given to the concerns of persons with disabilities; commitments which were expressed most recently in the Declaration of Pétion Ville.⁸

The reporting process should also be seen as an opportunity to engage persons with disabilities and their representative organisations to support governments in the process of review and compilation of reports. Such organisations should, after all, be involved not only in review but in policy formulation and decision making more generally; an important principle which is encapsulated by the slogan “nothing about us without us”. Most importantly, the review and reporting process should help countries to build and maintain the momentum necessary to achieve the goals of the Convention, and thereby help to guarantee the full enjoyment of rights among persons with disabilities in the region.⁹

B. The Marrakesh Treaty to Facilitate Access to Published Works for Persons Who Are Blind, Visually Impaired, or Otherwise Print Disabled

The Marrakesh Treaty to Facilitate Access to Published Works for Persons Who Are Blind, Visually Impaired, or Otherwise Print Disabled (MVT) is the most recent addition to the body of international copyright treaties administered by World Intellectual Property Organization (WIPO). The treaty, which went into force in 2016, creates a set of mandatory limitations and exceptions for the benefit of the blind, visually impaired and otherwise print disabled (VIPs) (WIPO, 2013).

This treaty requires Contracting Parties to introduce a standard set of limitations and exceptions to copyright rules in order to permit reproduction, distribution and making available of published works in formats designed to be accessible to VIPs, and to allow the import and export of accessible format copies under certain conditions. By expanding the availability of accessible books and other materials, the treaty promotes access to knowledge and information for persons with visual disabilities, in concordance with the CRPD. It also provides standards and harmonization for copyright conventions as they relate to the population with visual disabilities and accessible formats.

As of December 2017, 12 Latin American countries have ratified the Treaty of Marrakesh (Argentina, Brazil, Chile, Costa Rica, Ecuador, El Salvador, Guatemala, Mexico, Panama, Paraguay, Peru and Uruguay).

C. Latin American normative and policy frameworks

The Latin American region was a forerunner in advancing the rights of persons with disabilities with the adoption of the Inter-American Convention for the Elimination of All Forms of Discrimination against Persons with Disabilities (CIADDIS) in 1999, which has been ratified by 18 OAS Member States.¹⁰ At the time of its adoption, this Convention provided a framework for addressing disability and provided a more explicit commitment on the part of member states pertaining to the protection of the

⁸ These countries are: Argentina, Plurinational State of Bolivia, Brazil, Chile, Colombia, Costa Rica, Cuba, Dominican Republic, Ecuador, El Salvador, Guatemala, Honduras, Mexico, Panama, Paraguay, Peru, Uruguay, and the Bolivarian Republic of Venezuela. These figures reflect the information available through October 2017.

⁹ More information on the Convention on the Rights of Person with Disabilities can be found on the website of the Committee on the Rights of Persons with Disabilities, <http://www.ohchr.org/EN/HRBodies/CRPD/Pages/CRPDIndex.aspx>

¹⁰ OAS member states that have ratified the Convention: Argentina, Plur. State of Bolivia, Brazil, Chile, Colombia, Costa Rica, Dominican Republic, Ecuador, El Salvador, Guatemala, Haiti, Mexico, Nicaragua, Panama, Paraguay, Peru, Uruguay, Bol. Rep. of Venezuela.

rights of persons with disabilities than those contained in the general human rights instruments, which only partially or indirectly addressed the issue of disability (Ullmann, 2017).

The objectives of this Convention are to prevent and eliminate all forms of discrimination against persons with disabilities and promote their full integration in all spheres of society through legislation, social initiatives and educational programmes developed within each State Party (OAS, 1999). While this instrument does not specifically mention access to information and communication technologies per se, there are directives that promote States Parties to eliminate discrimination against persons with disabilities in a series of spheres, including, but not limited to:

Measures to eliminate discrimination gradually and to promote integration by government authorities and/or private entities in providing or making available goods, services, facilities, programmes, and activities such as employment, transportation, communications, housing, recreation, education, sports, law enforcement and administration of justice, and political and administrative activities;

Measures to eliminate, to the extent possible, architectural, transportation, and communication obstacles to facilitate access and use by persons with disabilities;

This call for non-discrimination against persons with disabilities enshrined in the CIADDIS can therefore be applied to non-discrimination in the inclusion and participation in the digital society.

Within the framework of the OAS, the Declaration of the Decade of the Americas for Persons with Disabilities (2006-2016) was also adopted, with a programme of action which calls on Member States to gradually adopt administrative, legislative and judicial measures and the necessary public policies for the effective implementation of the Programme of Action. One of the action points of the Programme of Action is to promote the access of persons with disabilities to new information and communication technologies and systems, including Internet.

D. The eLAC Agenda

Since 2005, the Latin American and Caribbean countries (LAC) have embraced the adoption of ICT as tools for economic development and social inclusion through the approval of the Action Plan for the Information Society in LAC (eLAC). As the Technical Secretariat for eLAC, UNECLAC efforts focus on fostering the implementation of this Action Plan, by coordinating the regional follow-up mechanism, monitoring compliance with the plan's goals, and the generation of statistics and indicators for measuring progress. The eLAC Action Plan for Latin America and the Caribbean proposes ICT are tools for economic development and social inclusion. In 2005, during the preparatory meetings for the second phase of WSIS, the countries of the region approved the Action Plan for the Information Society in Latin America and the Caribbean, known as eLAC2007. The continuity of the process was forged with the approval of the second plan, eLAC2010, followed by the eLAC2015 and recently eLAC2018.

In 2015, UNECLAC organized, in conjunction with the Government of Mexico, the Fifth Ministerial Conference on the Information Society in Latin America and the Caribbean. The Conference aimed to take stock of the agreements in place and continue the policy dialogue with a view to the post-2015 world, incorporating the emerging challenges of the digital revolution and their impact on public policy.

As a result of the Ministerial Conference, the countries of the region renewed the agreements of the eLAC process through the Mexico Declaration, approving the new digital agenda, eLAC2018, which sets out 23 policy objectives in five areas of action: (i) access and infrastructure, (ii) digital economy, (iii) e-government, (iv) sustainable development and inclusion, and (v) governance. With respect to action area four, Sustainable development and inclusion, objectives 14 (Incorporate or strengthen the use of ICT in education and promote the development of programmes that include teacher training, new pedagogical models, generation, adaptation and exchange of open educational resources, management of educational institutions and Educational evaluations), 15 (To contribute to the

improvement in the quality and coverage of health services through programmes and exchange of good practices in telehealth, telemedicine and electronic medical history, among others), 16 (Promote the development of normative frameworks on telework, in addition to encouraging the exchange of experiences and actions for monitoring and evaluation), and 18 (Ensure access to ICT to vulnerable groups, to improve their social, educational, cultural and economic integration) are particularly relevant for the inclusion of persons with disabilities.¹¹

¹¹ It should be mentioned that eLAC2010 had a Working Group on ICT and disabilities which sought to analyze ICT in relation to the situation of persons with disabilities, in order to facilitate the development of specific and innovative lines of action to ensure equal opportunities. Previously, in 2008, the Second Ministerial Conference on the Information Society resulted in the adoption of the San Salvador Agreement, which makes specific reference to the population with disabilities.

V. National-level legislation, policies and programmes to promote ICT usage among persons with disabilities

A. Legislation

Many countries in Latin America have laws that enshrine the rights of persons with disabilities to ICT, including in some cases an explicit mention of Internet (see Annex 2). Typically, these rights are mentioned in instruments pertaining to telecommunications or in legislation that relates to the rights of persons with disabilities specifically. In some cases, persons with disabilities are mentioned as the target population in conjunction with other vulnerable populations, such as those of low socioeconomic status and older adults, whereas in others they are mentioned exclusively.

Map 1
Countries with laws that enshrine the right to ICT for persons with disabilities



Source: Prepared by authors based on an Internet search.

Note: The boundaries and names shown on this map do not imply official endorsement or acceptance by the United Nations.

The laws that specifically mention ICT and persons with disabilities are either the general disability law in some countries (in 13 countries: Chile; Colombia; Dominican Republic; Ecuador; Honduras; Mexico; Nicaragua; Panama; Uruguay; and Bol. Rep. of Venezuela, Bahamas, Guyana, Cayman Islands) or are a provision of the general telecommunication law (in six countries: Argentina; Plur. State of Bolivia; Colombia; Costa Rica; Jamaica, Peru). Some countries, like Colombia, mention ICT and persons with disabilities in several normative instruments. Irrespective of the type of legislation where they are mentioned, the rights of persons with disabilities with respect to ICT refer mainly to the right to access in equal conditions as persons without disabilities (non-discrimination), and ensuring that technologies are in accessible formats. Also, legislation to make the web accessible has advanced in several countries (Peñañiel and Luján-Mora, 2014).

Despite the widespread existence of these laws, their actual implementation is more challenging. Indeed, in some cases these laws have been in place for over a decade, and yet achieving a more widespread access to and use of ICT among persons with disabilities, as reflected in section IV of the present document, has not been achieved. Moreover, as different investigations have suggested, these laws are not always harmonized across sectors. In other words, very advanced laws may exist with respect to the rights of persons with disabilities, but these may not be harmonized with laws that govern education, labour, health, access to information, among other areas (see for example Samaniego et al., 2012).

B. Policies and programmes

In view of the ever-increasing presence of technology in our societies and lives, in all spheres throughout the region countries have implemented digital agendas or plans that seek to promote and harness the positive economic and social effects of ICT. We found examples of such digital agendas that mention persons with disabilities in their strategies from 12 countries in Latin America (see Annex 3). It should be noted that, even though all Latin American countries have a public entity that is responsible for promoting and protecting the rights of persons with disabilities (usually in the form of a Secretariat, a Service, or a Council), most of the initiatives relating to ICT are carried out by the telecommunications entities, sometimes in conjunction with the disability entity.

These plans, policies, and programmes act on different fronts. Some, such as the Innovative Argentina 2020: National Plan of Science, Technology and Innovation – Strategic Guidelines 2012-2015 seek to incentivize the development of new technology and devices to improve the quality of life and inclusion of persons with disabilities. A second set of initiatives focuses on digital literacy and ICT capacity building for persons with disabilities, for example the Information Society Development Plan - The Digital Agenda 2.0 of Peru. Access to ICT for persons with disabilities is another area of action. Accessible infocenters, such as those in Honduras, are one mechanism to promote access to ICT for persons with disabilities.

Map 2
Countries in Latin America with national plan, policy or programme that mentions persons with disabilities and ICT



Source: Prepared by authors based on an Internet search.

Note: The boundaries and names shown on this map do not imply official endorsement or acceptance by the United Nations.

While the existence of these programmes and plans is encouraging, it is not clear whether these plans have established indicators to measure progress. It is also unclear whether the necessary resources, both financial and human, have been allocated in order to ensure their effective implementation.

In sum, the region has in place frameworks that recognize the potential of ICT as a tool to promote greater empowerment of persons with disabilities, and yet this population remains at the margins of ICT use. The existence of laws and policies, or national plans to operationalize these laws are necessary but not sufficient conditions to expand ICT usage among persons with disabilities.

C. Inclusive ICT in education and the workplace

The ways in which ICT can promote the integration of persons with disabilities in the spheres of education and in the workplace, vary considerably depending on the type and the severity of disability. Notwithstanding this section highlights some of the ways in which countries in the region are using ICT to expand education and employment opportunities for persons with disabilities.

1. Initiatives relating to ICT in the education context

In line with Article 24 of the CRPD on inclusive education, Sustainable Development Goal 4.5 calls on UN Member States to ensure equal access to all levels of education and vocational training for persons with disabilities. Additionally, Goal 4a, which refers to inclusive and effective learning environments for all makes specific mention of the availability of computers and Internet for pedagogical purposes, as well as of adapted infrastructure and materials for students with disabilities.

In 2014, UNESCO, in conjunction with the European Agency for Special Needs and Inclusive Education and The Global Initiative for Inclusive ICTs (G3ict), published the Model Policy for Inclusive

ICT in Education for Persons with Disabilities to support governments in the development of policies in the implementation of the United Nations Convention on the Rights of Persons with Disabilities (UN, 2006), specifically with respect to Articles 9 (accessibility), 21 (freedom of expression and opinion, and access to information) and 24 (inclusive education). The concept behind the Inclusive ICT in Education policy is that inclusive ICT can be incorporated in education to enable all learners – in particular those with disabilities – to learn in a way that is tailored to their individual learning styles and to promote the long-term inclusion into wider society, particularly through bolstering their social inclusion and employment opportunities (UNESCO, 2014a). The policy outlines objectives at different levels: the learner, the organization and the system.

In the education context, there is great potential to expand the use of ICT, with potentially positive impacts both for students with disabilities as well as for teachers. For students with disabilities ICT can afford them the opportunity to learn and acquire skills more independently, carry out their work at a pace that is adapted to their specific needs, and ICT can facilitate communication (through writing, reading and speaking) and interaction with teachers and other students, thus increasing social interaction and integration (BECTA, 2003). For teachers of students with disabilities, ICT can help to adapt learning materials into accessible formats, creating more effective ways to transmit information and knowledge content to students with disabilities (BECTA, 2003).

The rapid expansion of mobile applications like digital books, Open Educational Resources (OERs), Free and Open Source Software (FOSS) and Massive Open Online Courses (MOOCs), for example, has opened opportunities for knowledge attainment to many persons with disabilities around the world. The wide range and transversal nature of ICT applications, increase the prospects of persons living with disabilities achieving personal goals, including creating their own enterprises and getting a university education (Lidström and Hemmingsson, 2014).

In Latin America and the Caribbean, research finds that the use of ICT for the education of students with disabilities is very limited and that in general terms, teachers have insufficient knowledge about ICT and Assistive Technologies to enhance learning among students with disabilities (Samaniego et al., 2012). Moreover, the use of ICT as tools for classroom processes, although recognized from a theoretical point of view, often does not materialize. This may be due to the lack of teacher training, large class sizes, prohibitive costs of equipment and other technologies, a lack of infrastructure, and little exposure to emerging technologies among teachers and students alike (Samaniego et al., 2012). Some strategies for overcoming these challenges include disseminating good institutional practices for incorporating ICT in the education context for students with disabilities, increasing capacity and awareness among teachers regarding ICT and Assistive Technologies, promoting training in accessibility with the principles of universal design, and including ICT in the curricular plans for basic education and technical education (Samaniego et al., 2012). Below we highlight some positive experiences in the use of ICT to promote education and training among persons with disabilities.

Uruguay's Plan CEIBAL, which was inspired by the One Laptop per Child (OLPD) project is an initiative that is coordinated jointly by the Ministry of Education and Culture (MEC), the Technological Laboratory of Uruguay (LATU), the National Telecommunications Administration (ANTEL) and the National Administration of Public Education (ANEP). It is a programme which has a national reach that distributes laptop computers to school-aged children and teachers. The programme has a strong emphasis on principles of equality of opportunity in access to technology, on the democratization of knowledge and on the enhancement of learning in the school environment and in the experiential context of the students (Samaniego et al., 2012). Special education schools were incorporated from the beginning into the CEIBAL Plan. For students with visual disabilities, computers are adapted with the JAWS programme and with a magnifying glass for those with low vision. In addition, pedagogical needs were incorporated and didactics indicated by the teachers. Specialized hardware and software have been developed for the XO laptops. These adaptations have been carried out by LATU with the collaboration of the Teletón Foundation. Each school specifically assesses the needs of a student to make the necessary adaptations. Jamaica has a similar programme that distributes computers to children, the Abilities Foundation of Jamaica; although it

does not focus on children and young people with disabilities, it includes them as a general norm (Samaniego et al., 2012).

There are also regional examples of initiatives that seek to expand opportunities for students with disabilities in higher education and training for entry into the workforce through the use of technology. For example, CILSA, an NGO in Argentina, has a National Scholarship and Opportunities Programme with the aim of promoting access to higher education, job training and knowledge of technological tools among persons with disabilities and in a situation of vulnerability. The lines of action developed by CILSA are internally articulated and shared by the beneficiaries: Higher Education Scholarship Programme, Opportunities Programme for Employment through Technology in the Americas (POETA) and e-opportunities for certified virtual training courses (Samaniego et al., 2012).

With regard to addressing the deficit in teacher training in the use of ICT for students with disabilities, an example is a course "ICT and special educational needs" that is offered at the undergraduate level of the Educational Informatics Programme of the Distance State University of Costa Rica. This course has been imparted since 2009 to provide students with theoretical knowledge and practical information on the use and adaptation of ICT to the special educational needs of students, in addition to training in the development, implementation and use of specific applications so that they can use the ICT in a simple and practical way (Samaniego et al., 2012). At the sub-national level, the city of Buenos Aires has a programme, the Integral Plan for Digital Education (PIED) that is geared towards promoting the use and appropriation of technological tools by teachers in the classroom setting and the incorporation of digital content and resources to address the needs of students with various disabilities. In order to achieve this goal, the programme provides training and support to teachers, it provides infrastructure, connectivity and adaptive technologies and other resources (Sunkel and Trucco, 2012).

2. Initiatives relating to ICT in the workplace

In line with Article 27 of the CRPD on work and employment, SDG 8.5 calls on UN Member States to achieve full and productive employment and decent work for all persons with disabilities by 2030. Nonetheless, persons with disabilities face numerous challenges and barriers to enter and remain in the workforce. As noted previously, some of these challenges include their low levels of education and a lack of necessary skills; a lack of information regarding where to find employment opportunities; negative and discriminatory attitudes of human resources staff and hiring managers; limited opportunities to access financing mechanisms to launch a new enterprise; accessibility barriers in applying for jobs, transportation to reach their jobs, and lack of adaptations once they have secured employment.

Some of these challenges can be at least partially addressed by ICT. As outlined in the previous section, ICT can promote increased educational opportunities for persons with disabilities which can enhance their skills and improve their employability; accessible digital platforms can link persons with disabilities with potential employers; telework is an alternative for persons with reduced mobility as it allows them to work from home, thus overcoming two major barriers to work: a lack of accessible transportation to the place of work and physical accessibility of the place of work. It should be noted, however, that telework also has disadvantages such as limiting integration in the work environment, which is beneficial not only for those with disabilities but also for employees without disabilities (OISS, 2012).

In terms of telework initiatives to favour the employment of persons with disabilities, Colombia has enacted Law 1221 of 2008 which establishes the basis for public policy to promote telework, as well as the creation of a network to encourage telework, to disseminate and promote telework in the country. This law also established rights and protections for teleworkers. Other examples, from Argentina, are the PROPET programme which promotes telework in private sector companies, and the Training Programme in Telework of the Ministry of Work, Employment and Social Security, which focuses on different population groups, including persons with disabilities. This programme also includes a financial incentive to companies to hire persons with disabilities who have completed the training course (OISS, 2012).

A key regional initiative on this issue is the POETA programme, which is carried out by the Americas Foundation in alliance with the Organization of American States (OAS). POETA seeks to promote

employment for persons with disabilities through training in ICT. POETA works in conjunction with Microsoft and currently has over 100 informatics centres in 20 countries in Latin America and the Caribbean. Within the framework of POETA, for example, the Secretariat of Public Education of Mexico offers computer-related training courses in educational spaces that are equipped with accessible technology

D. Accessibility standards and guidelines

In the United States, a law known as “Section 508” was enacted to establish and enforce ICT accessibility standards for Federal agencies. In as much as the law also applies to any services procured by Federal agencies in the United States – and with the US Federal Government being the largest purchaser of ICT services in the country – the need for software vendors doing business with the Federal Government to build products in compliance with Section 508 accessibility requirements has contributed to the widespread adoption of industry standards for accessibility.

As a result, Section 508 compliance is a feature of many computer hardware products on the market today, including smartphones, which support a number of accessibility modes used by blind and deaf users. In addition, many software development and web authoring frameworks support Section 508 compliance out of the box – though a certain level of specialist knowledge is still needed to ensure that these tools are appropriately used. Unfortunately, many new and inexperienced software and web developers are not even aware of accessibility issues, and have not been trained on how to use these tools to develop accessible applications. Because of this, many web-based applications fall short of providing a fully inclusive user experience.

With regard to the accessibility of web-based applications in particular, the World Wide Web Consortium (W3C) – the international standards body for the web – has established the Web Content Accessibility Guidelines (WCAG). These guidelines are established along four principles – that information and user interface components must be perceivable, operable, understandable, and robust.

Perceivability requires that components of a web page be presented to users in a way that can be recognized, discerned, and distinguished, regardless of the way the content is accessed. For example, visually impaired users may access web sites through the use of a screen reader that translates all text on the page into spoken words. This can be a problem if important elements of the page are based on imagery. Thus, web developers are discouraged from using images alone to convey information and, in cases where images are used, there should be descriptive alternate text attached to the image that states the context of the picture. Web browsers are able to handle this “alt text” in a way that is unobtrusive to sighted users, but which enables the users of screen readers to interpret the content of an image. Unfortunately, alt text is frequently not maintained by proprietors of websites – including many government websites in Latin America and the Caribbean.

Operability entails the need to ensure that the functions of user interface and navigation components of websites are available to all users. For example, those using screen readers or who have impaired mobility commonly navigate desktop browsers using keyboards to tab between the various links on the page, rather than using a mouse to select a hyperlink. Thus, an important step in the development of any website is to validate that keyboard-based navigation works to access all functional elements of every page. This is a relatively straightforward task when dealing with simple page layouts, but is often complicated by the inclusion of complex elements, such as slideshows, drop-down menus, and special features implemented using Flash or JavaScript. In general, these elements can be made keyboard-accessible, but that often requires an additional investment of developer time and effort.

E. Facilitating access through Universal Service Funds

Universal Service Funds are mechanisms that have been set up in countries around the world to create a source of revenue that can be drawn upon to finance socially beneficial ICT projects. In general, they are funded through a one or two per cent surtax on telecommunications services. Traditionally, USFs have been used to expand telephone and broadband networks into geographical areas that private telecommunications companies would otherwise view as unattractive for investment. This is to ensure that people located in areas with low population density or limited wealth are nonetheless connected to telecommunications networks.

USFs exist in many Latin America and Caribbean countries, and have the potential to be a sustainable source of funding for programmes aimed at improving access to information and communication technologies (ICT) for persons with disabilities. As ITU points out (2013), USFs have a long history in the Americas region. The region has also shown an ability to incorporate broadband deployment in the USF mandate, and several governments themselves have successfully funded USFs. However, it seems that the region has been less inclusive of persons with disabilities in USF mandates and allocation (ITU, 2013).

In recent years, there has been a move to reshape the mandate of these funds towards ensuring both universal service and universal access. The concept of universal access recognizes that not only do remote, disadvantaged and vulnerable populations require an available connection to the broader telecommunications network, but they also need the skills, equipment and support services to be able to make use of it.

Persons with disabilities are in particular need of these types of programmes, not only due to their specific needs in terms of training and support, but because they often find themselves at significant financial disadvantage due to their income generating capacity being curtailed as a result of their disability. As a result, they may face difficulty in affording the technology that could make a difference in their lives by providing them with access to the digitally connected world. This is a gap that can be bridged through the use of Universal Service Funds.

Increasingly, the role of USF in facilitating access to the population with disabilities is being recognized as part of the legislative mandate for USFs. For example, Section 39(2.d.iii) of Jamaica's Telecommunications Act states that one of the roles of the fund is to "support information and communications technology programmes that specifically target vulnerable groups, including low income households, the elderly, the youth and disabled persons." Under Trinidad and Tobago's universal service regulations, put forth in 2015, it is considered a "mandatory Universal Service Initiative" for those with telecommunications concessions to make "special provision of approved assistive technology for persons with disabilities to support use of basic telecommunications services".¹² The USF makes funding available for concessionaires to recoup costs associated with providing this equipment.

The USF programmes in Jamaica and Trinidad and Tobago offer two different examples of how funding can be distributed, and this has significant implications for how they may be marshalled to support increased access to ICT for persons with disabilities. In Jamaica, USF funding is administered through a corporate body, which supports projects managed by a broad variety of organizations. Organizations that have managed USF projects include NGOs, such as the Jamaica Association for the Deaf, and educational institutions, such as the University of the West Indies' Centre for Disability Studies.

In Trinidad and Tobago, as in several other countries, the USF is administered directly by the telecommunications regulatory authority. Funding for projects under the USF is limited to the licensed telecommunications carriers that pay into the fund. Thus, disability support organizations wishing to pursue projects focused on reducing barriers to ICT use for the disabled must do so in partnership with

¹² It should be mentioned that eLAC2010 had a Working Group on ICT and disabilities which sought to analyze ICT in relation to the situation of persons with disabilities, in order to facilitate the development of specific and innovative lines of action to ensure equal opportunities. Previously, in 2008, the Second Ministerial Conference on the Information Society resulted in the adoption of the San Salvador Agreement, which makes specific reference to the population with disabilities.

one of the telecommunications carriers. This is somewhat limiting to the scope of projects, in as much as they must be congruent with the priorities of the telecommunications companies. However, most carriers in the region do have offices that work in support of corporate social responsibility, and therefore should be amenable to cooperating on projects to promote broader access to ICT – especially ones that can be financed via USFs.

In some cases, significant amounts of USF funding have remained unspent, especially in several of the Member States of the Eastern Caribbean Telecommunications Authority (ECTEL). According to CANTO¹³, after seven years of operation, the USF in Grenada had disbursed less than one per cent of the funds that it has collected, Saint Lucia had disbursed four per cent, Dominica 15 per cent, Saint Kitts and Nevis 15.5 per cent while Saint Vincent and the Grenadines had dispersed 76 per cent. It is unfortunate that such a large portion of these collected funds remain untouched when there is a great need to reduce barriers to access for disabled citizens of these countries. This disparity is one reason ECTEL has proposed a loosening of the restrictions on organizations that are eligible for USF funding.¹⁴ Should ECTEL's proposal be adopted by its Member States, disability-focused organizations in those countries may become directly eligible for funding, rather than having to work in conjunction with telecommunications service providers.

Universal Service Funds remain a valuable, but often-underutilized resource that can be used to fund programmes that could have a significant impact on the lives of persons with disabilities in the Latin America and Caribbean region. Thus, disability-focused organizations wishing to propose ICT-related programmes that may be eligible for funding should make enquiries with their national telecommunications regulator to understand what opportunities may be available. Further, these organizations may wish to advocate for a policy stating that a specific percentage – perhaps 20 per cent – of the money collected by these funds be directed to making ICT services accessible to persons with disabilities.

¹³ http://www.ntrcdom.org/images/consultations/Univ_service_fund_consult/CANTO_Response_ECTEL_Changes_USF_Feb_22_2016.pdf

¹⁴ http://www.ntrcdom.org/images/consultations/Univ_service_fund_consult/CANTO_Response_ECTEL_Changes_USF_Feb_22_2016.pdf

VI. Conclusions and recommendations

Identifying strategies and mechanisms to overcome the exclusion and marginalization experienced by persons with disabilities is essential in order to move towards more equitable societies. In today's digital world the ability to access and convey information and knowledge are key determinants of economic and social inclusion. Therefore, ICT are an essential part of a disability-inclusive development agenda.

We live in a context of an ever-evolving technological landscape. However, in Latin American and Caribbean countries the transition to the information society is uneven, both between countries and within them. There is increasing attention being given to the digital divide that affects the population with disabilities and the adverse impact this can have for their possibilities of inclusion in different spheres – not only in education and employment, but also in their ability to socialize, to participate actively as members of society and to exercise citizenship.

A reflection of this concern is expressed in a number of global and regional initiatives that seek to analyse and reflect on the role of ICT in the lives of persons with disabilities and that aim to consolidate commitments and action towards closing the gap. Two recent examples include the 2014 global conference From Exclusion to Empowerment: The Role of ICT for Persons with Disabilities and its outcome document “The New Delhi Declaration on Inclusive ICT for Persons with Disabilities: Making Empowerment Reality”. This document recognizes that the improvement in the well-being of persons living with disabilities requires the combined efforts of all stakeholders in society, including governments, businesses and NGOs, and provides a framework for the development of effective policies, and the foundation for promoting the human rights of this group (UNESCO, 2014b).

On a regional level, UNESCO and the Government of Costa Rica with the support of various partners organized the Regional Conference on ICT for Persons with Disabilities in Central America in San Jose, Costa Rica on 14-16 November 2016. The objective of the meeting was to empower persons with disabilities with respect to ICT, including women, girls and indigenous peoples. An outcome of this meeting was a Road Map, which is based on the recommendations of the meeting to ensure that persons with disabilities in Central America can access and use ICT. More recently, in November of 2017, ITU organized a meeting Accessible Americas IV: Information and Communication Technologies which also emphasized the situation of persons with disabilities in Latin America vis-a-vis ICT. The organization of these meetings is encouraging. Nonetheless, follow up is needed in order to progress beyond words, and towards action that will improve the lives of persons with disabilities.

Having documented the digital divide in Latin America and the Caribbean, a first step to devise recommendations to fully exploit the potential of ICT to advance their inclusion, is to consider the reasons why persons with disabilities are not using ICT.

Availability and affordability are two critical issues. Evidence from the region suggests that people with disabilities are more likely to be poor, unemployed and living in rural areas (see for example ECLAC, 2012). This combination of circumstances means that access to ICT will be limited by the availability and cost of the device, of electricity to power the device and of Internet access should that be necessary. In this regard it is important to consider how current and emerging technologies are being made more accessible, affordable and relevant for persons with disabilities.

Even when ICT are available and affordable, their design may render them useless for persons with disabilities. If technology is designed for those without disabilities, then the onus falls on those with disabilities to purchase additional technologies to make them accessible (MacDonald and Clayton, 2012). There may also be lag between rate of development of new technology and the much slower rate of development of advances in interfaces for persons with disabilities. Therefore, there is a need to incorporate universal design features in mainstream ICT, so that they incorporate accessibility and user functionalities from their inception, in order to meet the needs of a wide range of potential users (ITU, 2013). As persons with disabilities increasingly become ICT users and consumers they can exert pressure as consumers so that universal design features are taken into account and ICT developers are more responsive to the accessibility needs of persons with disabilities (Labrada and Valenzuela, 2013).

Box 4 **Principles of universal design**

Universal design is the design of products, environments, programmes and services that can be used by all persons, without a need for adaptations or specialized designs. The seven principles of universal design include:

Equitable use: with the same ways of use for all, the same privacy guarantees, security and design.

Flexible use: the design accommodates a wide range of individual preferences and abilities, offering different options for usage.

Simple and intuitive use: use that is independent of the user's experience, knowledge, language abilities or concentration level.

Perceivable information: the design transmits information through pictorial, visual, verbal, auditive and tactile means.

Tolerance to error: the design minimizes risks and adverse consequences of involuntary or accidental actions.

Adequate size and use: provides adequate space and size for reaching, manipulating and using, independently of the user's body size, posture, or mobility.

Source: Center for Universal Design of North Caroline State University.

But the use of ICT depends not only on availability, affordability and a design that facilitates use. Motivation and skills are also necessary - in other words the desire and the capacity to take advantage of these tools. For persons with disabilities a major barrier to access appropriate ICT tools is a lack of awareness that such tools exist. In some countries this barrier is aggravated by the fact that much of the information about the tools exists in English rather than in the person's own language. Several respondents to the questionnaire mentioned the need for compilation and dissemination of information about new ICT tools as they are created. In this sense it is important to raise awareness about the potential benefits of using ICT and develop skills for ICT use among persons with disabilities and those in their lives. Conventional and digital literacy may both be required, and may both be lacking. Research findings point to a continuing shortage of itinerant teachers with the specialised training needed to support persons with disabilities in the use of ICT.

The rising levels of education among youth in Latin America and the Caribbean (Trucco and Ullmann, 2015), and among youth with disabilities, is promising in terms of narrowing the digital divide

that affects the population with disabilities. Indeed, the statistical evidence presented in this investigation suggests that the digital divide between the population with and without disabilities decreases with rising levels of education. As education opportunities expand for young people with disabilities, it is also important to promote youth with disabilities to pursue careers in technology, so that they may be directly involved in the creation of technology so that these may better respond to their lived experiences and realities.

Expanding ICT usage among persons with disabilities is a promising strategy to enhance their economic, social and political integration into society, but this investigation clearly reveals that much remains to be done if the potential of ICT as a vehicle and tool for greater inclusion for persons with disabilities is to be realized. Some concrete recommendations in this regard include:

- (i) Ensure that people with disabilities have access, from a financial standpoint, to the technology that could enhance their inclusion and increase their empowerment. This is an important barrier for persons with disabilities, who tend to be overrepresented among the poor. In this regard governments should explore options to subsidize the acquisition of inclusive technologies for persons with disabilities. Universal Service Funds are a potential source of revenue to support this effort.
- (ii) The results from the qualitative components of this investigation indicate that plans to promote ICT use among persons with disabilities are often drawn up, but there is then a long hiatus before they are implemented. Therefore, it is necessary to strengthen and accelerate implementation of existing national plans that relate to ICT and persons with disabilities. Among other elements this could entail establishing concrete objectives, implementation and monitoring mechanisms, including indicators, and having a concrete budget allocation to carry out the activities needed to meet the objectives. With respect to indicators, ITU (2013) has suggested a series of indicators to measure progress towards the expansion of ICT use among the population with disabilities in different sectors (health, education, employment, independent living, government services, participation in political and public life).
- (iii) Strengthen the coordination and articulation among the different public sector, private sector and civil society entities that organize programmes to promote ICT usage among persons with disabilities so that the programmes reinforce each other.
- (iv) Promote the development, both in the private sector and in higher education institutions, of apps or other technological tools that are particularly designed to respond to the challenges of living with specific disabilities. An example of this type of encouragement can be seen in the annual FRIDA awards. FRIDA is the Regional Fund for Digital Innovation in Latin America and the Caribbean, an initiative of LACNIC (Latin America and Caribbean Network Information Centre), and was established in 2004. Promoting universal design and accessible ICT is especially critical. It has benefits for all, not only for persons with disabilities, and therefore has great potential as a tool for inclusive development.
- (v) Related to recommendation 4, it is important to promote greater participation of persons with disabilities not only in developing ICT that are specific to the population with disabilities, but also the development of mainstream ICT. Their involvement is also crucial in developing plans and strategies to expand ICT access and use in the population with disabilities.
- (vi) The need to improve statistics. Most countries in Latin America did not collect individual-level ICT use information in the 2010 census round. Although household surveys exist that do delve into this topic in more detail, these instruments do not necessarily gather information on disability, and in cases where they do, the sample size is often too small to allow for any meaningful analysis. In parallel, there are well-documented challenges of disability measurement in the region (see for example ECLAC, 2014). The statistical

invisibility of ICT use among persons with disabilities constitutes a formidable barrier to understanding the magnitude of the digital divide that affects this population and devising policy solutions to eliminate it.

- (vii) To further promote the generation of information on this issue, it is necessary to complement studies such as ours with qualitative data to shed further light on this issue. Although qualitative studies have been conducted on ICT use among persons with disabilities, these have generally been conducted in developed countries. Studies of this type in our region could enhance our understanding of the barriers and factors that limit or promote ICT use among this population, giving us clues as to the most relevant issues that condition ICT use for persons with disabilities in Latin America and the Caribbean, for example low levels of literacy, non-accessible formats, cost, lack of familiarity and other explanations, for example, individual perceptions of ICT.
- (viii) More emphasis must be placed on capacity building. There is a need for long-term, hands-on training that can walk individuals through how to use the technology. Increased capacity must also be promulgated among families and disabled persons organizations and other NGOs, so that they are equipped to provide the kind of training and support that is needed.
- (ix) Finally, what is needed is recognition by the society of the rights and the needs of its members who have disabilities. Expanding access to ICT is not a benefit or an act of charity but a way to make it more possible for persons with disabilities to enjoy their rights. It is necessary to raise awareness in all spheres, including but not limited to the public and private sector, as well as civil society organizations, and among persons with disabilities and their families regarding the importance of ICT and Assistive Technologies in equalizing opportunities and as a tool for exercising their rights. Framing ICT use among the population with disabilities in this way could also help us as societies move away from the medical model of disability and towards the human rights model, in coherence with the CRPD and other instruments.

As MacDonald and Clayton note (2012), while ICT have the potential to reduce barriers, they will not ultimately eliminate social exclusion for persons with disabilities. At the same time, ICT could be important tools for inclusion, but could also perpetuate exclusion, marginalization and inequalities if they are not designed for all in an accessible manner. Therefore, in order for ICT to fulfil their potential with respect to promoting the rights of persons with disabilities their design, use, and dissemination must occur in a political context that is strongly committed to the rights and the equalization of opportunities for persons with disabilities. Without this foundation, ICT may well exacerbate the exclusion of this population. As Sheldon notes (2004), technology is not neutral. Therefore, public policy must guide the development of accessible ICT and promote their widespread availability as a necessary condition to advance towards more inclusive and just societies.

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Annexes

Annex 1

Questionnaire for disability-related organizations in the Caribbean

The United Nations Economic Commission for Latin America and the Caribbean (ECLAC) is conducting research to determine how information and communication technologies (ICTs) can be used to support broader social inclusion for persons with disabilities. We ask for your assistance, as an organization active in the support of persons with disabilities, in conducting our research by completing the following questionnaire. Your responses will inform the development of the United Nations policy recommendations to national governments on how to reduce barriers to the effective use of technology by persons with disabilities in Latin America and the Caribbean.

Question 1: Please provide some background information on your institution:

- What is the official name of the institution?
- What population does the institution serve? (quantity/location/type of disability)
- What services are offered to this population?
- Is the organization public, private, or quasi-public?
- What are the sources of funding?
- Does the organization take part in any regional alliances or networks with organizations in their territories?
- Who may we contact at the institution if there are further questions?

Question 2: Please provide some information on how information and communication technologies (ICTs) are used by the persons with disabilities who are serviced by your institution. (For the purpose of this discussion, ICTs may include computers, mobile phones, or any type of specialized assistive digital technology).

- What ICT tools are used by persons with disabilities serviced by your institution? Please be specific with regard to names of software and other tools.
- To what extent does your institution provide technical support for these tools?
- How are persons with disabilities trained in the use of these tools?
- How are facilitators trained in the use of these tools?
- How are new tools discovered, evaluated, and considered for adoption?
- What barriers exist to broader access and use of these tools?
- Are you aware of any government or regulatory policies concerning the use of ICT for the support of persons with disabilities? Are these policies appropriate and effective, or are there elements of them that should be reconsidered?
- Are there any areas in which the available ICT tools are falling short in providing effective accessibility options for persons with disabilities? If so, what might be the cause of this shortfall?
- Please share any “success stories” that you may be aware of in which ICT has made an effective difference in the lives of persons with disabilities? What works well?

Thank you for completing this questionnaire. If you have any additional materials that may shed light on any of the items discussed above, we would appreciate their inclusion as part of your response. Please return to Robert.Williams@eclac.org.

Annex 2

National legislation that enshrine the right to ICT among persons with disabilities

Country	Legislation	Mention of persons with disabilities
Argentina	Digital Argentina law 2014	To guarantee that specific social groups, persons with disabilities , among them users with serious vision problems or visual disabilities, those low of hearing and with speech impediments, older persons and users with special social needs have access in equal conditions to ICT.
Bahamas	Persons with disabilities (equal opportunities) act, 2014	Every person with a disability shall be entitled to a barrier-free and disabled friendly environment to enable him to have access to...ICT.
Bolivia (Plurinational State of)	General law 164 of telecommunications, and information and communication technologies, 2011	Guarantee adequate access to services for persons with disabilities ; users with disabilities and older adults must have access to telecommunications and information and communication technology established in the regulation; providers must ensure that users with disabilities and older adults have access to telecommunications and information and communication technology established in the regulation.
Brazil	<u>Ordinance No. 16, 2012</u>	Guarantee access to the network of ICT services to minority and marginalized groups, those in poverty, those belonging to indigenous groups, those with a disability , the afro descendent population and older adults.
Cayman Islands	The disabilities (Solomon Webster) bill, 2016	The law reaffirms the economic, social and cultural rights of persons with disabilities and makes specific reference to technology in the section on reasonable accommodation.
Chile	Law number 20.422 that establishes norms on equal opportunities and social inclusion for persons with disabilities, 2010	The State, through the relevant agencies, will promote and implement affirmative action measures to advance the inclusion and non-discrimination in employment of persons with disabilities , it especially should: b) Promote the creation and design of processes, technologies, products and labour-related services that are accessible and disseminate their application. (Art 43, Lit b.); Public libraries must have materials, infrastructure, and accessible technologies for people with sensory-related disabilities, considering facilities, necessary adjustments and provide support services for these users.
Colombia	Law 1341 which defines the principles and concepts on the information society and the organization of the Information and Communication Technologies, 2009	Finance plans, programmes and projects to promote access to ICT for persons with physical limitations .
Colombia	Law 1680 which guarantees access to information, communication, knowledge and information technologies and telecommunications to blind people and those with low vision, 2013	The State guarantees persons with disabilities , the blind and those with low vision access to information, communication, access to knowledge and technology.
Colombia	Law 1618 through which the provisions to ensure the full exercise of rights for persons with disabilities are set forth, 2013	Implement appropriate measures to identify and eliminate obstacles and to ensure universal access for all persons with disabilities to the built environment, transportation, information and communication, including information and communication technologies and other services, ensuring the conditions for people with disabilities to live independently.

Table A.2 (continuation)

Country	Legislation	Mention of persons with disabilities
Colombia	Law 1221 to establish rules to promote and regulate Telework and other provisions, 2008	Ensuring access to the ICT services network for minority and marginalized groups, people living in poverty, those belonging to indigenous groups, those with disabilities , the elderly and afro-descendants. The Ministry of Social Protection, within six (6) months following the enactment of this law, will formulate a public policy to mainstreaming telework for vulnerable populations (people with disabilities, people in situation of forced displacement, population in a situation of geographic isolation, female-headed households, people in prison.
Costa Rica	General telecommunications law 8642, 2008	Provide high quality, timely, efficient and affordable telecommunications services to institutions and people with special social needs, such as shelters for children, the elderly, persons with disabilities , persons belonging to indigenous groups, schools and public schools, and public health centers.
Dominican Republic	General Law on Disability in Dominican Republic Law No 42-00, 2000	The State shall provide adequate technology to educational centers for the training and information of persons with disabilities .
Ecuador	Organic Disabilities Act (Official Gazette No. 796/12), 2012	Access for people with disabilities to the physical environment, transportation, information and communications is guaranteed, including computer systems and information and communication technology, and other facilities and services open to the public or public use facilities, both in urban and rural areas.
Guyana	The persons with disabilities act, 2010	Addresses accessibility of broadcast services and telephone services.
Honduras	Decree 160-2005 Law of equity and comprehensive development for people with disabilities, 2005	The premises of Internet services open to the public must be located in an accessible and adequate environment, and should have programmes and options in order to be used by persons with disabilities .
Mexico	General law for the inclusion of persons with disabilities, 2011	The competent authorities shall establish, inter alia, the following measures: I. To provide, in a timely manner and at no additional cost, information addressed to the general public, in accessible formats and with technologies appropriate to different types of disability ; II. Promote the use of the Mexican Sign Language, the Braille System, and other modes, means and formats of communication, as well as access to new information and communication technologies and systems, including the Internet; III. The institutions in charge of social services and programmes in the matter of disability will provide the information and the guidance required to favor their development and social integration, and IV. The media and private sector institutions that provide services and provide information to the general public will provide them in accessible and easily understandable formats for persons with disabilities .
Nicaragua	Law 763 on the Rights of Persons with Disabilities, 2011	The State has an obligation to promote access to information and communication systems and technologies, such as the use of sign language, braille system, augmentative and alternative modes, media and formats of communication, including Internet, at all stages of life of people with disabilities . The State shall guarantee to persons with disabilities access to web pages of public institutions according to international standards.
Panama	Law 42 establishing the equalization of opportunities for persons with disabilities, 1999	It is the responsibility of the State, through the competent authorities, to dictate, execute and supervise measures to ensure the application of communication, audiovisual, proprioceptive and gestural mechanisms, to provide information to the population with disabilities , in the media and in educational and cultural programmes.

Table A. 2 (concluded)

Country	Legislation	Mention of persons with disabilities
Peru	Law n ° 28.530 May / 05: Law on Promotion of access to the Internet for people with disabilities and adaptation of physical space in public Internet booths, 2005	
Peru	Law n ° 28.303 Jul / 04: Framework Law on Science, Technology and Technological Innovation, 2004	Development of Ctel projects that allow the productive incorporation and the economic and social integration of people with disabilities .
Uruguay	Law N° 18.651 Integral protection of persons with disabilities, 2010	The State shall provide coordinated assistance to persons with disabilities who lack any or all of the benefits referred to in the following text of the present article, in order to enable them to play a role in society on equal standing as other people. To this end, it will take the corresponding measures in the areas mentioned below as well as in any other that the law establishes: Accessibility to computers incorporating the existing technological advances.
Venezuela (Bolivarian Republic of)	Organic Disabilities Act (Official Gazette No. 796/12)	Makes provisions for the adequate access to services by persons with disabilities or with special needs; access to the fixed telephone service available to the public, comparable to those offered to other users.

Source: prepared by authors, based on an Internet search.

Annex 3

National plans, policies, or programmes that mention persons with disabilities and ICT

Country	Plan	Mention of persons with disabilities
Argentina	Innovative Argentina 2020: National Plan of Science, Technology and Innovation – Strategic Guidelines 2012-2015	Technologies for persons with disabilities: Development of components, innovation and design of equipment and devices for the improvement of the conditions of assistance of persons with different types of disabilities.
Chile	Digital Agenda "Imagina Chile" 2013-2020	Digital inclusion - digital literacy: the groups with the highest risk of digital exclusion will be considered through dedicated training activities, among them, persons with disabilities and groups of greater social vulnerability, so that they can benefit from the advantages of which ICT offer for their personal and professional development.
Colombia	"Vive Digital" Action Plan Colombia 2014-2018	Reduce the digital divide and ensure the full exercise of the rights to information and communication for people with some form of disability, through accessible technological spaces and tools that benefit the digital activities of this population, thus supporting an inclusive, equitable and sustainable development for all.
	Crea Digital	This programme seeks to promote the development of apps and digital content in the areas of culture and education. The 2014 iteration had a focus on developing inclusive content for persons with disabilities.
Costa Rica	National Telecommunications Development Plan 2015-2021 "Costa Rica: Una sociedad conectada"	Policies should be inclusive, servicing the general population, including the populations that are vulnerable: those who are economically disadvantaged, with an emphasis on persons with disabilities, children and youth, older adults, the indigenous, female heads of households, microentrepreneurs, and the public institutions that serve them. It will be ensured that the entire population (including persons with some type of disability) can access quality broadcasting services from the technical standpoint, on equal terms and without any discrimination. Also, accessibility in the production of software, content development and applications will be promoted, enabling innovative products and services.
Dominican Republic	Preliminary version of the Digital Agenda Dominican Republic 2016-2020	In order to ensure a proper gender perspective, and also to promote the integration of persons with disabilities, the institutions responsible for implementing the Digital Agenda assume the commitment to integrate the Equal Opportunities Plan for Dominican women in The Information Society (PIOM-SI) and collaborate with the Plan for Accessibility and Social Integration of persons with disabilities, in the plans, programmes and projects of each institution involved.
Ecuador	National Broadband Development Plan	By 2015, ensure that at least 40% of from vulnerable social groups (persons with disabilities, persons deprived of liberty, people with social problems, etc.) have access to broadband service.
El Salvador	Strategy and Action Plan for Electronic Government in El Salvador	Improvement in the design for web accessibility, which is the practice of creating and maintaining websites that can be used by persons with disabilities. It is the duty of any government to be inclusive with all citizens, whatever their sensory or cognitive capacities, so that web accessibility should be a priority.

Table A.3 (concluded)

Country	Plan	Mention of persons with disabilities
El Salvador	National policy for integral care of persons with disabilities	Promote access to innovative and affordable technologies.
Guatemala	National Agenda for the Information and Knowledge Society of Guatemala	Implement a system of education for life, with the participation of older adults and persons with disabilities.
Honduras	Digital Agenda of Honduras 2014-2018: connectivity, transparency, and efficiency	Encourage the digital inclusion of indigenous peoples and communities, persons with disabilities and older adults; the installation of broadband Internet access centers aimed at rural and urban communities, and in conditions that are accessible to all users, and the installation of Screen Reading Programmes for persons with visual disabilities. Promote the employment inclusion of persons with disabilities through teleworking.
Mexico	National Digital Strategy, 2013-2018	National Campaign for Digital Inclusion. To deepen the National Digital Inclusion Campaign with special emphasis on people of indigenous origin, older adults, persons with disabilities and groups in situations of marginalization and extreme poverty.
Panama	Digital Agenda 2014-2019 Panamá 4.0	Provide users with disabilities or with special difficulties access to information for online procedures.
Peru	Information Society Development Plan - The Digital Agenda 2.0	It should be ensured that developments that are promoted to advance towards the Information and Knowledge Society in Peru, consider actions to adequately address disability and diversity from the focus of equal rights and opportunities, non-discrimination, universal accessibility and reduction of barriers for the various vulnerable groups. The previously stated not only applies to the incentive policies to access a computer and the Internet, and/or ensure that access centers such as public booths and telecentres are prepared to support different users, such as the disabled, the elderly, children, indigenous peoples, Afro-descendants, among others. It also entails the generation of digital literacy projects and capacity building, as well as the development of applications and content that reveals multiculturalism and identity, as well as addressing disability issues.

Source: prepared by authors, based on an Internet search.

PROJECT

DOCUMENT

This paper examines the ways in which information and communications technologies (ICT) can promote greater inclusion of persons with disabilities. It characterizes the patterns of ICT use among persons with disabilities in Latin America and the Caribbean and proposes recommendations and strategies to expand access to and use of ICT among persons with disabilities in the region in order to harness the potential of these tools to promote greater inclusion. We find that, even after accounting for age differences between persons with and without disabilities, the use of Internet among persons with disabilities lags behind that of persons without disabilities. There are also inequalities within the population with disabilities. These gaps are especially acute for those with lower levels of education, those out of work, older persons with disabilities and those with certain types of disabilities, namely difficulties in remembering/concentrating and communicating/speaking. In view of these gaps, and in light of their responsibilities as signatories to the Convention on the Rights of Persons with Disabilities, governments in the region must take steps to close this digital divide.