WORLD FEDERATION OF THE DEAF

Working Document on Adoption and Adaptation of Technologies and Accessibility
Prepared by the WFD Expert Group on Accessibility and Technology
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1. *WFD Mission*

WFD works in partnership with the United Nations (UN) and its agencies and member states, other international organisations, national organisations of deaf people, Regional Secretariats and with experts. With these partners, WFD promotes the rights of deaf people to participate in society, government and other areas of life as equal citizens.

2. *Technology Revolution as the Impetus for Full Access and Utilisation*

The ever-changing and expanding role of technology on a global scale is impacting the lives of deaf persons. The rapid progress in information and communication technologies (ICT) in most cases is creating a positive impact on the life of a deaf person. The technological revolution takes many forms, from basic to advanced, and ranging from biotechnology to ICT. The use of various ubiquitous ICT tools such as video, text and cell phones, video and text relay services, and most notably the Internet, has revolutionized interaction opportunities especially for persons with disabilities. The future holds exciting things in store for deaf people around the world.

At the same time, it is important to realize that new technologies do not only create new opportunities for improved access, but also can put up new barriers. A notable example is the Internet itself. In its early days, it was a text-and image-driven medium, which worked wonders for deaf people who wanted to get in touch among one another and with the hearing world; but many website details (text) and videos do not provide a sign language translation option and / or are not captioned; and there are an increasing number of audible alerts through other channels which are unfortunately not accessible - this limits access for all. Constant monitoring is required to keep up with trends in new and emerging technologies to make sure that deaf people can access them, or we risk being increasingly marginalized, as the world is constantly undergoing ICT revolutions.

Over the past few years, incorporating Universal Design [1] (also known as *Design for All)*, in product and service development has gained acceptance. It is based on the recognition of the fact that it is often easier and more cost-effective to design a product from the ground up, so that anyone can use it, rather than building in accessibility features for specific target groups after the fact. Ensuring that universal design principles are followed and that technology is accessible, typically requires working with the new technologies and their manufacturers (so that barriers are recognised in a timely manner and addressed), as well as advocating for better access with consumer groups, policymakers, and regulatory and legislative bodies.

The United Nations Convention on the Rights for Persons with Disabilities (CRPD) increasingly ratified by many countries across the world is providing a significant influence for government and business to include universal design in their policies across all spectrums of service provision to their communities.

It is critical that deaf people are involved in working with government and business in policy and service development to ensure CRPD obligations are included. The WFD *Statement on Adoption and Adaptation of Technologies and Accessibility* will ensure that design principles within the universal design movement are incorporated so that no deaf person is left behind in the rush to newer and emergent ICT technologies. This *Working Document* also includes mention of access needs for people who are deafblind or hard of hearing, many which are the same as deaf people, but some are specific to their needs and will continually be updated as technology and accessibility features change.

3. *WFD Vision 2020 on Accessibility and Technology*

Ensure Technological Advances Create Maximum Accessibility and Utilisation

Because of technological advances, which potentially ensure full access to information and communications, deaf people can and do participate more in all aspects of community life. This means there are more social, educational and employment equality, and more opportunities for academic and employment advancement. There are more deaf people in professional and leadership positions, such as teaching, medicine, psychology, engineering, science, business, law, and politics. Importantly, the [impositions] problem of social disadvantage and economic burden on the deaf person are dramatically reduced, and true equality is gained.

deaf people have taken advantage of the rapid advances in information and communication technologies, and use them creatively to improve their quality of life. Access to information and ease of interaction is possible by visual communications (e.g.; YouTube videos with captions, etc); services supplied on-line in sign language; relay services and other emerging accessible technologies. Advances in the Internet, smart mobile devices (phones and tablets) and other information technology provides for new and innovative means to enable communication in sign language, between two or more individuals anywhere in the world. Access to community life is more and more positive for deaf people, as it is increasingly supported by information and communication services that are visual and accessible. The goal of full accessibility and true equality is becoming more achievable.

WFD envision's that by 2020, provided CRPD obligations are implemented by government and service providers across the world, deaf people will increasingly experience a significantly improved and barrier-free access to communications, enjoy increased capacity in any written or signed lan-

guage, benefit from accessible information and full interaction through the advent of universal design within emergent information technologies. This vision, however, can become a reality only if deaf people are given the opportunity to participate actively in ensuring that technologies are accessible, and that they meet the needs of deaf people.

4. Legal Framework

The United Nations Convention on the Rights of Persons with Disabilities (CRPD) sets out obligations for national governments to ensure that persons with disabilities are fully included in their societies and ensure that they are not left behind in any sphere of their lives. Relevant paragraphs from the UN Convention are repeated below for clarification and also to underpin this policy. Examples of CRPD Articles and solutions as recommended by WFD are included in the table at the end of the document (appendices 1).

5. *WFD Implementation Priorities for Technology in 2014 - 2020*

The biggest obstacle standing in the way of full and equal technological access is arguably a lack of easy-to-find information on what technologies are available, on the specific needs of the deaf, and on policies and best practices. This has led to absurdities, such as companies touting expensive business videophones with tiny displays and exorbitant monthly charges as a solution to the communication needs of the deaf, or researchers proposing devices that would require radical changes in the way the deaf communicate.

Problems like these highlight that technology needs to be designed to meet the specific requirements of the deaf from the ground up, rather than tacking on accessibility features as an afterthought, based on the best guess of the researchers and/or developers of such technology. The only way to improve this state of affairs is to have clear and easy to find information available, and to make it easy for technology research and development to connect to the right deaf people in the field. To this end, it is vital to have a one-stop clearing house for best practices. It is also vital that such information is acted upon by equipment manufacturers and service providers, and that these are designed into the core of such services. Ensuring that this is the case requires constant involvement by deaf individuals in standards and policy setting activities.

6. Clearing House to Promote and Distribute Best Practices

The Clearing House was an original recommendation from the XIII World Congress of the World Federation of the Deaf (1999) in Brisbane, Australia. The idea is to develop a 'one-stop' shop where anyone can access to source information on any aspect of ICT-related material, products and services that affect or are used by deaf people. TAP at Gallaudet [2], TRACE Center at the University of Wisconsin-Madison [3], RNID [4], Cost 219 [5], and CTIA's AccessWireless web site [6] are examples, with TAP being the closest to a deaf-centric 'Clearing House'. We have an abundance of research, information, products and services that are dispersed across many different places. If these were available in the 'Clearing House' (C/H), they would enrich and enhance our ability to direct future development of ICT issues and needs, etc. It would also encourage collaboration and resource development through deaf organisations, research work environments and ICT providers to look for solutions to help achieve the goals as ascribed in this WFD document.

Obviously, the management and resourcing of such a C/H is the difficult part - WFD do not have sufficient ability to deal with this, so more likely a partnership with an organisation such as Gallaudet (TAP) to manage and administrate such a C/H with links to any organisation that has similar philosophies or support motives (ITU/IETF, Internet Societies, W3C, WGBH, Cisco, IBM, Microsoft, Apple, Centre for Universal Design (NCSU), etc; is one option to consider. A good starting point would be to work with institutions that already have compiled some information or have plans to do so, such as Gallaudet University, which has stated in Goal E of its strategic plan: "E.3.3 Establish a state-of the-art web-based national information center,"[2] which could possibly be adapted to encompass internationally relevant information, as well.

7. Network of Experts to Support WFD mission

As mentioned in the previous sections, the pace of technological advances, and the subsequent impact that they have on the lives of the deaf is huge, with far-reaching effects. Deaf people need to be constantly involved to ensure that they are not left behind in the 21st century – especially in developing countries, where the majority of deaf people live. To this end, we applaud the WFD Board in recognising the role and the importance of this area, and to ensure WFD Congress Commission status, acknowledging that Accessibility and Technology embraces all aspects of society in some shape or form. It will provide a stronger basis to the network of experts to pursue their work and collaborative activities; something which has been a problem throughout the past years, and does not reflect the true importance of universal design.

We realise that limited resources are a problem for the WFD. Similar to the suggestion in the section on the clearing house, officially partnering with institutions that take on an active role in the development of accessible technologies could go a long way to alleviate the problems. Gallaudet's Technology Access Program (TAP), in particular, is a potential partner, and unique in this respect, because it conducts R&D on accessible technologies specifically for deaf and hard of hearing people. Partnering would have the following benefits:

- being able to draw on the resources of people who are paid full-time to keep up with technological developments
- WFD getting alerted to new technological developments as they occur
- having an institution that is capable of reaching out to experts on technology in their day-to-day work

It is also important to establish an official point of contact in the WFD network, for people who have questions about the deaf, as related to accessibility, and that such questions are passed on in a timely manner. To this, end it would be beneficial to have a dedicated address, widely published, under which the WFD network of experts can be reached and support is also available from Secretariat and regional secretariats.

8. The Role of deaf Leadership and Early Adopters

In the underdeveloped sections of complex societies of developing countries (like India), exclusion can have multiple dimensions. Considering the large number of affected deaf individuals by the lack of access to possibilities of good living this section of society should be included in the target of inclusive design along with other people with disabilities (PwD) and advanced age. The local communities of [Majority World] developing

countries face exclusion due to economic hardship, stigma of poverty, illiteracy and hence little access to ICT. However, the life of deaf people thrives through local social networks comprising of various social groups. Such social groups could be i.e. deaf professionals, deaf teachers, local shopkeepers, volunteers and deaf community leaders who could be termed as Human Nodes of Community Communication at local level. Deaf Community leaders and experts [The Human Nodes] should be engaged and considered for any inclusive design approaches for marginalized deaf communities in developing countries. By including Deaf Community leaders and experts in Inclusive ICT design initiatives, social innovation can be addressed. These may include:

1. Support – provide input to member organizations and others seeking directions and input on information and communication technology;
2. Networking – create website to offer information and resources on technology;
3. Developing Countries – establish and conduct expert collaboration to support and address lack of information and technology parity.
4. 2015 WFD World Congress – Encourage and solicit papers that focus on policy initiatives on technology and accessibility, and on assimilation of technology in developing countries.

9. Accessibility practices and policy

Below are ground rules according to the WFD that any information and communication technology work should incorporate:

a) **Best practices**

Technology is changing at such a fast pace that many best practices become obsolete fairly quickly; some of the practices given below should therefore be only viewed as "snapshots" of the year 2013, and continually be reviewed and updated, as new developments warrant. We encourage all ICT product and / or service developments include universal design principles so that all people can access and utilize them.

This includes information on products and services being accessible. Many deaf people are not aware of products / services and accessibility features content which are pre-dominantly presented in print / text or videos with /without captions. They are not demonstrated or illustrated in sign language which means those deaf people who have limited literacy skills (especially developing countries) will not sufficiently enjoy the benefits of these products and services.

b) Obligations to collaborate with end users

Accessibility is not an afterthought. Products need to be designed with it in mind from the ground up. Involve deaf consumers from the beginning. Test, test, test, and test some more with a representative sample from the target group. Respect deaf people as humans, involve them and acknowledge that they know better than anyone else what deaf people need.

c) **Functional equivalence**

The overarching goal and litmus test of any technology should be whether it allows deaf people to function on a level similar to hearing people, at similar costs. That is, deaf people should not be required to shoulder undue financial burdens in order to gain access, nor should they face restrictions in what services and technologies they can use, compared to hearing people.

d) **Interoperability**

deaf people should not be locked into proprietary products. A path needs to be kept open for them to communicate both among themselves and with the mainstream. International standards should be adopted and followed, not proprietary protocols. Where there are no international standards, preference for widely adopted mainstream standards over little-used ones is acceptable.

e) Multimodal communication: Specific examples of video, text and audio communication

Examples of multimodal communication include *Skype, OoVoo* and other Total Conversation (ITU-T recommendation F.03) and multimedia communication software or applications.

Note that, as mentioned above, these practices are subject to change as technologies evolve. When in doubt, follow the principles of functional equivalence and interoperability.

f) **Real-time text**

- Real-time text is where devices can communication with each other in real time. In the SIP environment they should be supported according to RFCs 4103 and 5194; in other environments they should be supported according to the defined standards for that environment (e.g. XEP-0301 for XMPP; 3GPP TS 26.114 v2.0.0 for IMS).

g) **Video Relay services (VRS) or Video Remote Interpreting (VRI)**

- Any video relay service (VRS) or video remote interpreting (VRI) should be interoperable with any mainstream IP based video terminals and / or services (including H.263, SIP or application based programs, etc, eg; Skype).
- IVRS and VRI should also provide support for ITU-T recommendation H.264 for video.
- VRS and VRI should offer nationally qualified and experienced interpreters in sign language and with good usability as described in ITU-T Series H Supp. 1.;
- VRS and VRI should be available 24/7 and accessible via a variety of technology including computers, laptops, smart devices;
- Emergency services access should be available 24/7.

h) Text-based Relay Services

- Any PSTN based text relay service should be interoperable with any text terminal compliant with ITU-T;
- Text-based Relay Services should be available 24/7 and accessible via a variety of telecommunication networks and technology including textphones, caption-phones, computers, laptops, smart devices;
- Emergency services access should be available 24/7 via a variety of telecommunication networks and technology including textphones, caption-phones, computers, laptops, smart devices;
- Any IP based text relay service should be interoperable with any text terminal or service using IETF SIP for call control and RFC 4103 for real-time text. Audio support should be provided for G.711 A-Law.

i) **Websites and social media services**

- Any service that provides web based access should be compliant at least with W3C web content accessibility guidelines **WCAG 2.0** [i.11] level "Double-A", and WAI-ARIA guidelines, and should be compatible with those web browsers specified in the contract and published to users.
- Websites and video services should include capacity for sign language translation and captioning of all videos and text-based material. Particularly those that have language translation features such as Google Translate and Wikipedia.
- For deafblind people, accessibility features for many websites are not satisfactory and they have to download software programs to make them accessible and configured to suit their needs. Web browsers should have In-built accessibility features available for any person's access requirements.

j) Information Services (providing audio content such as cultural venues, airports, transportation hubs, hospitals, etc)

- All audio information (real time or taped) should be accessible in sign language and captions.

k) Emergency services

- All emergency services should be accessible directly as well as via Relay services allowing for real time communication options such as video (sign language), text and voice).
- Emergency warnings broadcast on television, IPTV, websites or mobile phone messages, should include provision for live sign interpretation as well as real time captions options.

l) **Telephone, Mobile phones / smart phones, multimedia devices (e.g. iPad 2, other tablets)**

- Smartphone design should include [provide] accessibility features, such as customizable vibrating and visual alerts, sign language and captioning translation options, etc.
- Smartphones should not impede or prevent users from installing accessibility software.
- Smartphones and carriers should not impede or block the transmission of video, real-time text, and audio over IP.
- Smartphone apps should include accessibility features
- All phones and devices with voice call capabilities should provide hearing aid compatibility with appropriately low levels of interference, and provide a coupling mechanism via telecoil or other possible future digital transmission standards.
- For deafblind people, accessibility features have to be downloaded and configured to the app(s) Icecream sandwich Ver. 4 is the only version of Android that includes some accessibility, however, many Android devices don't allow upgrades to this latest version of Android. Speech output does NOT work with Braille displays - Speech output cannot be customised eg; phone numbers are read as "four hundred and seven million, eight hundred and eighteen thousand, eight hundred and three. All the accessibility features must be "found", downloaded, installed and configured. This is time consuming and just too difficult for many users. All mobile phones should have Include Inbuilt accessibility features.

m) **TV media, Cinema**

- TV Media (live [real time] and taped) should be fully accessible to the deaf, via sign language, subtitling / captioning, or both;
- TV should be accessible 24/7;
- All cinema programs should include captioned options including open or closed captions of all movies;
- Subtitles/ captions should include a description of background and ambient sounds (e.g. "birds chirping," "door slams," songs, music, etc.);
- Subtitles / captions should clearly identify the respective speaker, e.g. via colours and / or positioning.

n) **Digital distribution technology: DVDs, Net**

- All Digital distribution technologies should include accessibility features, such as subtitles / captions.
- All Digital distribution technologies available on the Internet, should offer subtitles if they are available for the same content on a different medium [(e.g. if the DVD has subtitles, so must a streaming download on the Internet)].
- All playback devices/software for digital content should offer options to display subtitles, if they exist in the media.

This policy document is continually reviewed and updated as technology changes. We seek to strive towards a world were equality considerations as mandated by the United Nation's Convention on the Rights of People with Disabilities. While there have been great strides in accessibility features being considered and / or incorporated in information and communication technology services there is still a long way to go. WFD seeks to work with our partners to achieve that goal.

Notes 1 http://www.ncsu.edu/ncsu/design/cud/about_ud/about_ud.htm
2 http://www.gallaudet.edu/documents/presofc/strategic_plan/goale_2009.pdf
3 http://trace.wisc.edu/
4 http://www.rit.edu/overview/ntid
5 http://www.cost.eu/domains_actions/ict/Actions/219ter
6 http://www.ctia.org/

Appendices 1

UN Convention on the Rights of Persons with Disabilities *as it relates to deaf people and accessibility and technology*

UN Convention Article.	Topic	Statement	Access model ensuring the needs for deaf, deafblind and hard of hearing people are included / met. (examples are described in the document '8.a to n' on pages 5-8)
4	**General Obligations**	1.(g) To undertake or promote research and development of, and to promote the availability and use of new technologies, including information and communications technologies, mobility aids, devices and assistive technologies, suitable for persons with disabilities, giving priority to technologies at an affordable cost;	• Best practice research models that includes deaf people in design stages; • Universal design principles adopted • Accessible mainstream technology • Functional equivalence principle included • See 8. a - n
		1.(h) To provide accessible information to persons with disabilities about mobility aids, devices and assistive technologies, including new technologies, as well as other forms of assistance, support services and facilities;	• Best practice accessibility features are included • Universal design principles adopted • Information is accessible in all required formats • See 8. a - n

9	**Accessibility**	1. To enable persons with disabilities to live independently and participate fully in all aspects of life, States Parties shall take appropriate measures to ensure to persons with disabilities access, on an equal basis with others, information and communications, including information and communications technologies and systems…. These measures, which shall include the identification and elimination of obstacles and barriers to accessibility, shall apply to:- (b) Information, communications and other services, including electronic services and emergency services.	• Best practice accessibility features are included • Universal design principles adopted • Information is accessible is all required formats • Accessible mainstream technology • Functional equivalence principle included • See 8. a - n
9	**Accessibility**	2. (c) Provide training for stakeholders on accessibility issues facing persons with disabilities;	• Information and training is accessible in all required modes and formats • See 8.a,b,c
9	**Accessibility**	2. (f) To promote other appropriate forms of assistance and support to persons with disabilities to ensure their access to information;	• Information is accessible in all required formats • See 8. a - n
9	**Accessibility**	2. (g) Promote access for persons with disabilities to new information and communications technologies and systems, including the Internet;	• Information and training is accessible in all required modes and formats • See 8. a - n

9	**Accessibility**	2. (h) 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.	• Best practice research models that includes deaf people in design stages; • Universal design principles adopted • Accessible mainstream technology • Functional equivalence principle included • See 8. a - n
19	**Living independently and being included in the community**	(b) Persons with disabilities have access to a range of in-home, residential and other community support services, including personal assistance necessary to support living and inclusion in the community, and to prevent isolation or segregation from the community;	• Information and training is accessible in all required modes and formats • Communication technology and services are accessible and available in all required modes and formats • See b, e, f,g,h,I,j,k,l,m,n
		(c) Community services and facilities for the general population are available on an equal basis to persons with disabilities and are responsive to their needs.	• Information and communication technology and services are available in all required modes and formats • Universal design principles adopted • See b, e, f,g,h,I,j,k,l,m,n
20	**Personal Mobility**	(b) Facilitating access by persons with disabilities to quality mobility aids, devices, assistive technologies and forms of live assistance and intermediaries, including by making them available at affordable cost;	• Information and communication technology and services are available in all required modes and formats • See e, f,g,h,I,j,k,l,m,n
20	**Personal Mobility**	(a) Encouraging entities that produce mobility aids, devices and assistive technologies to take into account all aspects of mobility for persons with disabilities.	• Best practice research models that includes deaf people in design stages; • Universal design principles adopted • Accessible mainstream technology • Functional equivalence principle included • See 8. a - n

21	**Freedom of expression and opinion and access to information**	(a) Providing information intended for the general public to persons with disabilities in accessible formats and technologies appropriate to different kinds of disabilities in a timely manner and without additional cost;	• Information is accessible in all required modes and formats • See 8. a - n
21	**Freedom of expression and opinion and access to information**	(b) Accepting and facilitating the use of sign languages, Braille, augmentative and alternative communication,	• Information and communication technology and services are available in all required modes and formats • See 8. a - n
21	**Freedom of expression and opinion and access to information**	(c) Urging private entities that provide services to the general public, including through the Internet, to provide information and services in accessible and usable formats for persons with disabilities;	• Best practice research models that includes deaf people in design stages; • Universal design principles adopted • Accessible mainstream technology • Functional equivalence principle included • See 8. a - n
21	**Freedom of expression and opinion and access to information**	(d) Encouraging the mass media, including providers of information through the Internet, to make their services accessible to persons with disabilities	• Information is accessible in all required modes and formats • See 8. a - n
24	**Education**	2. (b) Persons with disabilities can access an inclusive, quality and free primary education and secondary education on an equal basis with others in the communities in which they live;	• Best practice education accessibility features are included • Universal design principles adopted • Information is accessible is all required formats • Accessible mainstream technology • See e, f,g,h,I,j,k,l,m,n
		(c) Reasonable accommodation of the individual's requirements is provided;	• Information and learning is accessible is all required formats • Accessible mainstream technology • See e, f,g,h,I,j,k,l,m,n

		(*d*) Persons with disabilities receive the support required, within the general education system, to facilitate their effective education;	• Information and communication technology and services are available in all required modes and formats • See e, f,g,h,I,j,k,l,m,n
		(*e*) Effective individualized support measures are provided in environments that maximize academic and social development, consistent with the goal of full inclusion.	• Information and communication technology and services are available in all required modes and formats • See b, e, f,g,h,I,j,k,l,m,n
24	**Education**	3.(*a*) Facilitating the learning of Braille, alternative script, augmentative and alternative modes, means and formats of communication and orientation and mobility skills, and facilitating peer support and mentoring;	• Information and learning is accessible is all required formats • Peer role models are use to support learning • See 8. a - n
		(*b*) Facilitating the learning of sign language and the promotion of the linguistic identity of the deaf community;	• Information and learning is accessible is all required formats • Peer role models are use to support learning • See e,g,I,j,k,l,m,n
		(*c*) Ensuring that the education of persons, and in particular children, who are blind, deaf or deafblind, is delivered in the most appropriate languages and modes and means of communication for the individual, and in environments which maximize academic and social development.	• Best practice education accessibility features are included • Universal design in education principles adopted • Information is accessible is all required formats • Peer role models are use to support learning • See 8. a - n

24	**Education**	4. In order to help ensure the realization of this right, States Parties shall take appropriate measures to employ teachers, including teachers with disabilities, who are qualified in sign language and/or Braille, and to train professionals and staff who work at all levels of education. Such training shall incorporate disability awareness and the use of appropriate augmentative and alternative modes, means and formats of communication, educational techniques and materials to support persons with disabilities.	• Best practice education accessibility features are included • Universal design in education principles adopted • Information is accessible is all required formats • See b, e, f,g,h,I,j,k,l,m,n
24	**Education**	5. States Parties shall ensure that persons with disabilities are able to access general tertiary education, vocational training, adult education and lifelong learning without discrimination and on an equal basis with others. To this end, States Parties shall ensure that reasonable accommodation is provided to persons with disabilities.	• Best practice education accessibility features are included • Universal design in education principles adopted • Information is accessible is all required formats • See 8. a - n
29	**Participation in Political and Public life**	(ii) Protecting the right of persons with disabilities to vote by secret ballot in elections and public referendums without intimidation, and to stand for elections, to effectively hold office and perform all public functions at all levels of government, facilitating the use of assistive and new technologies where appropriate	• Information and communication technology and services are available in all required modes and formats • See b, e, f,g,h,I,j,k,l,m,n

32	**International Cooperation**	(a) Facilitating and supporting capacity-building, including through the exchange and sharing of information, experiences, training programmes and best practices;	• Information and communication technology and services are available in all required modes and formats • See 8. a - n
		(c) Facilitating cooperation in research and access to scientific and technical knowledge;	• Best practice research models that includes deaf people in design stages; • Universal design principles adopted • Accessible mainstream technology • Functional equivalence principle included • See 8. a - n
		(d) Providing, as appropriate, technical and economic assistance, including by facilitating access to and sharing of accessible and assistive technologies, and through the transfer of technologies.	• Best practice research models that includes deaf people in design stages; • Universal design principles adopted • Information and communication technology and services are available in all required modes and formats • See 8. a - n

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