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# About Mada

Mada Assistive Technology Centre is a non-profit organization committed to connecting persons with disabilities to the world of Information and Communication Technology. Founded in 2010, to accommodate the UN convention on People with Disabilities, in recognition that technology is pervasive across a breadth of private and public sector activities and inherent in the Ministry of Transport and Communications strategy, and works to improve digital inclusion for persons with disabilities in the State of Qatar.

The Qatar National Vision 2030 serves as a clear roadmap to guide economic, human, social and environmental development in the State of Qatar. The growth of our country is dependent on all who live here, and therefore it is our responsibility to cater to all people effectively, support their ability to live independently, and derive equal opportunities when it comes to education, employment and independent living.

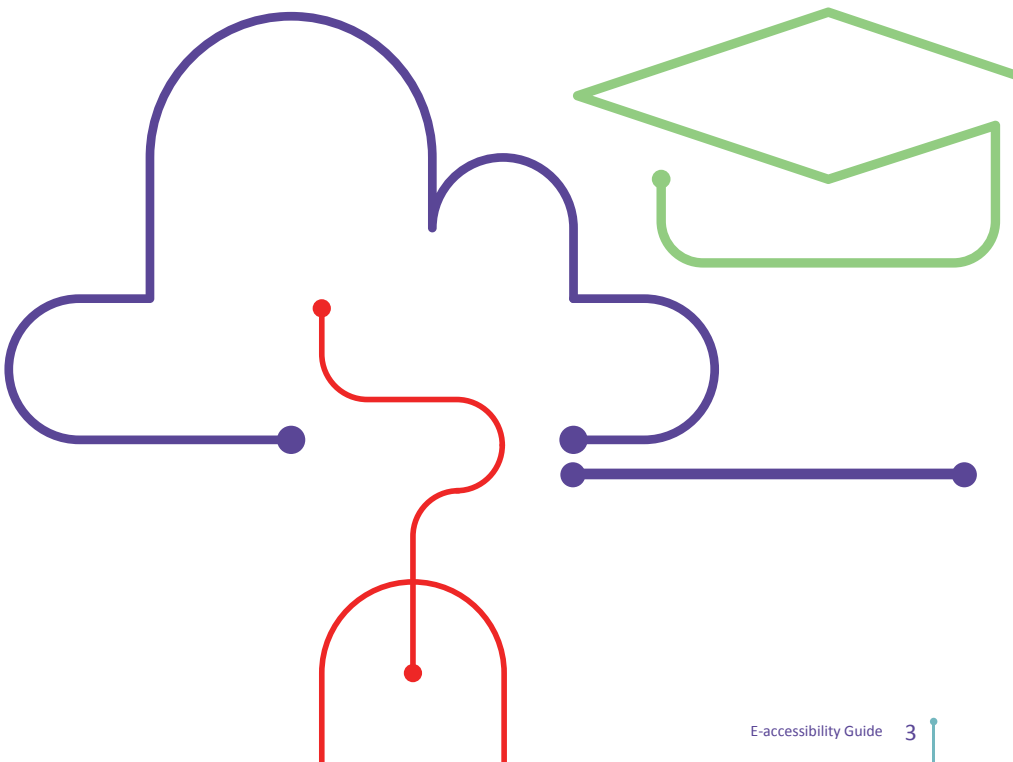
Persons with disabilities form an integral part of our society and have tremendous potential to contribute to the growth of the economy. Mada was created to help this community by leveraging on the capabilities of information and communications technology.

The organization strives to do more than just empower an individual; it endeavors to enrich the lives of PWD to the fullest, by addressing issues in the ecosystem to ensure that they have all the required technology to succeed. To deliver on its ambitions, Mada engages in strategic and operational partnerships with critical players in the People with Disabilities ecosystem.

## Mada prioritizes three key areas:

- Education: Educating both PWD and a variety of stakeholders about the ways in which ICT can be used to enhance life
- Employment: The inclusion of PWD into mainstream society through harnessing the power of ICT to create employment and nurture entrepreneurship
- Community: Enabling independent living by encouraging the creation of an accessible community for PWD through the power ICT

Mada also enables these areas through provision of advisory services and policy recommendations



# Introduction

Enabling people with disabilities to access information and communication technology is considered a vital step towards greater integration and accessibility. This is to core services such as healthcare and government, as well as access to the labor market and general social integration.

Despite the advancements in technology, the impact it has on the lives of people with disability is minimized when content is designed and published in an inaccessible manner. This results in the creation of barriers to online information and services. The reality is that the majority of websites and mobile apps are still inaccessible to people with various disabilities.

The group of people who do not have access to information and Internet services includes people with disability, the elderly, the illiterate and semi-illiterate, and those who access the Internet using a range of technologies and platforms as well as persons belonging to cultural or linguistic minorities. These groups face difficulties in accessing electronic and media services as a result of the lack of commitment to the principles of global design during the creation of websites and the preparation of content on the internet.

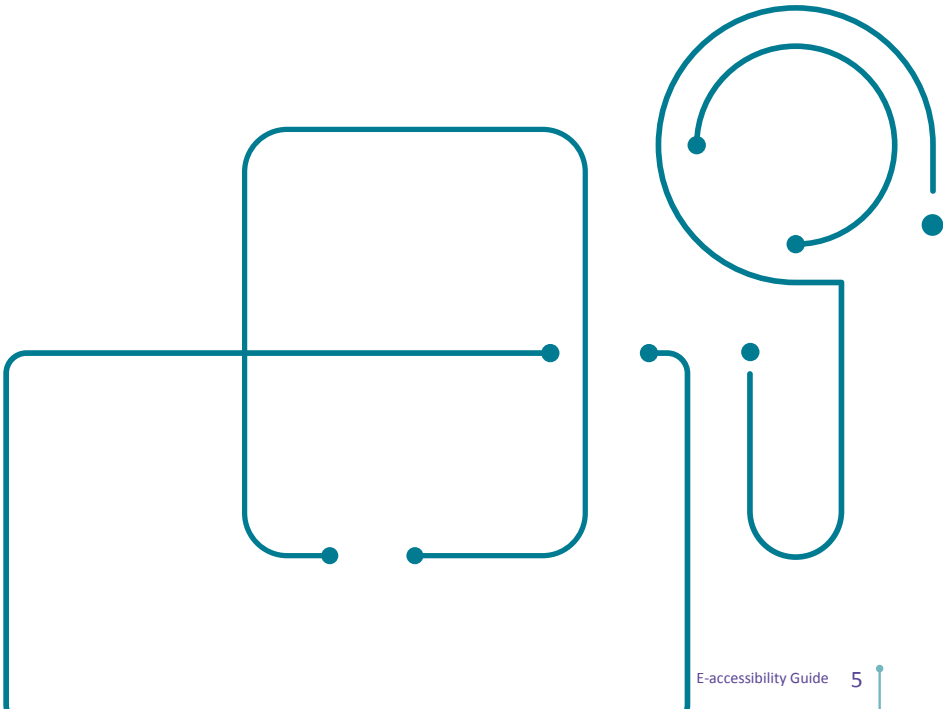
MADA seeks to make this guide available to stakeholders to use as a reference material for the development and implementation of E-accessibility and information technology policies, strategies, projects and initiatives as well as to enhance the common knowledge base with decision makers. The purpose of this guide is to identify how the specified



standards, guidelines, and best practices can be applied to support E-accessibility.

This guide will identify E-accessibility standards in the specified domains of:

1. Websites
2. Mobile applications
3. Electronic documents
4. Media (video and audio)
5. Electronic kiosks and automated teller machines (ATMs)
6. Text and video relay services for the deaf



# Functional limitation to consider when using ICT

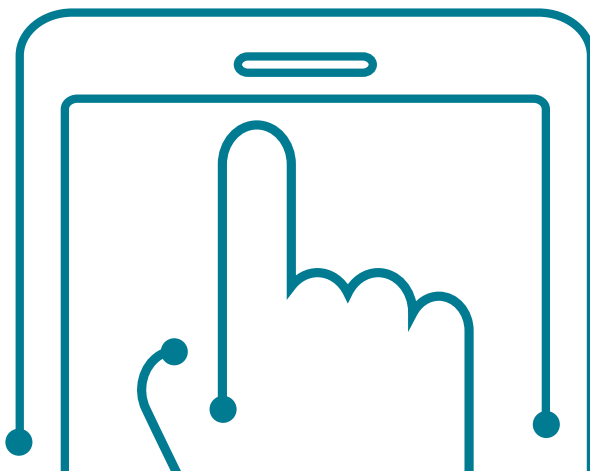
Accessible electronic communications and technology must provide alternative modes of access to users with specific disabilities such as:

- **Blindness** (without vision) – by providing an alternative to visual access
- **Limited vision** – by providing magnification, a reduction of the field of vision required, or user control of contrast
- **Without color perception** – by providing a mode of operation or communication of information that is not dependent on color
- **Deafness** (without hearing) – by providing a mode of operation or comprehension of content that is not dependent on sound
- **Limited hearing** – by providing a mode of operation that reduces background noise, one that improves clarity, or one that allows user control of volume
- **Without speech** – by providing at least one mode of operation that does not require user speech
- **With limited manipulation** – providing that, where a manual mode of operation is used, at least one mode does not require fine motor control or operation of more than one control at the same time
- **With limited reach and strength** – providing that, where a manual mode of operation is used, at least one mode with limited reach and strength is operable with limited reach and limited strength. These functional limitations are not specific to singular disabilities, but in varying degrees, often a part of the aging process, and therefore a consideration in serving all customers. When coupled with resistance to technology adoption, they become significant barriers to access to new and existing services for older customers.

# Barriers to ICT Accessibility

## Organizational and Technical Barriers:

- Lack of awareness about accessibility and the relevant technical standards
- The view that accessibility is unnecessary or optional
- The absence of policies or objectives related to ICT accessibility.
- An absence of responsibility or accountability for accessibility in the organization
- A shortage of local experts with the necessary technical skills, tools or training in accessibility practices
- Recognition of accessibility needs or requirements late in a program or project
- Lack of equipment and software
- Not implementing the Web Content Accessibility Guidelines (WCAG) standards
- Some budget restrictions on website development



# E-accessibility Standards

Some of the standards affecting e-Accessibility address over-arching aspects of ICT that span multiple domains. Some of those include:

## **1. W3C WAI: Web Content Accessibility Guidelines (WCAG) 2.0.**

The Web Content Accessibility Guidelines (WCAG) are part of a series of web accessibility guidelines published by the Web Accessibility Initiative (WAI) of the World Wide Web Consortium (W3C), the main international standards organization for the Internet. They are a set of guidelines that specify how to make content accessible, primarily for people with disabilities—but also for all user agents, including highly limited devices, such as mobile phones.

## **2. Information technology – ISO/IEC TR 29138-2:2009.**

Accessibility considerations for people with disabilities – Part 2: Standards inventory (ISO/IEC, 2009) identifies a collection of documents that provide guidance on meeting the needs of people with disabilities. While its primary audience is standard developers, it can be helpful for developers of information technology products and services, policy makers, purchasing officers, and accessibility advocates.

## **3. Ergonomics of human-system interaction – ISO 9241-100:2010.**

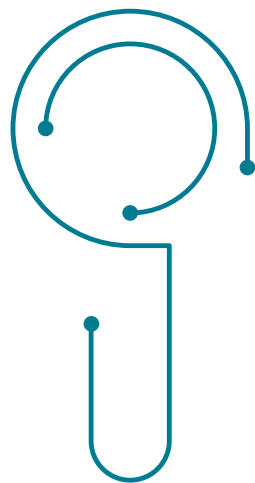
Part 100: Introduction to standards related to software ergonomics enables users of standards related to software ergonomics to identify standards that are particularly relevant to software development, giving them an overview of the content of software-ergonomics standards, an understanding of the role of software-ergonomics standards in specifying user requirements and designing and evaluating user interfaces and an appreciation of the relationship between the various standards. The software-ergonomics standards apply to all software components of an interactive system that affect usability, including application software (and web-based applications), operating systems, embedded software, software development tools, and assistive technologies.

#### 4. Information technology - ISO 24751-2.

Individualized adaptability and accessibility in e-learning, education and training – Part 2: “Access for all” personal needs and preferences for digital delivery. This standard provides a common information model for describing the learner or user needs and preferences when accessing digitally delivered resources or services. This description is one part of a pair of descriptions used in matching user needs and preferences to educational delivery. This is an open registry-based standard that can be easily updated to meet future personalization preferences. This standard is useful for storing user needs and preferences, and for adapting devices accordingly. A subset of this standard has been applied successfully in Cloud4all to PCs, smartphones, TVs, ticket vending machines, and feature phones.

#### 5. Information technology - ISO/IEC 24756:2009.

Framework for specifying a common access profile(CAP)of needs and capabilities of users,systems,and their environments (ISO/IEC,2009a) defines a framework for specifying a common access profile of needs and capabilities of users, computing systems, and their environments, including access supported by assistive technologies.It provides a basis for identifying and dealing with accessibility issues in a standardized manner across multiple platforms.It can be used to evaluate the accessibility of existing systems in specific environments for specific users.



## **6. Information Technology – ISO/IEC TR 24785:2009.**

Taxonomy of cultural and linguistic adaptability user requirements (confirmed in 2013)(ISO/IEC, 2009b)defines a taxonomy describing the various elements of user requirements in terms of cultural and linguistic adaptability, for use in a computer environment.

## **7.Information technology–User interfaces–ISO/IEC 24786:2009.**

Accessible user interface for accessibility settings (ISO/IEC, 2009c). People with disabilities can experience difficulties in accessing computers and other ICT devices. Accessible user interfaces can help them to operate computers if they are able to adjust the accessibility settings prior to use. If this is not possible,then some people will not be able to access these devices without help from others.

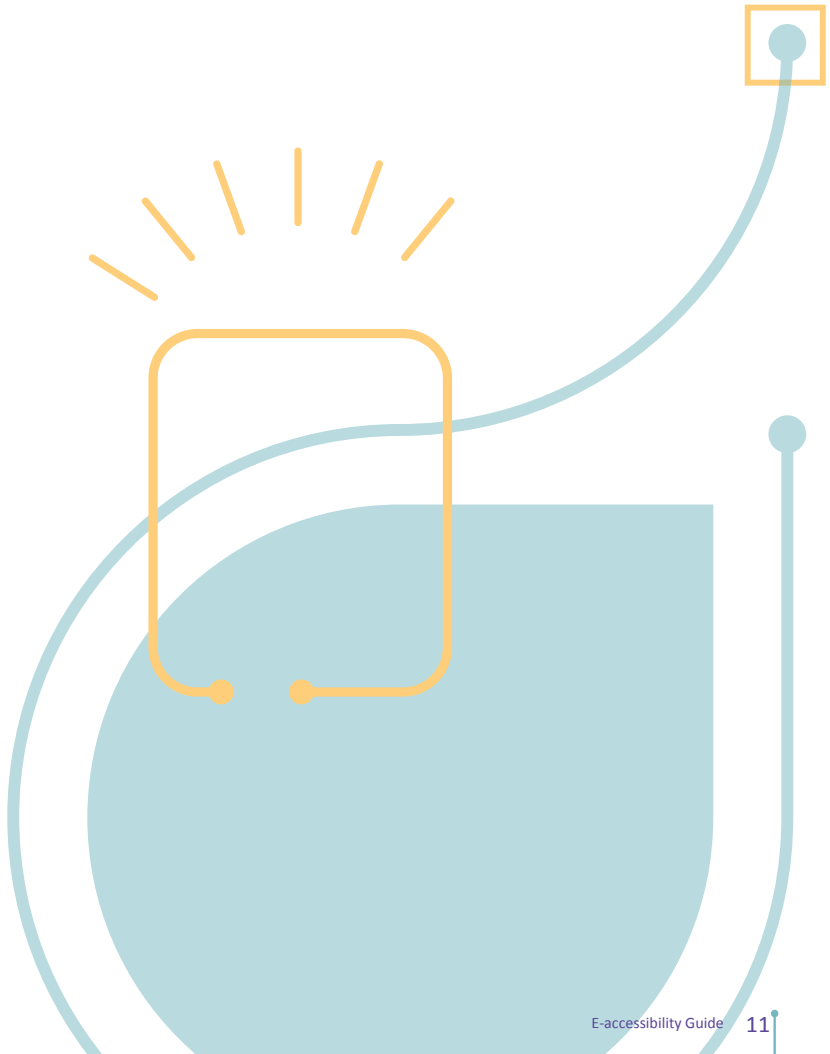
## **8. Accessible design – Ergonomics – ISO 24500:2010.**

Auditory signals for consumer products specifies the auditory signals used as a means of feedback for operations or conditions of consumer products,when used by a person with or without a visual or auditory impairment.It is intended to be applied as appropriate to these products, depending on the product type and its conditions of use.It applies to auditory signals of a fixed frequency used in general applications (also called“beep sounds”),but not to variable frequency or melodic sounds. It does not specify fire or gas leak alarm sounds or crime prevention alarm sounds (which are determined by other laws and regulations),electronic chimes,voice guides or other sounds specific to communication instruments,such as telephones;nor it is applicable to auditory danger signals used in public or work areas(covered in ISO 7731, ISO 8201 and ISO 11429).

## **9. Accessible design – ISO 24501:2010 Ergonomics.**

Sound pressure levels of auditory signals for consumer products specifies methods for determining the sound pressure level range of auditory signals so that users of consumer products,including people with age-related hearing loss, can hear the signal properly in the presence of interfering sounds.Auditory signals refer to sounds with a fixed frequency(also called beep sounds)and do not include variable frequency sounds, melodic sounds, or voice guides. This standard is applicable to auditory signals which are heard at an approximate maximum distance of 4 m from the product, as long as no physical

barrier exists between the product and the user. It is not applicable to auditory signals heard through a head receiver or earphones, or to those heard with the ear located very near the sound source because of the interference of the user's head with sound propagation. The standard does not specify the sound pressure level for auditory signals regulated by other statutes, such as those for fire alarms, gas leaks and crime prevention, nor does it specify auditory signals specific to a communication tool, such as telephones. Nor does this standard specify auditory danger signals for public or work areas, which are covered in ISO 7731, ISO 8201 and ISO 11429.



# Recommended ICT Standards by Domain

## Domain 1: Websites

Standard	Scope of Application
Mada Recommends: Web Content Accessibility Guidelines (WCAG) 2.0	Target users: Web developers, designers and content providers
Further resources: U.S. Rehabilitation Act, Section 508 Guidelines	Target users: Governmental agencies – to make electronic and information technology accessible to people with disabilities in a manner comparable to the access available to others.
Further resources: ISO/IEC 24786:2009 Information technology – User interfaces – Accessible user interface for accessibility settings	Target users: Web developers, designers and content providers

**Table 1. Standards for Websites**

According to the World Accessibility Initiative(WAI),web accessibility means that “people with disabilities can perceive,understand,navigate, and interact with the web, and that they can contribute to the web. “This is the most fundamental and simplest definition of web accessibility that is widely accepted. ISO/IEC Standard 24786:2009 Information technology – User interfaces – Accessible user interface for accessibility settings, as previously described, addresses a fundamental prerequisite to ICT accessibility.Accessible user interfaces help people with disabilities to operate computers by adjusting accessibility settings prior to use. This standard: (1)Specifies requirements and recommendations for making accessibility settings accessible;(2)provides guidance on specific accessibility settings; and, (3) applies to all operating system



user interfaces on computers, but can also be applied to other types of ICT, where appropriate. It does not apply to the user interface before the operating system is loaded and active. The international guideline recommended for website domains is ISO/IEC 40500:2012, the Web Content Accessibility Guideline (WCAG) 2.0 that was developed by the WAI working under The World Wide Web Consortium (W3C). Participation in and contributions to the WAI are open to all countries. The current version of the guideline, WCAG 2.0, was published on December 11, 2008, and it explains how to make web content more accessible for people with disabilities. WCAG 2.0 covers a wide range of recommendations for making Web content more accessible to a wider range of people with disabilities, including blindness and low vision, deafness and hearing loss, learning disabilities, cognitive limitations, limited movement, speech disabilities, photosensitivity and combinations of these. Following these guidelines often makes Web content more usable to users in general. It is recommended that requirements reach at least Level AA. WCAG 2.0 is recommended over EN 301 549, Accessibility requirements suitable for public procurement of ICT products and services in Europe, for websites. The European standard basically incorporates the web accessibility requirements of WCAG through specific references in Section 9, Web.



## Domain 2: Mobile Applications

Standard	Scope of Application
Mada Recommends: W3C mobile accessibility	Mobile web accessibility best practices guidelines.
Mada Recommends: WCAG 2.0 – Web Content Accessibility Guidelines (WCAG) 2.0 User Agent Accessibility Guidelines (UAAG) Authoring Tool Accessibility Guidelines (ATAG)	Recommended for content using Web browsers Target users: Web developers, designers and content providers WCAG 2.0 covers web pages and web applications, including web content used on mobile devices. UAAG explains how to make user agents accessible. ATAG explains how to make the authoring tools accessible.

**Table 2. Standards for Mobile Products and Applications**

### Mobile Devices

A wide range of mobile digital devices are now commonplace (tablets, e-readers, fitness devices, medical devices, etc.), but the device with the highest level of market penetration and usage is the mobile phone. It is the cell phone and tablets that will be the primary focus of standards scrutiny, but issues related to other types of devices will be examined.

The convergence of technologies envisioned in the 1990s has been realized in the mobile phone, and to an even greater degree than imagined. The current generation of “smartphones” combines a host of technologies once separated into numerous devices, both digital and analog: telephone, answering machine, computer, Internet connection, watch, alarm clock, calculator, calendar/diary, address book, wayfinding system (maps or GPS), emergency alert system, voice recorder, and memo pad. Convergence into a single device, in and of itself, increases and expands accessibility to a degree by removing the need for multiple physical devices and making the services both mobile and omnipresent.

That considers only basic functionality – before the user customizes the device by enabling access to other digital services or downloading any number of free or inexpensive apps to support an enormous range of needs and preferences. Beyond the Internet, users may be streaming live television, radio, sporting events, music, or movies. They may be reading a novel or studying a textbook.

Mobile devices and applications represent a domain of extraordinary opportunity for improving accessibility for all individuals, not just those with disabilities, and simultaneously, perhaps the most challenging domain for the identification and application of standards. That is because the domain requires addressing a complex matrix of hardware, operating systems, applications, and user needs.

## User Needs

The CRPD requirements mandate general and specific requirements for access and delivery. Mobile devices – most commonly mobile phones and tablets – must accommodate the entire spectrum of disabilities: visual, hearing, physical, cognitive, and those related to aging. The challenge of addressing all of those needs in a device of limited size is compounded by the breadth of functionality afforded by mobile phones. Product designers, manufacturers, systems designers, and applications developers must consider the entire range of user needs when designing mobile device and applications. Mobile phones assist in meeting the requirements of CRPD and accessibility standards with features helpful to each category of disability, but they also present challenges to developers.

Vision disabilities range from mildly impaired vision to total blindness, and the buttons and screen sizes of small mobile devices disadvantage many users. Blind people have serious difficulties accessing the information shown on device screens because they are dependent on screen readers. Visual elements used as the only means of communication with the user compound the problem if a text alternative is not provided. The small screen size and the ability to adjust text size and contrast are issues for people with low vision.

Hearing disabilities range from mild hearing loss to partial or total deafness. Mild hearing problems can be corrected by using sound amplifying devices, but some users who employ support products

experience reaction or irritation from electromagnetic interferences which emanate from mobile telephones. A fast pressing of radio signals from digital telephones can increase the buzzing or murmur effect.

Many deaf users (those deaf from birth or early childhood) have a quite restricted vocabulary and have been dependent on sign language.

They often experience difficulty understanding texts or concepts where unusual terms or complex syntax are employed, or which may be too long. Information contained within images and diagrams can be very useful for this kind of user, as well as the possibility of including sign language videos within the contents or services displayed on mobile devices.

Users with manual coordination or manipulation problems (weakness, limited muscular control, lack of sensitivity, joint problems, and amputation) may have problems when handling or holding a mobile telephone and pressing its keys. Some of these users also experience many barriers when using touch screens that require accuracy when selecting or accessing the different elements on the screen.

Individuals with cognitive (e.g., dyslexia, attention deficit disorder, memory loss, or brain injury) and intellectual disabilities may have difficulties understanding and assimilating information communicated in symbols or graphics, or using a complex navigation structure. Some older people experience a wide range of difficulties when using mobile devices, many of which are the same difficulties experienced by people with disabilities described in the groups above.

In spite of these barriers, mobile phones afford a wide range of support for people with disabilities, not just with the usual features of the device, but with the many specialized apps to support accessibility and independent living.

## **Provider Support for Development**

The diversity of mobile device platforms reinforces the need for accessibility standards. Although manufacturers of mobile device platforms such as Apple, Nokia, and Google, have provided native application developers and designers with documents on interface design for their platforms and navigation to contribute toward achieving a satisfactory user experience, the differences among mobile operating systems remains a barrier for people with disabilities.

## Applicable Standards for Mobile

Because of the multidimensional structure of mobile devices and applications, there is no singular standard or set of guidelines covering all mobile accessibility issues. The recommendation for this domain is a split decision. For those mobile devices that provide access through a Web browser, WCAG 2.0 and its supporting guidelines, recommendations and tools are appropriate. However, there is a strong case to be made that this standard should not be applied to software applications for mobile devices, but that the carefully selected provisions of EN 301 549 (2014), Section 11, the European Standard for accessible ICT software and digital devices, is a better fit.

WCAG 2.0 (ISO/IEC 40500:2012 WCAG 2.0 - Web Content Accessibility Guidelines) was originally designed for the delivery of Web content to computer screens/monitors. Rapid developments in mobile technology have outpaced standards development, but in 2015, W3C released *Mobile Accessibility: How WCAG 2.0 and Other W3C/WAI Guidelines Apply to Mobile*. This document provides guidance by explaining how the existing standards apply to mobile devices, but these are working notes, not standards.

The Web was not originally designed with anticipation of the miniaturization of delivery devices and screens, but W3C supports the idea of “One Web” that can be accessed by anyone from any Internet-enabled device. W3C provides criteria and techniques so that a mobile device can access websites in the best way possible.

The W3C’s Device APIs Working Group has defined a set of guidelines (<http://www.w3.org/2008/webapps/>) to standardize design criteria for the development of several functionalities and applications on the Web such as widgets, specific programs executed from a Web browser, or elements to adapt contents and functionality to different devices.

The WAI defines mobile accessibility as making applications and websites accessible to people with disabilities when they are using mobile phones. WCAG 2.0, User Agent Accessibility Guidelines (UAAG), and Authoring Tool Accessibility Guidelines (ATAG), are being used together to address mobile accessibility. WCAG 2.0 covers web pages and web applications, including content used on mobile devices and WAI developed a reference document for how WCAG 2.0 and other W3C/WAI guidelines apply to mobile.

## Domain 3: Electronic Documents

Standard	Scope of Application
<p>Mada Recommends: ISO 32000-1:2008 Document management - Portable document format - Part 1: PDF 1.7</p>	<p>Targets: Developers of software that create PDF files (conforming files), software that reads existing PDF files and interprets their contents for display and interaction (conforming readers) and PDF products that read and/or write PDF files for a variety of other purposes(conforming products).</p> <p>The standard specifies a digital form for representing electronic documents to enable users to exchange and view electronic documents independent of the environment in which they were created or the environment in which they are viewed or printed.</p>
<p>Mada Recommends: WCAG 2.0</p>	<p>Target users: Developers, content providers</p>
<p>Mada Recommends: (U.S.) Section 508 Guidelines for Accessible Documents</p>	<p>Target users: Content providers Guidance for creation and checking of the four most commonly used file types:PDF format,and Microsoft Word, Excel and PowerPoint files. It also specifies a standard for online forms.</p>
<p>ISO 14289-1:2014 Document management applications - Electronic document file format enhancement for accessibility-Part 1:Use of ISO 32000-1 (PDF/UA-1)14289-1:2014</p>	<p>Target users: Content providers Specifies the use of ISO 32000 1:2008 to produce accessible electronic documents.</p>

**Table 3. Standards for Electronic Documents**

An electronic document can be defined as information recorded in a way that requires a computer or other electronic device to display, interpret, and process it. There are many different types of electronic documents produced by widely used authoring tools, and accessibility standards and/or requirements were developed mostly for Portable Document Format (PDF), Microsoft Office Word, Microsoft Office Excel, and Microsoft Office PowerPoint documents. The best structured standards and requirements are provided in Table 3. It should be noted that major international providers of document authoring and dissemination tools, including Microsoft, Adobe, IBM, SAP AG, and Google, are active participants in the development of the WCAG 2.0 Guidelines. An extensive list of guidance documents for compliance with Section 508 is available at the General Services Administration (GSA) website, section 508.

### **Portable Document Format (PDF) Files**

PDF was originally developed as an export option to reproduce (display or print) a document in its original format. PDF files were created by scanning a paper document and saving it as an image file. Originally developed by Adobe Systems as an Acrobat product, the licensed versions offered only basic editing and commenting features. Acrobat was not meant to provide an editing environment. In addition, when the PDF file format was introduced, the use of assistive technology to read a PDF file was not available. Over the years, Adobe has worked to retrofit and develop the Acrobat programs to allow assistive technologies such as screen readers and refreshable Braille devices to utilize the products. Even with these changes, the true accessibility of a PDF document depends on how it is developed, converted, or edited. Specifications for PDF files were standardized in ISO 14289-1:2014. This part of ISO 14289 is not applicable to:

- Specific processes for converting paper or electronic documents to the PDF/UA format;
- Specific technical design, user interface, implementation, or operational details of rendering;
- Specific physical methods of storing these documents, such as media and storage conditions;
- Required computer hardware and/or operating systems.

## Documents Produced by Globally Used Software Applications

The basic applications of Microsoft's Office Suite (Word for text documents, Excel for spreadsheets, and PowerPoint for presentations) have become ubiquitous around the globe and particularly on the Internet.

Microsoft has incorporated limited accessibility checking capabilities into the applications but external organizations have developed comprehensive checklists.

The inclusion of basic accessibility checking in the authoring tools fosters the use of best practices. It is much easier to create an accessible document at the outset than remedy a non-conforming document. Using best practices (styles, structuring tables, and providing alternative text for images and graphics) creates a more structured document and results in accessible material, whether leaving it in the native.doc format or exporting to other formats such as PDF or HTML.

## Accessible Textbooks

The use of authoring tools takes on an additional dimension when used to develop instructional materials, specifically textbooks. All of the specified standards come into play along with additional needs for content that communicates information through scientific and mathematical formulas, use of symbols, and extensive tables or informational graphics. These require tools beyond the standards to make them fully accessible and usable in combination with assistive technologies such as e-readers.

## Online Forms

Online forms are important facets of accessibility to both government and commercial services for all citizens, but serve to provide increased accessibility to people with disabilities or those with limited transportation options. The accessibility of digital forms is vital to those users.

Online forms also are used frequently to provide services or to complete commercial transactions. Australian consultant Roger Hudson tackled the application of WCAG 2.0 to forms development in two guidance papers on the topic.



## Domain 4: Media (video and audio)

Audio and video media are widely used in entertainment, education, and the entire range of Internet sites (including the social media sites most frequently used in Arabic-speaking countries—Google, Facebook and YouTube.) The barriers to accessibility of audio and video media for those with hearing and vision disabilities were described at the outset of this report.

Media such as cinema, videos or televised content can be made accessible for individuals with hearing or visual limitations by captioning and audio description of content. The addition of audio descriptions or captions alone does not solve the issues of a print-related disability; however, accessible media does provide another opportunity for exposure and understanding.

Both hearing and vision-related disabilities remove one of the three learning modalities: visual, auditory, and kinesthetic. Absent one of these critical abilities, the individual must compensate with the increased use of another mode. The use of other media and the application of technology facilitate this. Captioning allows individuals who are deaf or hard of hearing to rely more heavily on visual learning, and audio description allows individuals who are blind or low-vision to make increased use of auditory learning. Accessible strategies, such as captioning and audio description, are needed to make both traditional print selections and content that involves multimedia more accessible for individuals with disabilities.

Audio description is a form of audio-visual translation in which a narrator supplements the dialogue, music, and sound effects of a live performance or recorded visual media with a description of what is happening on the stage or screen during natural pauses in the audio. Through audio description, blind and low-vision individuals are provided the visual information they may be missing by using an auditory medium, thus enabling a more complete understanding and experience of what is happening on the stage or screen.

## Critical Importance of Accessible Media to Education

Lacking audio description for broadcast, video remains inaccessible for all individuals with vision disabilities, whether child or adult. This precludes the use of educational television programming as a supplementary instructional aid in the classroom, unless it can be obtained with audio description from an alternative source. While the development of modern audio description and its best practices are still in their infancy, audio description is in reality a very old practice, as sighted individuals have for generations been describing to blind individuals what is visually happening around them.

Students who are blind or low vision read at rates one-half to one-third of their sighted peers (Ferrell, Mason, Young, & Cooney, 2006; Legge, Madison, & Mansfield, 1999; Morris, 1966; Simon & Huertas, 1998). Those who use enlarged or magnified print have only slightly better results.

Video with audio description on topics of educational relevance can play a key role in providing an additional medium for information acquisition, as well as a sense of inclusion for participating in the use of a common and popular technology. In one study, blind and low-vision students who viewed a program with audio description scored as well on comprehension as the sighted viewers, but the blind and low vision students who viewed the same program without descriptions scored much lower than sighted students (Frazier and Coutinho -Johnson, 1995).

Engaging content and new technology may allow students to re-watch programs or videos, thus moving at their own pace and learning by using different styles, tactics, and multiple senses; but, if these videos are not adequately designed and planned with accessibility concerns in mind, they will underserve many students with disabilities.

Focusing on children who are deaf or hard of hearing, the (U.S.) National Center for Instructional Materials points out that, "Essentially every word for these deaf readers is a sight word. That, combined with the lack of signed and printed vocabulary due to limited interactions with fluent signers, results in the lag in the reading ability of these deaf individuals."

## Legal Mandates for Audio and Video Accessibility

Standard	Scope of Application
The (U.S.) Twenty-First Century Communications and Video Accessibility Act (CVAA); FCC Rules	These rules address the accessibility of broadcast television programming and its reuse on the Internet.
EN 301 549 (2014) The European Accessibility Act	Target users: Providers and purchasers of ICT products and services
Mada Recommends: WCAG 2.0, Time-Based Media, Guideline 1.2	Target users: Media producers Provide alternatives for timebased media.

**Table 4. Standards for Audio and Video Media Accessibility**

WCAG 2.0, Guideline 1.2 Time-Based Media, addresses the accessibility requirements for various forms of audio and video content and is recommended as the standard for adoption in this domain. W3C provides an excellent explanatory section for this portion of the standard.

Implementation of accessibility in this domain requires the resources of highly skilled individuals for captioning and audio description for a variety of circumstances. Because of the extent of recorded media, it is also helpful to have a national or international archive of broadly used media (for education and entertainment) that has been rendered accessible.

Accessibility for audible language is dependent on accommodations for hearing or loss or limitation. This is achieved by encoding text alternatives, called captions or subtitles, for display on a television, movie or computer screen. Although introduced in the U.S., Australia, and New Zealand in the early 1970s, closed captioning was first mandated in the U.S. in the 1996 Telecommunications Act. The mandate is not universal, but applies to certain broadcast entities.

Captioning is mandated for U.S. public television programming and is broadly available in other television and video materials. Since 1996, the Federal Communications Commission (FCC) has implemented and monitored compliance with the Telecommunications Act, which requires most television programs to be captioned. A majority of widely-used educational programming is captioned but not audio described. Audio description has only a very limited mandate for television programming on major networks in major markets.

The (U.S.) Twenty-First Century Communications and Video Accessibility Act (CVAA) was passed by the U.S. Congress in 2010 to update the nation's telecommunications protections for people with disabilities. Title II of the accessibility act makes it easier for people with disabilities to view video programming on television and the Internet. For example, programs shown on television with captioning will be required to include the captioning when they are re-shown on the Internet. The Act also ensures that people with disabilities have access to emergency information such as 911 services and emergency information on TV. The European Accessibility Act (European Union, 2014) is intended to bring region-wide conformance to ICT products and services with divergent standards across the nations, and to address the accessibility obligation in the CRPD. It targets the production and procurement in:

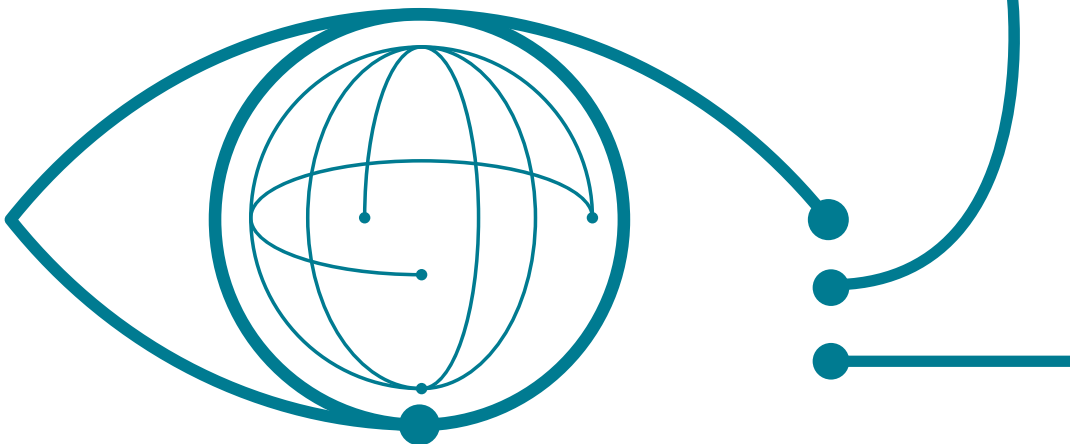
- Computers and operating systems
- ATMs, ticketing and check-in machines
- Smartphones
- TV equipment related to digital television services
- Telephony services and related equipment
- Audiovisual media services such as television broadcast and related consumer equipment
- Services related to air, bus, rail and waterborne passenger transport
- Banking services
- e-books
- e-commerce

## Legal Mandates for Audio and Video Accessibility

In the U.S., the media accessibility mandated by the ADA is implemented through FCC regulations. Closed captioning displays the audio portion of a television program as text on the TV screen, providing a critical link to news, entertainment and information for individuals who are deaf or hard-of-hearing. Congress requires video programming distributors (VPDs)—cable operators, broadcasters, satellite distributors and other multi-channel video programming distributors – to close caption their TV programs.

Several standards of practice may be used to support actual implementation in this domain. They are:

- The Described and Captioned Media Program Description
- Audio Description Standards and Code of Professional Conduct for Describers (2009)
- Standard Practice Paper for Video Relay Interpreters (Registry of Interpreters for the Deaf)



## Captioning Educational Television and other Video Content

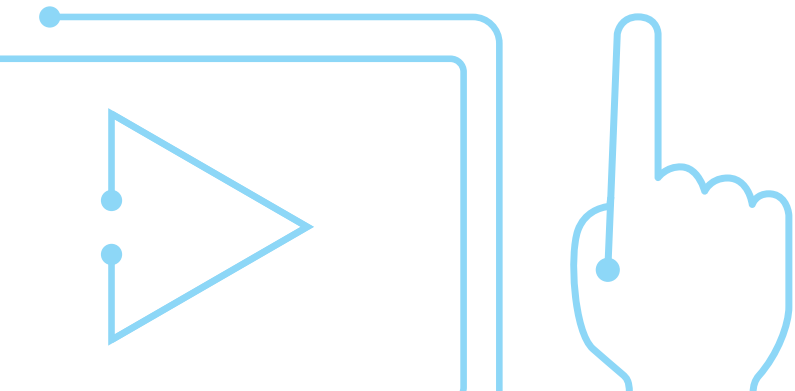
The objective for audio description and captioning of Educational Television Programming (and other videos for instructional use) is to make programming accessible for individuals with disabilities and also to make video content an accessible supporting technology for instruction in the classroom. Principles of accessibility of instructional media for individuals with disabilities guide the work from intent to selection, to access, and use. Audio description promotes inclusion of students who are blind or have low vision in video instructional activities with their sighted peers. The expected outcome of the instructional use of audio described and captioned educational television programming is to improve comprehension skills by providing access to multiple modalities of learning for individuals with all print-related disabilities.

In addition, the availability of described and captioned video could prove beneficial to aging adults with declining vision and hearing. The captioning and audio description serve as assistive technology (AT), with AT being any product or service that assists in education, the workplace, or the activities of daily living. Access to the enhanced video, or information about its availability, could be extended through agencies serving older adults.

Additionally, described and captioned media could be helpful as transitional assistive technology in rehabilitation settings for people involved in accidents where individuals are recovering from major eye injury, hearing loss, or surgical procedures and have had no opportunity to master alternative modalities.

# Domain 5: Electronic Kiosks and Automated Teller Machines (ATMs)

Standard	Scope of Application
<p>EN 301 549 (2014) European Accessibility Act</p> <p>DEG HF 00031 Human factors guidelines for IT products and services: Design for all.</p> <p>EG 202 116 (2002) Guidelines for IT products and services: Design for all.</p> <p>ES 201 381 (December 1998) Telecommunication keypads and keyboards: Tactile identifiers.</p> <p>ETR 165 (1995) Recommendations for a tactile identifier on machine readable cards for telecommunications terminals.</p> <p>ETR 345 (Jan 1997) Characteristics of telephone keypads and keyboards; Requirements of elderly and disabled people.</p> <p>ETS 138 (1998) Public terminals for the elderly.</p> <p>TC TR 007 (1996) Human Factors (HF); User requirements of enhanced terminals for public use.</p>	<p>Target users: Providers and purchasers of ICT products and services</p>



Standard	Scope of Application
Mada Recommends: (U.S.) ADA Standards for Accessible Design (Americans with Disabilities Act, amendments effective 3/15/2012)	Target users: Providers, purchasers and users of ATMs and ITMs
Mada Recommends: Ergonomic aspects: ISO/IEC TR 29138-2:2009 Information technology — Accessibility considerations for people with disabilities — Part 2: Standards inventory (ISO/IEC, 2009)	Physical design of devices.
Mada Recommends: User interface aspects: ISO/IEC 24786:2009 Information technology — User interfaces— Accessible user interface for accessibility settings (ISO/IEC, 2009c)	User interface design for devices
Mada Recommends: ITU/G3ict e-Accessibility Policy Toolkit for Persons with Disabilities, Electronic Kiosks	Target users: Providers, purchasers and policy makers

**Table 5. Standards of Automated Teller Machines and Electronic Kiosks**

**Summary:**

Equal access to banking services through automated teller machines (ATMs), ticketing machines for trains and airplanes, or information kiosks in public places is often not available to individuals with disabilities. Other common electronic kiosks are used for wayfinding and postal services.



## Domain 6: Text and Video Relay Services for the Deaf

Standard	Scope of Application
Mada Recommends: (U.S.) FCC Mandatory Minimum Standards for TRS	Target users: Telephony service providers and government(state) relay services
Mada Recommends: EN 301 549 European Standard for Accessible ICT, Sec. 13 Relay services	Target users: Telephony service providers and government(state) relay services

**Table 6. Standards and Guidelines for Text and Video Relay Services**

Relay services now fall into the intersection of several digital domains, depending on the method of delivery. Given the focus on e-Accessibility in this document, the end goal of accessible communication will be addressed.

The development of ICT is transforming the manner in which relay services are provided. Video Relay Services (VRS) target deaf, hard-of-hearing and speech-impaired people. Among the countries that have implemented these services nationally are Sweden(1992) and the United States(2000). Germany and Spain have free video conferencing schemes as a public service for deaf, hard-of-hearing and speech-impaired people. In most places, these systems are free of charge (at least on the user’s side), and are sometimes subsidized by regional, local or national governments; companies that must hire this system as a legal requirement (mostly ADA compliance in the US) are sometimes also charged.

The European Standard EN 301 549 Functional Accessibility Requirement mandates specific standards for ICT providing relay or emergency service access. These straightforward standards are recommended for adoption.

The right of individuals with disabilities to equal access to telephone services in the U.S. was affirmed in the Americans with Disabilities Act. Telephone relay service (TRS) providers must offer service that meets certain mandatory minimum standards set by the Federal Communications Commission (FCC), the regulatory body for video relay services (VRS) in the United States. In addition to overseeing deaf VRS, the FCC also oversees Telecommunications Relay Services (TRS), from which the VRS regulatory framework has evolved.

Today, a plethora of relay services exist across a span of technologies:

- TTY relay services, the original and now traditional relay service, which can be reached by anyone by dialing 711 (in the U.S.) from a telephone or TTY1;
- Voice Carry Over (VCO) for people who communicate by speaking;
- Hearing Carry Over (HCO) for people with a speech disability who use a TTY;
- Speech-to-Speech (STS) relay service for people with a speech disability who use a telephone;
- Captioned Telephone Service (CTS) for people with a special “captioned telephone” that enables them to communicate by speaking, listen to what they can hear, and read what the other person is saying through captions displayed on the “captioned telephone”
- Video Relay Service (VRS), an Internet-based system for people with video conferencing equipment or videophones who communicate in Sign Language;
- Internet Protocol Relay (IP Relay) service, an Internet-based system for people with a computer or other web-enabled device who communicate using text;
- Internet Protocol Captioned Telephone Service (IP CTS), an Internet-based system that enables people to communicate by speaking and listening to what they can hear over a telephone, and read what the other person is saying through captions displayed on a computer or other web-enabled device.

# Conclusion

This guide identifies all the best practices and standards for accessibility of the main six domains. The original report was professionally created from a reliable source to compare and recommend the standard that is most suitable to be used, taking into consideration the Arabic content. Although all the information provided comes from valid sources, Mada highly recommends choosing the standards that were specifically highlighted in the report under Mada recommendations. Mada encourages further research to be conducted in this specific area especially that technology is constantly changing and developing. As always we encourage you to get in touch with our team for further advice and answers to specific questions.



# Appendix

## Where to Locate Recommended Standards and Guidance by Domain

### Overall Accessibility Standards

ISO/IEC TR 29138-2:2009 Information technology—Accessibility considerations for people with disabilities — Part 2: Standards inventory (ISO/IEC, 2009) identifies a collection of documents that provides guidance on meeting the needs of people with disabilities.

ISO-IEC Guide 71 (Second edition, 2014-12-01). Guide for Addressing Accessibility in Standards. Retrieved from [http://isotc.iso.org/livelink/livelink/fetch/2000/2122/4230450/8389141/ISO\\_IEC\\_Guide\\_71\\_2014%28E%29\\_Guide\\_for\\_addressing\\_accessibility\\_in\\_standards.pdf?nodeid=8387461&vernum=-2](http://isotc.iso.org/livelink/livelink/fetch/2000/2122/4230450/8389141/ISO_IEC_Guide_71_2014%28E%29_Guide_for_addressing_accessibility_in_standards.pdf?nodeid=8387461&vernum=-2)

### Websites

#### Web Content Accessibility Guidelines (WCAG 2.0)

For the complete guidelines and implementation guidance, see

<https://www.w3.org/TR/WCAG20/>

#### User Agent Accessibility Guidelines (UAAG).

<https://www.w3.org/WAI/intro/uaag.php>

#### Authoring Tool Accessibility Guidelines (ATAG)

<https://www.w3.org/WAI/intro/atag.php>

Accessibility Checking Tools <https://www.w3.org/WAI/ER/tools/>

#### Section 508 Guidelines Section 508 of the Rehabilitation

Act: Application and Scoping Requirements, 508 Chapter 1: Application and Administration. <https://www.access-board.gov/guidelines-and-standards/communications-and-it/about-the-ict-refresh/proposed-rule/text-of-the-proposed-rule>

## **Mobile Applications**

Web Content Accessibility Guidelines (WCAG 2.0)

<https://www.w3.org/TR/WCAG20/>

Mobile Web Best Practices

<https://www.w3.org/TR/mobile-bp/>

## **Electronic Documents**

ISO 14289-1:2014 PDF/UA Format

<https://www.iso.org/obp/ui/#iso:std:iso:14289:-1:ed-2:v1:en>

Section 508 Standards for Electronic Documents

<https://section508.gov/content/build/create-accessible-documents>

Microsoft Office Documents: Word, Excel, PowerPoint

[www.microsoft.com/enable/products/office2013/](http://www.microsoft.com/enable/products/office2013/)

[www.microsoft.com/enable/products/office365/](http://www.microsoft.com/enable/products/office365/)

## **Media (Video and Audio)**

WCAG 2.0, Time-Based Media, Guideline 1.2

<https://www.w3.org/TR/UNDERSTANDING-WCAG20/media-equiv.html>

The (U.S.) Twenty-First Century Communications and Video

Accessibility Act (CVAA); FCC Rules

<https://www.fcc.gov/node/23883>

Standard Practice Paper for VRI Interpreters. Registry of Interpreters for the Deaf (RID) (2011)

<https://drive.google.com/file/d/0B3DKvZMfLdTk4QnM3T1JRR1U/view>

DCMP Standards for Audio Captioning and Video Description (to meet FCC regulations) (U.S.)

[https://www.dcmp.org/descriptionkey/what\\_to\\_describe.html](https://www.dcmp.org/descriptionkey/what_to_describe.html)

Audio Description Standards and Code of Professional Conduct for Describers (2009), Audio Description Coalition (US)

<http://www.audiodescriptioncoalition.org/standards.html>

## Electronic Kiosks and Automated Teller Machines (ATMs)

Accessibility Checklist, February 2014 Edition.

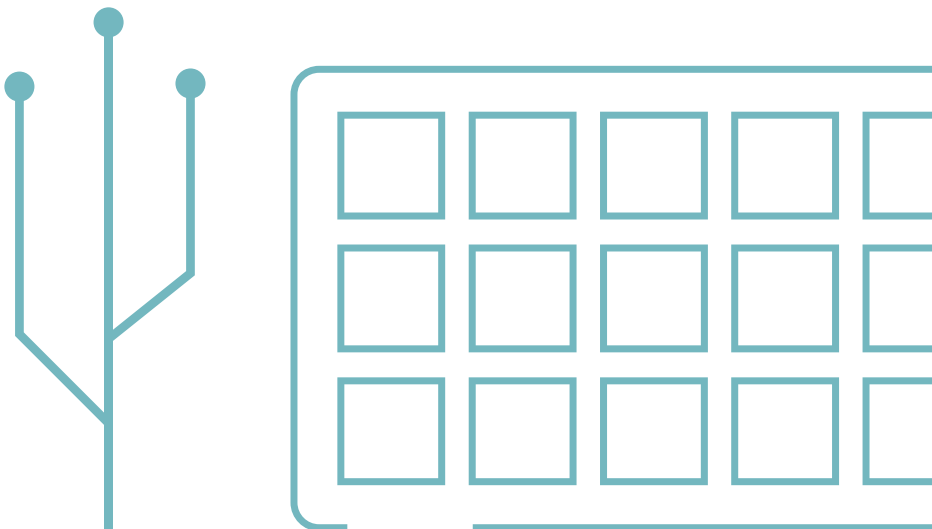
Based on the 2010 ADA Standards for Accessible Design

[http://nwadacenter.org/sites/adanw/files/files/2010%20ADA%20Standards%20Checklist\\_Feb%202014%20Edition.pdf](http://nwadacenter.org/sites/adanw/files/files/2010%20ADA%20Standards%20Checklist_Feb%202014%20Edition.pdf)

Checklist for the general principles of accessibility for public access terminals. Ireland. <http://universaldesign.ie/Technology-ICT/Irish-National-IT-Accessibility-Guidelines/Public-Access-Terminals/Guidelines-for-Public-Access-Terminals-Accessibility-Printable-Version/blic> display terminals

E-accessibility Policy Toolkit for Persons with Disabilities. A Joint ITU/G3ict Toolkit for Policy Makers Implementing the Convention on the Rights of Persons with Disabilities. ITU/G3ict.

[http://e-accessibilitytoolkit.org/toolkit/technology\\_areas/electronic\\_kiosks](http://e-accessibilitytoolkit.org/toolkit/technology_areas/electronic_kiosks)



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Deloitte Access Economics (2011). The economic benefits of increasing employment for people with disability. Commissioned by the Australian Network on Disability. <https://www.deloitteaccesseconomics.com.au/uploads/File/Economic%20benefits%20of%20increasing%20employment%20disability.pdf>.

Accessed 3/20/2015.

Developing Standards for Accessibility. Telecommunications Industry Association. <http://www.tiaonline.org/sites/default/files/pages/Final-TIA-Presentation-HLAA-2014-2014-06-26.pdf>

Disability in the Arab Region: An Overview. <http://unsdn.org/disabilityin-the-arab-region-an-overview/>. Retrieved Feb. 14, 2016

Fembek, Michael, Butcher, Thomas H., Heindorf, Ingrid, and Wallner-Miki, Caroline. Zero Project Report 2013: International Study of the Implementation of the UN Convention on the Rights of Persons with Disabilities (2012). Klosterneuburg, Austria: ESSL Foundation.

G3ict. CRPD 2013 ICT Accessibility Progress Report: A Resource for Advocates and Policy Makers to Benchmark Progress in Making ICTs Accessible in Compliance with the Convention on the Rights of Persons with Disabilities (2013). 3rd Edition. Developed by G3ict, in cooperation with Disabled People's International.

Accessed 3/25/2015 from

[http://g3ict.org/resource\\_center/CRPD\\_2013\\_ICT\\_Accessibility\\_Progress#sthash.Fad6w7lv.dpuf](http://g3ict.org/resource_center/CRPD_2013_ICT_Accessibility_Progress#sthash.Fad6w7lv.dpuf)

ICT adoption and prospects in the Arab region. International Telecommunications Union, Connect Arab Summit 2012.

[http://www.itu.int/dms\\_pub/itu-d/opb/ind/D-IND-AR-2012-PDF-E.pdf](http://www.itu.int/dms_pub/itu-d/opb/ind/D-IND-AR-2012-PDF-E.pdf)

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doi:10.7237/s. 16 Feb. 2016 from <http://www.sjpub.org/sjp/sjp-221.pdf>.

United Nations (2014). Factsheet on Persons with Disabilities.

[www.un.org/disabilities/default.asp?id=18](http://www.un.org/disabilities/default.asp?id=18). Accessed 3/20/2015.