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The Harmonization of ICT Accessibility Standards for Public Policies

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Abstract. *Nowadays, individuals are able to access an ever-increasing number of services via the Internet. However, only when all individuals, including people with disabilities, are able to completely access the Internet can a digital society be considered truly universal. Legislative frameworks exist in several countries which support compliance with Web accessibility. Moreover, there are accessibility standards that address how to implement accessibility differently. However, despite numerous efforts by various governments, universal Web accessibility is still a global issue. Many different causes for the non-compliance with this regulatory framework occur such as, for example, the lack of international consensus regarding accessibility standards due to the fact that the standards for this in each country are similar but have some significant differences. This article presents the current proposal, adhering to the legislation, for the harmonization of accessibility standards that has become the future global regulatory strategy all countries must adhere to. While benefits from this new regulatory framework are expected, challenges to achieving this are also foreseen.*

Overview

We continually use information and communications technology (ICT) for everyday tasks. The Internet is the principal medium through which the self-actualization of individuals as full members of the information society is realized. However, many users are currently being left behind and, therefore, denied full membership in the information society due to the existence of barriers preventing these individuals from fully accessing the Web. While these barriers disproportionately affect users with disabilities, there are numerous other user groups which are also at risk of exclusion such as the elderly. For the purpose of avoiding this exclusion, it is essential that public websites and their services adhere to accessibility standards so that any citizen, with or without disabilities, is able to access all websites.

The number of people with disabilities is significant. The *World Health Organization (WHO)* estimated that approximately 10% of the world's population in 2014, or 650 million people, lived with some type of disability, making them the world's largest minority group. According to an *American Community Survey (ACS)*, the overall rate of disability in the US population in 2015 was 12.6%. These figures are increasing due to population growth, medical advances and the aging process. By 2050 there will be 2 billion people over 60

according to the *Global Initiative for Inclusive Information and Communication Technologies (G3ict)*. According to this information, people must realise that, at some time, everyone may likely suffer from a momentary or permanent disability.

The legislation is, therefore, vital to all of us. A legislative framework exists which supports compliance with Web accessibility and, in most cases, is mandatory for websites belonging to public administrations.

While many important initiatives around the globe have been launched in order to address this issue and to work towards the design of a truly universally accessible Internet, many obstacles still exist. Data indicates that a vast number of currently existing websites continue to present serious barriers to accessibility [1, 2]. The fragmentation of reference standards and a lack of resources, in addition to the need to focus more on consistent methods and toolsets, are the main reasons for this [3].

Moreover, the inclusion of diverse users when designing ICTs makes good financial sense for those companies which create them. According to estimates from the *U.S. Census Bureau*, people with disabilities in the U.S. have approximately $220 billion a year in discretionary income. Thus, companies that do not consider inclusive design are losing a substantial number of potential customers.

There are several aspects which can have a positive impact on the fulfilment of Web accessibility such as taking accessibility into account in the policies of organizations. It is essential to guide governmental policies in order to raise awareness that Web accessibility should be part of the corporate social responsibility.

Accessibility laws

Since the late 1990s, several countries began to enact laws adopting computer system accessibility for technology either supported or provided by the government. With the *1973 Rehabilitation Act* and its *Section 508* (modified in 1998), the United States was one of the world's first countries to do this. The U.S. Congress, with this act, made it mandatory for all information technology that received funding from any of the federal agencies to be accessible for all individuals, including people with disabilities. One of the main goals of this legislation was to remove any barriers people with disabilities may have had in accessing information technologies thus providing them with new opportunities and promoting the development of related technologies. Furthermore, since 1990, all buildings, whether public or private, that are open to the public must be accessible to people with disabilities thanks to the *Americans with Disabilities Act (ADA)* by which all civil rights were specifically extended to people with disabilities. A few years later, in 1996, the Internet was found to be just such a public place by the U.S. Department of Justice. Similar laws have been passed in many other countries such as the U.K.'s *Disability Discrimination Act (DDA)* which was enacted more than two decades ago.

The *European Council* also began to address this issue with several action plans such as the *eEurope 2000*, *eEurope 2002*, *eEurope 2005* and *Europe 2020* strategies they implemented. The goal of these initiatives is to ensure that all citizens have access to ICT services by

removing the technical barriers that some people encounter when using them.

Thanks to these initiatives, *The United Nations Convention on the Rights of Persons with Disabilities* in 2006 was ratified by the European Union and its Member States. In Article Nine, the Convention requires States to ensure the accessibility of, among other elements, systems and information technology and electronic services. It recognizes disability as an outcome of the interaction between an individual and the physical, technological and economic barriers, as well as other aspects, which prevent their full participation in society.

As a result of the *United Nations Convention on the Rights of Persons with Disabilities* and the initiatives, several European countries began to enact national laws regarding the accessibility of information systems such as Germany, with the *BITV* in 2002, Italy, with the *Stanca Act* in 2004, or the *Royal Decree 1494* in 2007 in Spain. During the same period, other countries enacted accessibility laws, many of which have updated and referenced standards such as those listed in the next section.

In February of 2015, the *U.S. Access Board* released "*The Refresh*", their proposal for updating *Section 508's ICT Standards and Guidelines*. Revisions for the *Communications Act's Section 255* are also included in these updates and pertain to those companies which manufacture and/or provide telecommunications products and services. In the last year, legislative changes have taken place. In January 2017, this update was officially put into force. Mandatory compliance with these new regulations began on January 18th, 2018. The goals are to not only update accessibility requirements and make them easier to understand and comply with, but also harmonize them with international standards such as *European Standard EN 301 549 "Accessibility requirements suitable for public procurement of ICT products and services in Europe"* and the WCAG 2.0, both of which are introduced in the following section.

On the other hand, a European Directive from December 22nd, 2016, has been approved by the *European Parliament* concerning Web Accessibility for Public Sector Websites, making Web accessibility the law in Europe. This Directive makes it so that all new websites and applications developed in the public sector must be accessible. Moreover, all current websites are required to be updated. If requested, older content, such as videos or word documents, must also be provided in accessible formats. All videos broadcast by governments, including those streamed live, have to be closed captioned. If this is not possible, another equally accessible alternative must be provided. Furthermore, any online service such as, for example, the payment of fines or fees, also need to be accessible to all individuals. Lastly, every website is obliged to inform users if any part of it is not fully accessible. Compliance with the *EN 301 549 Standard* is mentioned in the *European Union Directive*. Similarly, EU members have also been advised to incorporate the standard into their legislation no later than September 23rd, 2018, in the *EU Directive* regarding the Accessibility of Websites and Mobile Applications. Compliance with the standard by newly launched public-sector websites must occur within one year. The deadline for compliance for other public-sector websites is September 23rd, 2020, while that for public-sector mobile applications is June 23rd, 2021.

This broad regulatory framework shows that Web accessibility is an issue of global concern.

Despite these legislative endeavours, many public organizations' websites continue to have accessibility barriers[4]. There several studies which have revealed accessibility issues on government websites around the globe[5,6], proving that government websites do not comply with these laws. There are few studies that carry out good practices for the implementation of accessibility[7].

Accessibility standards

It is important to mention that consensus standards are not international laws, but rather mere guidelines that governments can agree on standards in their legislative processes.

In order to achieve comprehensive ICT accessibility and compliance with the legislation, standards which identify problems and suggest new accessible designs exist. With regards to accessibility standards, special mention must be made of the *World Wide Web Consortium (W3C)* with the *Web Accessibility Initiative (WAI).*

The WAI has been working since 1997 on accessibility guidelines. The most relevant guidelines are the *Web Content Accessibility Guidelines (WCAG),* first published as version 1.0 in 1999 and then updated to version 2.0 in 2008. WCAG 2.0 is internationally recognized as the benchmark for Web accessibility and is referenced in the regulations of several countries that govern the accessibility of public websites such as those shown in Table 1. In June 2018, ten years after the publication of the WCAG 2.0, the definitive version of the WCAG 2.1 were made public. The WCAG 2.1 document suggests moving forward and applying the WCAG 2.1 since, even though they are recommendations, formal obligations do mention the WCAG 2.0. It is expected that the WCAG 2.1 will be quickly adopted by both national and international standards and regulations.

Additionally, there are other important standards which are very similar to WCAG 2.0, although most of them are less extensive. These are either totally or partly related to Web accessibility issues (see Table 1). In this regard, since 2012 the WCAG 2.0 has been an international benchmark using the *ISO/IEC 40500:2012 standard (Information technology -- W3C Web Content Accessibility Guidelines (WCAG) 2.0).*

In the field of *software accessibility, the International Standards Organization (ISO) published its ISO 9241-171* in 2008. This standard established guidelines and specifications for the ergonomic design of software to be used at home, work, in education and public spaces. It deals with a variety of issues related to the design of accessible software which is to be used by individuals with a wide range of abilities (physical, sensory and cognitive). The elderly and people suffering from temporary disabilities are also contemplated in this standard. With the ISO 9241-171, applied also to interactive systems and their accessibility, a broader array of users can benefit from the improved usability of different systems.

The WCAG2ICT Task Force was created by W3C in 2013 to develop documentation describing how to apply "*WCAG 2.0 to Non-Web Information and Communications Technologies (ICT)*". This task works to obtain a consensus about which elements of WCAG may be applied as handwritten to Non-Web ICT and which elements require interpretation and replacements of the terms.

Country	Standards and guidelines	Legislation/Directives	Scope
Australia	WCAG 2.0 (Level AA)	Disability Discrimination Act 1992 (DDA)	Mandatory for e-Government Websites and non e-Government Websites
Canada	WCAG 2.0 (Level AA) with some exceptions	Human Rights Act 1985	Mandatory for e-Government Websites
EU	WCAG 2.0 (AA)	Web and Mobile Accessibility Directive (2016))	Mandatory for EU Commission Websites and other Websites with public services
France	RGAA 3 (built on WCAG 2.0 (Level AA))	Law No 2005-102, Article 47	Mandatory for e-Government Websites and other Websites with public services
Germany	BITV 2 (built on WCAG 2.0 (Level AA), but not identical.)	Federal Disabled Equalization Law (BGG)	Mandatory for e-Government Websites
India	Guidelines for Government Websites (built on WCAG 2.0) (Level AA)	Government Directive	Mandatory for e-Government Websites
Ireland	Code of Practice on Accessibility of Public Services and Information Provided by Public Bodies (which includes WCAG 2.0)	Disability Act 2005, National Disability Authority Act, 1999	Mandatory for e-Government Websites
Israel	WCAG 2.0 (AA) (Identical to Israeli standards and guidelines for accessibility 5568 standards)	Equal Rights for People with Disabilities Regulations 5773-2013.	Mandatory for e-Government Websites and commercial Websites
Italy	Guidelines of Law 4/2004 (Identical to WCAG 2.0 (Level AA))	Law 4/2004 (Stanca Act)	Mandatory for e-Government Websites
Japan	JIS X 8341-3:2016 (Japanese Web Accessibility standard) (Identical to WCAG 2.0 (Level AA))	Act on the Elimination of Discrimination 2013	Mandatory for e-Government Websites and commercial Websites
Netherlands	Dutch guidelines (which include WCAG 2.0 (Level AA))	Government Directive	Mandatory for e-Government Websites.
New Zealand	New Zealand Web Accessibility Standards 2.0 (Identical to WCAG 2.0 (Level AA))	Human Rights Amendment Act 2001	Mandatory for e-Government Websites
Norway	WCAG 2.0 (Level AA), but not identical)	LOV 2008-06-20 nr 42 Lov	Mandatory for Websites with some exceptions
Ontario	SGQRI 008 (built on WCAG 2.0 (Level AA) with some exceptions)	Ontarians with Disabilities Act (AODA), 2005	Mandatory for e-Government Websites and other Websites with public services.
Quebec:	Standard sur l'accessibilité d'un site Web (built on WCAG 2.0 (Level AA))	Government Directive	Mandatory for e-Government Websites
Spain	Spanish Standard UNE 139803:2012 (Identical WCAG 2.0 (Level AA))	Royal Decree 1/2013	Mandatory for e-Government Websites and other Websites with public services.
United Kingdom	WCAG 2.0 (Level AA)	Equality Act 2010	Mandatory for e-Government Websites
USA	Section 508 Refresh (references WCAG 2.0 (Level AA))	Section 508 (Ongoing Section 508 Refresh)	Mandatory for e-Government Websites

Table 1. Web Accessibility Standards, Guidelines, and Legislative Framework currently

WCAG 2.0, as shown in Table 1, is mandatory in many countries for government and public websites and, in some cases, even for privately owned sites. Nevertheless, software accessibility requirements have much less impact on regulations. One exception is the standards of section 508 which include some fundamental accessibility requirements for software systems (*1194.21 Software applications and operating systems*)[8]. This situation implies that accessibility standards are fulfilled on the Web more than the rest of software. The accessibility standards that are being updated are driving changes in this area.

Accessibility standards to drive process change

Organizations must meet the special needs of people with disabilities along the whole ICT development process. There are related standards that offer a guide on how organizations can integrate accessibility into their processes[9]. These standards are best practices with regard to implementing accessibility within the organizations and public policies. One example of this is the methodological approach "*Developing Organizational Policies on Web Accessibility*" from the WAI, which helps to develop a policy for creating, managing, and delivering accessible websites in conformance with WCAG.

In the United States, one example is the *Twenty-First Century Communications and Video Accessibility Act (CVAA)*, approved in 2010. According to act, "Manufacturers and service providers must consider performance objectives ... stage as early as possible and must implement such performance objectives, to the extent that they are achievable". This directive aims to ensure the accessibility and usability of all products, equipment and services. By integrating this requirement into laws, a powerful force is created which can promote change and innovation and introduce a distinguishing factor into the market[10].

Likewise, with regards to products and services, accessibility must be included in both design and development processes by developers according to the Section 508 Refresh. The Refresh proposal has been refocused to regulate the capabilities of features found in the various products and service instead of their nature. With this change, the Refresh hopes to address the issue that, currently, a variety of different functions are combined in one single product or service as can be seen with a mobile phone which joins hardware, software, Web content and communication technology in the same device. By reorganising these standards and guidelines, confusion as to which requirements are relevant is reduced and repetitive elements, which were found in all areas of the Section 508 in order to deal with the same problem across all the different types of products, are eliminated. Furthermore, a change in terminology is incorporated and what previously was referred to as Electronic and Information Technology (E&IT) is now called Information and Communications Technology (ICT). Additionally, changes have been included in the Section 508 refresh which: (a) incorporate WCAG 2.0 and its application to websites and offline electronic documents and software; (b) obligate text functionality in real time to be included in real-time services and two-way voice communications; (c) clearly establish which types of non-public electronic content is covered and (d) states detailed specifications as to the mandatory compatibility of the technologies subject to these standards and guidelines (including any operating system, software development toolkits and software applications which incorporate assistive technology). Following a human-centred approach, this standard requires that people with disabilities be involved in the product design and evaluation processes, therefore, improving the user experience.

Moreover, market research must also consider the needs of individuals with disabilities.

Other standards are aimed at the standardisation of accessible technology such as BS 8878 published by the *British Standards Institution (BSI)* in 2010. While WAI Web accessibility standards focus on the technical or testing aspects regarding accessibility, this standard provides guidelines for organisations and subcontractors to follow when implementing accessible websites. Furthermore, its focus is based more on the individual user[11]. With the creation of *BS 8878*, managers are now provided with a guide that will lead them through the entire lifecycle of each project without needing to have exhaustive knowledge of or experience with the more technical aspects of accessibility.

In Europe, there is an ongoing effort along the same trend with regards to public procurement. The European Commission published Mandate M/376 in 2005 calling for the three *European Standard Organizations (CEN, CENELEC, and ETSI)* to develop functional accessibility requirements to be used in the public procurement of ICT products and services. The result is the previously mentioned *European standard EN 301-549* titled "Accessibility requirements suitable for public procurement of ICT products and services in Europe," the first version of which was published in 2014, that establishes functional accessibility requirements and includes guidance material and an online toolkit to support the work of public procurers. It is applicable to both products and services. The M/376 project is linked to the WCAG2ICT Task Force. Currently, CEN-CENELEC is working on new standards, to be implemented by the M/376, M/420 and M/473 mandates, that will result in related standards.

With the aim of supplying support for the implementation of accessibility standards, ISO launched the standard *ISO/IEC Guide 71 standard (Guide for Addressing Accessibility in Standards)* that contains approaches on how to address accessibility in standards and fitting them to the various social policy models found in different countries.

The Harmonization of Updated Standards

So far, there has been a lack of consensus on accessibility standards which is not conducive to the compliance with these regulations. Currently, as previously seen, there is a trend for harmonization.

The harmonization proposal consists of standards and guidelines such as *Section 508 Refresh* and the *European EN 301-549 standard* for public procurement of ICT as well as international consensus standards such as the *WCAG* and the *ISO standard for universal accessibility (PDF/UA-1)* (see Figure 1). The most relevant change is that *Section 508 Refresh* and the *EN 301-549* use *WCAG*. Additionally, they include guidelines not only for web content but also for Non-Web documents and software.

Figure 1: Accessibility Standards of the Harmonization Proposal

The results of these harmonized efforts to define accessibility requirements for ICT have strong implications in the set of requirements software products must meet. It is essential to provide support in order to assist companies and organizations in implementing global accessibility standard unification. Given its recent release, the majority of the resources are currently specific to each standard. One example is the online toolkit used to define and manage the functional accessibility requirements of the *EN 301 549* and the *Section 508* requirements. There are many resources related with accessibility evaluation but which only check compliance with a specific standard. There is a need for resources which offer support for compliance with accessibility standard unification. In this regard, one resource is the *Voluntary Product Accessibility Template (VPAT)*, which incorporates the updated criteria found in *EN 301 549*, as well as the *WCAG, Section 508* and *Section 255*.

In order to tackle the updated standards and this new regulatory framework, it is important to follow methodological approaches such as *British Standard 8878 (BS 8878)* or the one provided by the guide "*Planning and Managing Web Accessibility*" by *WAI* for the implementation of the harmonization of accessibility standards. Activities are provided in this guide which assist in integrating accessibility throughout the entire process (see Figure 2).

Figure 2. Planning and Managing Web Accessibility [Source: W3C, WAI, https://www.w3.org/WAI/planning-and-managing/]

In summary, this focus will include actions in an Accessibility Plan for standards harmonization such as: the creation of an Accessibility action Group, the definition of Accessibility Policies in the organization, the creation of a Training Plans on accessibility standard unification, the selection of adequate technology that allows to create technology according to the harmonization of standards, the use of User-Centered Design Methods to ensure the access to ICT by users with disabilities, and making accessibility monitoring and evaluation technology for the unification standards conformance available. This methodological approach is of great interest and relevance for an organization wishing to adopt a global accessibility policy.

Challenges in regulatory trends

In the last decade, despite the existence of accessibility standards and accessibility policies in the majority of countries, Web and Non-Web ICT accessibility issues remain prevalent. The challenges have not been completely resolved.

The fragmentation of standards has not facilitated the acquisition of knowledge regarding this issue among professionals and an awareness regarding accessibility by society as a whole. Practically speaking, the implementation of accessibility issues continues to be a specialised area. In order to support ICT professionals and promote the incorporation of accessibility principles into their practices, more training is needed [12]. On the other hand, the lack of technology which assists in the implementation of the accessibility as well as monitoring accessibility has not facilitated the overcoming of these challenges [4].

The harmonization proposal can improve the situation of compliance with global accessibility laws in the upcoming years only if this is accompanied by solid Accessibility Policies and pro-active Accessibility Plans.

Conclusions

There has been a long history of laws defending the rights of people with disabilities to access ICTs. However, different standards have currently been established by the laws passed in each country. This situation has led to an international fragmentation of standardization and favours non-compliance with accessibility regulations.

A single regulatory framework for all countries has been developed that will facilitate the implementation of the Accessibility of ICTs for Public Policies and its compliance according to laws.

The updated *Section 508* and the *European EN 301-549* regarding the public purchasing of ICT as well as consensus standards like *WCAG 2.0* are all included in the proposal of this new regulatory framework. Both regulatory processes, the *EU 301-549* and *Section 508 Refresh* in the United States, define current standards and require the accessibility of any technology developed or procured by governments at the national level.

These more aligned standards provide guidance to those organisations which hope to sell ICTs to both governments and on the market at the national as well as the international level. This one common set of standards helps society reach conformance and, therefore, the harmonization of these standards benefits all involved parties.

The future we have before us is more promising, but there continue to be many challenges which must be faced.

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(RELATED WORK TO HELP READERS UNDERSTAND THE CONTEXT)

People with Disabilities in Web use

There is a wide range of people with disabilities which includes individuals with blindness or impaired vision as low vision, hearing loss, cognitive limitations, limited movement, speech disabilities, photosensitivity and combinations of these. Also, some people may have disabilities due to an illness, or they may acquire impairments with age.

Moreover, there is a broad range of diversity found in the people. People have diverse abilities, skills and preferences that have an impact on how they use the Web.

In accordance with the specific characteristics, special needs and preferences of the people with disabilities, they access the Web in different ways. At times, people configure standard software according to their needs and, other times, people use assistive technologies. Assistive technologies are technologies that people with disabilities need to manage and access content in their interaction with the Web. Examples of these technologies are software as screen magnifiers programs for people with low vision and screen readers programs that read webpages aloud for blind people, and when people cannot use a keyboard or mouse, exist hardware as adaptive switches.

Using technology in a way that supports accessibility means that it compatibles with assistive technologies. The accessibility requirements of assistive technologies are met if accessibility standards, such as WCAG, are followed.

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 (RELATED WORK TO HELP READERS UNDERSTAND THE CONTEXT)

Web Content Accessibility Guidelines (WCAG)

WCAG provides recommendations for making web content more accessible to a wider range of people with disabilities. Following these guidelines often makes web content more user-friendly in general.

Regarding the structure of the WCAG 2.0 W3C Recommendation, 11 December 2008, it has three main levels of support: principles, guidelines and success criteria. The principles are four: perceivable, operable, understandable and robust. Each principle has guidelines associated. Twelve guidelines provide fundamental objectives that web designers should know regarding make content more accessible to people with disabilities.

Lastly, sixty-one success criteria are provided for each guideline. These criteria are used to carry out conformance testing according to WCAG 2.0. In order to meet the needs of different user groups and environments, there are three levels of conformance: A (lowest), AA, and AAA (highest).

In general terms, a webpage must fully meet one of these levels of conformance. In most regulatory frameworks that have adopted the WCAG 2.0, conformance to the AA level is mandatory.

The goal of the new version of the Web Content Accessibility Guidelines (WCAG) 2.1 W3C Recommendation, 05 June 2018, is to improve accessibility guidelines for specific groups of users such as people with cognitive or learning disabilities, people with impaired vision and people with disabilities who access content via mobile devices. The WCAG 2.1 offers users of mobile devices more up-to-date guidance which includes support for those interactions carried out by touch, dealing with more complex gestures and assisting them in avoiding activating an interface accidentally.

The focus of the WCAG 2.1 is additive and, therefore, is intended to demonstrate that if a webpage complies with the WCAG 2.1, it also complies with the WCAG 2.0. All of the WCAG 2.0's compliance criteria are included in those found in the WCAG 2.1. The structural requirements inherited from the WCAG 2.0, the clarity and impact of the proposals received and the strict calendar established have, in the end, resulted in the inclusion of 17 new criteria. This is essential so that websites which update to the WCAG 2.1 do not lose their compliance with WCAG 2.0 and continue to comply with the legal requirements regarding accessibility.

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RESOURCES:

More Information about Web Accessibility Initiative (WAI)
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- Web Content Accessibility Guidelines (WCAG) Overview, 2012, https://www.w3.org/WAI/intro/wcag.php
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- Developing Organizational Policies on Web Accessibility, https://www.w3.org/WAI/planning/org-policies/
- Web Accessibility Laws & Policies, https://www.w3.org/WAI/policies/

More Information about Accessibility Laws
- Nations Convention on the Rights of Persons with Disabilities http://www.un.org/disabilities/convention/conventionfull.shtml
- US, Section 508 of Rehabilitation Act: https://www.section508.gov/manage/laws-and-policies#508-policy
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More Information about European Directive on Web Accessibility:
- Directive (EU) 2016/2102 of the European Parliament and of the Council of 26 October 2016 on the accessibility of the websites and mobile applications of public sector bodies https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32016L2102
- European Commission, Web Accessibility https://ec.europa.eu/digital-single-market/en/web-accessibility

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