# TR 101 550 V1.1.3 (2021-07)


**Documents relevant to EN 301 549 (V1.1.1)**
**"Accessibility requirements suitable for public procurement of ICT products and services in Europe"**

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# Foreword

This Technical Report (TR) has been produced by ETSI Technical Committee Human Factors (HF).

# Modal verbs terminology

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# Introduction

The present document was prepared in response to Phase 2 of Mandate M 376 [i.9] from the European Commission to CEN, CENELEC and ETSI.

The primary objective of Mandate M 376 was to produce a European Standard (EN 301 549 (V1.1.1) [i.3]), hereafter, for the purpose of the present document, called "the EN", that sets out in a single source, detailed, practical and quantifiable functional accessibility requirements which: take note of global initiatives in that field, are applicable to all ICT products and services identified in Phase I, and are usable in public procurement.

The present document is one of two Technical Reports that support the EN. The present document lists the standards and technical specifications used in the creation of the compliance requirements for accessibility set out in EN 301 549 (V1.1.1) [i.3]. It also provides a source reference for other documents needed to implement the test procedures required by the EN.

The present document also notes new test methods developed during the work on the EN and identifies exceptional cases where further research was found to be necessary. It does not address additional sources or issues raised during the creation of later versions of the EN.

A second Technical Report (TR 101 551 [i.7]) gives guidance to procurers on the award criteria relevant to each area of user needs in the products and services under consideration.

# 1 Scope

The present document lists the documents used in the creation of EN 301 549 (V1.1.1) [i.3] on accessibility requirements for public procurement of ICT products and services in Europe and provides a source reference for any other documents needed to implement the test procedures specified in that document.

As well as identifying the sources for the EN content, the present document also provides additional explanation to assist users of the EN with clarifications and supporting information about measurement methods, particularly where no globally agreed test presently exists.

Where there are any test gaps, these are identified and test descriptions and evaluation methodologies are developed. In those exceptional cases where it is not possible to do so, recommendations are given on how the gaps should be filled. The present document does not address additional sources or issues raised during the creation of later versions of the EN.

# 2 References

## 2.1 Normative references

Normative references are not applicable in the present document.

## 2.2 Informative references

References are either specific (identified by date of publication and/or edition number or version number) or non-specific. For specific references, only the cited version applies. For non-specific references, the latest version of the referenced document (including any amendments) applies.

NOTE: While any hyperlinks included in this clause were valid at the time of publication, ETSI cannot guarantee their long term validity.

The following referenced documents are not necessary for the application of the present document but they assist the user with regard to a particular subject area.

[i.1] ANSI C63.19 (2011): "Methods of Measurement of Compatibility between Wireless Communications Devices and Hearing Aids".

[i.2] ETSI EG 201 013: "Human Factors (HF); Definitions, abbreviations and symbols".

[i.3] CEN/CENELEC/ETSI EN 301 549 (V1.1.1): "Accessibility requirements suitable for public procurement of ICT products and services in Europe".

[i.4] ETSI ES 200 381-1: "Telephony for hearing impaired people; Inductive coupling of telephone earphones to hearing aids Part 1: Fixed-line speech terminals".

[i.5] ETSI ES 200 381-2: "Telephony for hearing impaired people; Inductive coupling of telephone earphones to hearing aids; Part 2: Cellular speech terminals".

[i.6] ETSI ETS 300 381: "Telephony for hearing impaired people; Inductive coupling of telephone earphones to hearing aids".

[i.7] CEN/CENELEC/ETSI TR 101 551: "Guidelines on the use of accessibility award criteria suitable for public procurement of ICT products and services in Europe".

[i.8] ETSI TR 102 612: "Human Factors (HF); European accessibility requirements for public procurement of products and services in the ICT domain (European Commission Mandate M 376, Phase 1)".

[i.9] European Commission M 376: "Standardisation Mandate to CEN, CENELEC and ETSI in support of European accessibility requirements for public procurement of products and services in the ICT domain".

[i.10] European Commission M 420: "Standardisation Mandate to CEN CENELEC and ETSI in support of European Accessibility Requirements for Public Procurement in the Built Environment".

[i.11] ISO 9241-171:2008: "Ergonomics of human-system interaction-Part 171: Guidance on software accessibility".

[i.12] ISO 21542:2011: "Building construction -- Accessibility and usability of the built environment".

[i.13] ISO 26800: 2011: "Ergonomics -- General approach, principles and concepts".

[i.14] ISO/IEC 17007:2009: "Conformity assessment -- Guidance for drafting normative documents suitable for use in conformity assessment".

[i.15] ISO/IEC 13066-1:2011: "Information technology -- Interoperability with assistive technology (AT) -- Part 1: Requirements and recommendations for interoperability".

[i.16] ISO/IEC 40500:2012: "Information technology -- W3C Web Content Accessibility Guidelines (WCAG) 2.0".

[i.17] ISO/IEC TR 29138-1 "Information Technology -- Accessibility considerations for people with disabilities - User needs summary.

[i.18] Supplement 1 to ITU-T H-Series Recommendations: "Application profile - sign language and lip-reading real time conversation using low bit rate video communication".

[i.19] Telecommunications and Electronic and Information Technology Advisory Committee (TEITAC): "Report to the Access Board: Refreshed Accessibility Standards and Guidelines in Telecommunications and Electronic and Information Technology", April 2008.

[i.20] TIA-825-A: 2003: "A Frequency Shift Keyed Modem for Use on the Public Switched Telephone Network".

[i.21] TIA-1083-A (2010): "Telecommunications; Telephone Terminal equipment; Handset magnetic measurement procedures and performance requirements" - Telecommunications Industry Association.

[i.22] US Access Board: "Draft Information and Communication Technology (ICT) Standards and Guidelines" March 2010 (ANPRM 2010).

[i.23] US Access Board: "Draft Information and Communication Technology (ICT) Standards and Guidelines", December 2011 (ANPRM 2011).

[i.24] US Department of Justice: "2010 ADA Standards for Accessible Design".

[i.25] W3C® Recommendation (11 December 2008)/ISO/IEC 40500 (2012): "Web Content Accessibility Guidelines (WCAG) 2.0".

NOTE: Available at http://www.w3.org/TR/WCAG20/.

[i.26] W3C® Working Group Note (5 September 2013): "Guidance on Applying WCAG 2.0 to Non-Web Information and Communications Technologies (WCAG2ICT)".

NOTE: Available at http://www.w3.org/TR/wcag2ict/.

[i.27] Recommendation ITU-T F.700: "Framework Recommendation for multimedia services".

[i.28] Recommendation ITU-T F.703: "Multimedia conversational services".

# 3 Definition of terms, symbols and abbreviations

## 3.1 Terms

For the purposes of the present document, the terms given in ETSI EG 201 013 [i.2] and the following apply:

**accessibility:** extent to which products, systems, services, environments and facilities can be used by people from a population with the widest range of characteristics and capabilities, to achieve a specified goal in a specified context of use

NOTE 1: This definition of term is from ISO 26800 [i.13].

NOTE 2: Context of use includes direct use or use supported by assistive technologies.

**assistive technology:** hardware or software added to, connected to, or incorporated within, a system that increases accessibility for an individual

NOTE 1: This definition of term is from ISO 9241-171 [i.11].

NOTE 2: Examples are braille display, screen reader, screen magnification software, eye tracking devices.

NOTE 3: Where ICT does not support directly connected assistive technology, but can be operated by a system connected over a network or other remote connection, such a separate system (with any included assistive technology) can also be considered assistive technology.

**electronic content:** information and sensory experience to be communicated to the user by means of ICT

**real-time text:** form of text conversation in point to point situations or in multipoint conferencing where the text being entered is displayed on all terminals in such a way that the communication is perceived by the user as being continuous

## 3.2 Symbols

Void

## 3.3 Abbreviations

For the purposes of the present document, the following abbreviations apply:

| | |
|---|---|
| ADA | Americans with Disabilities Act |
| ANPRM | Advance Notice of Proposed Rule Making |
| ANSI | American National Standards Institute |
| ATAG | Authoring Tool Accessibility Guidelines |
| FPC | Functional Performance Criteria |
| FPS | Functional Performance Statement |
| GSM | Global System for Mobile communications |
| ICT | Information and Communication Technologies |
| IEC | International Electrotechnical Commission |
| IMS | IP Multimedia Subsystem |
| IP | Internet Protocol |
| ISO | International Organisation for Standardization |
| JWG | Joint Working Group |
| PSTN | Public Switched Telephone Network |
| RTT | Real-Time Text |
| SI | Système International (International System of Units) |
| TEITAC | Telecommunications and Electronic and Information Technology Advisory Committee |
| W3C | World Wide Web Consortium |
| WCAG | Web Content Accessibility Guidelines (of W3C) |

# 4 Overview

When writing EN 301 549 (V1.1.1) [i.3], hereafter, for the purpose of the present document, called "the EN", there were a number of key requirements that had to be taken into account.

It was important to build on the significant work undertaken during Phase 1 of Mandate M 376 [i.9] which resulted in ETSI TR 102 612 [i.8]. Phase 1 was the preparatory work that preceded the Phase 2 activity of preparing a European Standard (Norm) (EN) containing in one volume all the necessary functional accessibility requirements for public procurement of products and services in the ICT domain. This EN, EN 301 549 (V1.1.1) [i.3], was intended to contain these requirements in a fully demonstrable and testable form, compliant with ISO/IEC 17007 [i.14], the standard which gives guidance for drafting normative documents suitable for use in conformity assessment.

It was important that the document should achieve global acceptability, originally by taking into account the requirements of the US Telecommunications and Electronic and Information Technology Advisory Committee (TEITAC) Report published in April 2008 [i.19] on which the Phase 1 work was based. Unfortunately, before work started on Phase 2 of the Mandate [i.9], the US Access Board set out in an Advance Notice of Proposed Rulemaking (ANPRM) of their "Information and Communication Technology (ICT) Standards and Guidelines" [i.23].

In order to maintain the aim to reduce the burden on manufacturers by providing a common set of public procurement requirements for accessibility which as far as possible could apply to markets both in Europe and in the rest of the world it was necessary to change the work to meet the new US ANPRM [i.23]. This has been achieved whilst meeting the requirements mandated by the European Commission.

Whilst trying to achieve a globally acceptable standard it was important to ensure that the requirements of the EN took account of the European public procurement needs, particularly in those areas affected by European legislation. It was also necessary to take note of some areas where aspects of performance are controlled by different legislative requirements, such as telephone transmission.

Where websites are concerned, it was important to achieve global status for the accessibility requirements by referring to the well-established process of conformance to the internationally accepted web content accessibility guidelines (WCAG) produced by the World Wide Web Consortium (W3C), an international community that develops recommendations. These recommendations are currently at version WCAG 2.0 [i.25], which was adopted in December 2008.

# 5 Preparation of the EN requirements

## 5.1 General

For each potential requirement identified in Phase 1 of the work on Mandate M 376 [i.9], the sources identified in the report were checked to see if they were appropriate to be a potential source of wording for the requirement (i.e. whether it was a widely accepted global standard) and, where appropriate, to identify whether the specific text in the standard could be taken into account when wording the requirement. A full listing of the sources that relate to each requirement can be found in ETSI TR 102 612 [i.8] produced at the end of Phase 1.

The original Terms of Reference for the work on the EN were based on the output of Phase 1 of the mandate. Subsequent to the publication of the Phase 1 reports there were considerable developments in relevant international regulations and standards. The publication by the US Access Board of an Advance Notice of Proposed Rulemaking (ANPRM) [i.22] in March 2010 was particularly significant.

When writing the EN an attempt was made to maximize alignment with the updating of the American accessibility requirements that are foreseen by the American Architectural and Transportation Barriers compliance board's (Access Board) document entitled "Telecommunications Act Accessibility Guidelines: Electronic and Information Technology Accessibility Standards". This was published as an advance notice of proposed rulemaking (ANPRM) on the 22nd March 2010 [i.22]. This document led to the writing of the US Access Board's draft "Information and Communication Technology (ICT) Standards and Guidelines" [i.22] (henceforward described here as the first 508/255 ANPRM), and was followed by a second version of the standards and guidelines that was published on the 8th December 2011 [i.23]. This second 508/255 ANPRM was significantly different from the first one, replacing many of the previous requirements by global references to WCAG 2.0 [i.25]. At the time of writing it is not known what requirements will be included in the final Notice of Proposed Rule Making (NPRM) which will lead to the formal revision of Section 508 of the Rehabilitation Act.

Initially, the first 508/255 ANPRM text, together with the official comments on the proposed requirements, were considered as the basis of candidate text. Following this study, in some cases the same text was able to be used, but in many cases the wording was changed by the experts writing the new requirements in order to address the issues raised by the official comments and to address points found in the other standards that were consulted.

In some cases the concepts and wording from widely accepted International Standards were used as a basis for the drafting or re-drafting of those requirements.

A new requirement was introduced into the EN to provide a clear point of separation between those areas that are Web content, and hence within the scope of WCAG 2.0 [i.25], and those that are not. The intent was that for Web content, the requirements of the EN would be identical to those of WCAG 2.0. This was to be achieved by making WCAG 2.0 a part of the EN as a PDF attachment.

Major re-writing or expanding of the requirements beyond that of the 508/255 ANPRM had to be undertaken for areas where the performance requirements of European networks or legislation demanded different or more precisely defined specifications of services, for example when defining requirements for magnetic coupling of ICT to hearing aids and also for Real Time Text.

In summary, the net result of taking all of these factors into account was that, for the majority of the individual requirements (for ICT not within the scope of WCAG 2.0), the wording was closely based on the wording of the 508/255 ANPRM with changes being made to reflect the concerns expressed in the official comments on that document and also the concerns of the experts drafting the European requirements. Where a requirement that was identified in Phase 1 did not appear in the 508/255 ANPRM, but was still seen as being important to be included in EN 301 549 (V1.1.1) [i.3], the initial source chosen to look for appropriate wording was the TEITAC report [i.19].

The structure of some requirements in the 508/255 ANPRM was found to be incompatible with the rules adopted and considered essential by the ESOs and official International Standards Bodies. It was therefore necessary to alter the way in which these groups of requirements were structured and to amend the wording of requirements to match the revised structuring logic. In making these changes, care was taken to avoid altering the intended meaning of the individual requirements and the intended relationships between them.

On 8th December 2011, a second 508/255 ANPRM was issued with a completely new set of standards and guidelines [i.23]. The approach taken in the second 508/255 ANPRM was radically different from that taken in the first 508/255 ANPRM. The number of requirements and the overall size of the document was greatly reduced in this second 508/255 ANPRM by proposing that the WCAG 2.0 Success Criteria could be applied to "User interface components and content of platforms and applications" as well as to web pages. This approach met with initial scepticism from some commentators in the US, as well as from those drafting EN 301 549 (V1.1.1) [i.3]. In particular the US Access Board's suggestion that applying WCAG 2.0 Success Criteria to these other areas was "straightforward" was widely questioned. There was also concern that some requirements appeared to have been lost.

After considering the implications of the changes proposed in the second 508/255 ANPRM it was decided that it was possible to move significantly in the proposed direction. The result of this re-evaluation was that many of the requirements that had been developed in the earlier drafts of EN 301 549 (V1.1.1) [i.3] were removed, with their place being taken by equivalent Success Criteria in WCAG 2.0. This change was somewhat less dramatic than it might at first appear as many of the requirements in the first 508/255 ANPRM started as minor redrafts of WCAG 2.0 Success Criteria.

Detailed consultation also took place with experts in the US who were actively involved in commenting on and contributing to the 508/255 ANPRM. The result of this consultation was that a level of mutual agreement was reached about certain proposals in the second 508/255 ANPRM that could not be fully accepted. Acceptable alternatives were then drafted jointly and some of these have been carried forward into the revised versions of EN 301 549 (V1.1.1) [i.3] in parallel to being submitted as proposals for potential revisions to the content of the 508/255 ANPRM. US regulations meant that it was not possible to negotiate directly with the Access Board.

Further initiatives were undertaken to maximize alignment between the requirements in EN 301 549 (V1.1.1) [i.3] and the equivalent requirements in future updates to Section 508. These initiatives, which relate to the application of WCAG 2.0 to non-Web ICT, are described in more detail in clause 5.10 of the present document.

An issue that will affect the degree of alignment between European and US accessibility requirements for ICT public procurement is that the final changes in Section 508 of the US Rehabilitation Act will not have occurred before EN 301 549 (V1.1.1) [i.3] enters its approval process. Attempts were made to judge where changes were likely to occur between the second ANPRM and the final update to Section 508 in an attempt to maximize alignment between the two sets of accessibility standards.

## 5.2 Global issues within the EN

A point of significant confusion throughout the development of the EN is the fundamental difference in status between the EN and the equivalent standards in Section 508, both in its current form and in the subsequent ANPRMs [i.23]. Although the Section 508 documents are called "standards and guidelines" they are an integral part of U.S. law. In contrast, EN 301 549 (V1.1.1) [i.3] is a voluntary standard that has no direct legal status. The first parts of Section 508 specify issues of "application and administration" and "scoping requirements", whereas the subsequent parts of Section 508 and the ANPRMs contain requirements that are similar to those normally found in a voluntary standard.

The expectation of those who are familiar with Section 508 was that the EN should contain the important policy issues such as "equivalent facilitation" and "best meets" as well as a list of exemptions for certain categories of ICT or certain contexts of use of the ICT. Such policy-related issues are not permitted in a voluntary standard such as an EN. These factors are expected to be dealt with by any legislative instruments that use the EN as the technical basis for the legislation.

There were also requests that whole categories of ICT should be exempted from meeting some or all of the requirements of the EN. It is not possible to include such exemptions in the EN. Any exclusion of specific types of ICT would need to be agreed at a policy level within Europe.

In the later phases of the development of the EN additions were made to the text, or proposed by commenters, to try to ensure that the EN could not be mistakenly used in situations that could be against the interest of any or all direct or indirect users of the standard (i.e. users of the ICT, procuring authorities and suppliers). Unfortunately, the wording that was designed to prevent such unintentional misuse almost always fell into the category of policy-based language and had to be removed.

As a consequence of the above issues and others, significant effort was made to ensure that the title and scope of the EN correctly reflected its role and purpose. An adjustment was made to the title to ensure that its suitability for use in public procurement was clear, whilst not implying that it could only be used in public procurement. The finally agreed title for the EN was agreed to be:

- "Accessibility requirements suitable for public procurement of ICT products and services in Europe".

The scope was carefully adjusted to ensure that any exclusion to the scope of applicability of the standard were not policy-based but related to technical issues only. The relevant text in the scope that was agreed was:

- "-- *the requirements in the present document are not applicable:*

  - *when the product is in a failure, repair or maintenance state where the ordinary set of input or output functions are not available;*

  - *during those parts of start-up, shutdown, and other state transitions that can be completed without user interaction.*

  *NOTE 1: Even in the above situations, it is best practice to apply requirements in the present document wherever it is feasible and safe to do so.*

*NOTE 2: Compliance issues are covered in normative clause C.1."*

At the outset of the work on the EN, consideration was given to the possibility of defining requirements:

- that could each be me met at different levels (e.g. a minimum level, a typical level or a superior level);
- that were part of a scheme that supported different levels of conformance (i.e. similar to the levels of conformance of WCAG 2.0 [i.25].

The experts responsible for drafting the requirements soon recognized that there was no way to decide how the different levels referred to above could be assigned to accessibility requirements for ICT in general. It was fairly obvious that many requirements would be very important for some users, if they met their specific accessibility needs, but those same requirements might offer no benefits to other users with different accessibility needs.

W3C spent significant time deciding how to allocate their success criteria to the different conformance levels. These levels are now well established and accepted in the field of web accessibility. However, the W3C WCAG2ICT Task Force also recognized that these same levels might not be applicable when the WCAG 2.0 success criteria were applied to non-web ICT. This was reflected in the EN by the removal of the conformance level designators (i.e. A and AA) in clauses 10 and 11 of the EN.

There are two very fundamental related principles underlying the way that the requirements and tests have been drafted. The first principle is that a description of the scope of application of a requirement should be written as the first part of the requirement text. The implication of this principle is that it should be possible to read a requirement from the EN in isolation and know whether it is applicable to the item of ICT under consideration. Formulating requirements in this way should also be beneficial when the requirements are used outside of the direct context of the EN itself (e.g. when they are used in the M 376 toolkit).

The second principle builds upon the one described above. This principle is that the tests in Annex C of the EN should be a direct rewrite of the requirements in the main body of the EN. The requirements are written in a consistent way so that the scoping text that starts the requirement becomes the pre-condition for the test. The wording of the rest of the requirement can be decomposed into a series of checks to be performed during testing and a pass/fail evaluation for the test that is based upon which checks are true or false. In the last processing of the EN, a thorough re-examination and adjustment of the self-scoping text in the requirements and updating of the tests was undertaken. A note was added to clause C.1 of the EN to highlight these principles:

*"NOTE 3: All clauses apart from those in clause 12 are self-scoping. This means they are introduced with the phrase 'Where ICT <pre-condition>'. Compliance is achieved either when the pre-condition is true and the corresponding test (in annex C) is passed, or when the pre-condition is false (i.e. the pre-condition is not met or not valid)."*

The following clauses identify specific instances where the above general approaches described in clauses 5.1 and 5.2 were either significantly altered or where one or more specific standards were used as a major source in formulating the requirements or their compliance demonstration descriptions. Where specific standards are the source of the special requirements in the EN, these clauses will list the documents referenced when generating those requirements. As a result of the increased reference to WCAG 2.0 [i.25] as the primary source of many requirements, the links to other references that were identified in Phase 1 of the Mandate and listed in ETSI TR 102 612 [i.8] no longer exist as the specific requirements are now replaced by the equivalent WCAG 2.0 Success Criteria.

## 5.3 Definitions (clause 3 of the EN)

One of the most critical issues throughout earlier drafts of the development of EN 301 549 (V1.1.1) [i.3] was the choice of definition for the term accessibility; which appears in the title of EN 301 549 (V1.1.1) [i.3] and also in many related documents and policies in which EN 301 549 (V1.1.1) [i.3] might be cited. Accessibility experts with a wide range of backgrounds, affiliations and experience have strong views on what the term accessibility means. These accessibility experts largely polarize into two clusters, each advocating a different accessibility definition. Despite this, there was a common acceptance that the choice of definition would not influence the nature and meaning of the requirements contained in the EN.

The word accessibility only appears in the EN in the following contexts:

- accessibility services;
- accessibility features;

- accessibility information;
- information provided for accessibility.

In the above cases, accessibility refers to something that is decided by an external body, such as the designers of the software platform that provides the "accessibility services". Therefore, wherever the word accessibility is used in the EN, the meaning of the requirement is independent of the definition of accessibility. For clarity, it was therefore agreed to adopt a common definition across all documents produced under Mandate M 376 [i.9].

During the public enquiry commenting phase, an important interrelationship between the definitions of "assistive technology" and "closed functionality" was identified. The wording "or incorporated within" that appears in the ISO 9241-171 [i.11] definition of assistive technology, that was the basis for the definition in the EN, could be taken to include functionality built into a closed product to meet an accessibility need. As the EN's definition of closed functionality says that assistive technology is prevented from being used, there was a potential conflict between the two definitions .The contradiction was resolved by removing the words "incorporated within" from the assistive technology definition. As the words "or connected to" had previously been added to the ISO 9241-171 [i.11] definition, the words "from ISO 9241-171" were no longer added to the assistive technology definition.

## 5.4 Functional performance (clause 4 of the EN)

### 5.4.1 Functional performance statements

In the first 508/255 ANPRM [i.22] a number of "functional performance criteria" (FPC) were included. The general understanding of how these were to be used in procurement was that FPC, need only be consulted in order to evaluate equivalent facilitation in cases where any of the technical standards are not met or where the technical standards do not adequately cover the function of the product.

In the second 508/255 ANPRM [i.23] it was clearly stated that "that all products shall conform to the FPC". This statement caused great concern to suppliers as, despite some attempts to make the FPCs precise, they were generally considered to be too broad and imprecise. This meant that if a supplier claimed conformance to an FPC it was not possible to provide incontrovertible evidence of this conformance. This lack of certainty was seen to be of no benefit to either the supplier or the procuring authority. The procuring authority could not be sure how reliable the stated compliance was and would have no means of determining whether different suppliers had interpreted these broad requirements in the same way. On their part, suppliers would be very concerned that they had no way of providing convincing proof that they had met the broad requirements and they would always be in fear that the customer or another supplier might, at any time, challenge their claims.

The possibility of making the FPCs more testable was explored by some experts in the US. However, any attempt to increase precision had the effect of reducing the scope of the FPC and making it more like the detailed narrow technical requirements in the rest of the 508/255 ANPRM. The possibility of also including more testable FPCs in EN 301 549 (V1.1.1) [i.3] was examined in detail and it was concluded to be an approach that could not be successfully applied without totally losing the higher-level principles behind the FPCs.

The alternative approach adopted in EN 301 549 (V1.1.1) [i.3] was to re-formulate the 508/255 ANPRM FPCs into "functional performance statements" that clearly identify a set of user accessibility needs that relate to users who have various ability impairments. The wording of the functional performance statements was amended to align with the "social model of disability". Clause 4.1 indicates that ability impairments may be permanent or temporary.

Although there is a clear relationship between many of the functional performance statements and the "user needs" identified in ISO/IEC TR 29138-1 [i.17], it was not possible to import these "user needs" into the EN as they are not formulated in a way that allows the clear relationships to the requirements of clauses 5 to 13 to be made (as occurs in table B.2 of the EN).

This reformulation enables the true breadth of need to be reflected in the wording, without the need to restrict and compromise the statements by trying to see how they could be unambiguously and reliably tested. This reformulation has also allowed the inclusion of two additional functional performance statements ("Usage with limited cognition" in clause 4.2.10 and "Privacy" in clause 4.2.11) that is not in the 508/255 ANPRM. This could be included as it was identified that several Success Criteria in WCAG 2.0 provided a level of support for some people with cognitive impairments. It is not possible to have "Usage with limited cognition" as a testable FPC because the range of cognitive impairments is broad and the ways to address these different impairments are so diverse that no single test of success in meeting such an FPC could be devised.

The way in which the functional performance statements have been written makes it easier to see how accessibility award criteria could be defined for ICT public procurement. It allows their incorporation in technical specifications without restricting competition. Clause 4.1 "Meeting functional performance statements" of the EN contains a statement that "ICT meeting the applicable requirements of clauses 5 to 13 is deemed to have met a level of accessibility conformant with the present document and consistent with the user accessibility needs identified in clause 4.2 "Functional performance statements". This statement says that ICT that meets the requirements of clauses 5 to 13 is consistent with the user accessibility needs identified by the functional performance statements. It does not say that there is total equivalence between the functional performance statements and the sum of the relevant technical requirements of clauses 5 to 13. It recognizes the fact that there may be many other things that can be done to enhance the accessibility of ICT, even though those things cannot be captured as universal, testable requirements with predictable outcomes.

How well ICT satisfies the user accessibility needs within the FPCs is one of the most important things to understand about the ICT. The expectation is that anyone wanting to know how accessible an ICT product is would firstly ask how well the functional performance statements have been met. Finding the answer to this question will enable a procuring body, or anyone using the EN, to get a comprehensive understanding of how accessible the ICT is. The more detailed picture of which of the requirements in the EN have been met is significant evidence to demonstrate how the functional performance statements have been satisfied.

The expectation is that the toolkit that supports the EN will assist the user of the EN to get information on how the ICT satisfies the functional performance statements of clause 4.2 as well as detailing which requirements from clauses 5 to 13 have been met.

### 5.4.2 Mapping between requirements and functional performance statements

Table B.2 of the EN provides a mapping between the requirements of clauses 5 to 13 and the functional performance statements of clause 4. These relationships are marked with a "P" indicating that the requirement provides "primary support" for the relevant user accessibility need and an "S" used to indicate that it provides "secondary support".

Some requirements (and WCAG success criteria) are specifically intended to provide support for one or more user needs stated in the functional performance statements (FPS). In the EN it is explained that some requirements provide direct support ("primary support") for the functional performance statements and others provide partial support ("secondary support") because users may use the feature in specific situations. Examples of "primary support" include:

- 1.1.1 (WCAG - non text content) is clearly intended for blind users, and thus provides support for the user need "with no vision" in clause 4.2.1.
- 2.1.1 (WCAG) is intended for keyboard users, who are the users unable to use vision (clause 4.2.1) and the users with limited manipulation (clause 4.2.7).
- 2.3.1 Three Flashes or Below Threshold (WCAG) is intended for persons with photosensitive epilepsy, that is "minimize photosensitive seizure triggers" in clause 4.2.9.

There are also requirements that have the secondary role of providing support for user needs that were not the primary purpose for which were drafted. These secondary benefits typically occur because of the way users deal with their limitations.

Examples of "secondary support" include:

- 1.1.1 provides support for some persons with limited vision (because they may be using screen reading in addition to magnification) and for some persons with limited cognition (because they may use text-to-speech output instead of reading the content in the screen).
- 2.1.1 provides support for people unable to provide "speech input" when they use the keyboard as an alternative for speech input. So 2.1.1 provides secondary support for "without vocal capability" in clause 4.2.6.
- 2.3.1 has no "secondary support" as it is clearly focused on only one FPS.

## 5.5 Generic requirements (clause 5 of the EN)

This category contains a subset of the requirements in chapter 4 of the 508/255 ANPRM, titled "Hardware". Almost all those who commented on the 508/255 ANPRM identified that the title hardware was poorly chosen as the requirements within it covered a wide range of requirements that were generic (and could apply to both hardware and software), some that were largely controlled by software, some that applied to services such as two-way voice communication and others that were exclusively related to hardware. The subdivision of the requirements from the 508/255 ANPRM chapter 4 into different categories began with discussions between some of those responsible for the EN and experts from the US. The grouping of requirements in clause 5 of the EN was one of the results of these discussions.

During the public enquiry commenting it was recognized that some of the requirements that were in the hardware clause of the EN (clause 8) were also relevant in the generic requirements clause. To resolve this, requirements related to "operable parts" were duplicated with appropriate editorial changes and placed in both clauses 5 and 8. The definition of "operable part" was adjusted to ensure that it had a generic meaning that was applicable to both mechanically operable parts and operable parts presented by software user interfaces. A new definition of "mechanically operable parts" was added, that qualified the generic "operable parts" definition.

## 5.6 ICT with two-way voice communications (clause 6 of the EN)

### 5.6.1 Audio bandwidth for speech (informative recommendation) (clause 6.1 of the EN)

The recommendation regarding good audio quality for speech was changed so that it no longer referred to a patented enhanced-bandwidth technology. Instead, it was reworded to refer to a minimum upper frequency limit (7 000 Hz).

### 5.6.2 Real-Time Text (RTT) functionality (clause 6.2 of the EN)

There were many public comments on the RTT requirements in the first 508/255 ANPRM and these led to significant changes in the requirements in the second 508/255 ANPRM, have attracted significant criticism. Due to the lack of a well-accepted set of RTT requirements, considerable effort was expended in the production of the requirements in clause 6.3 of the EN.

In clause 6.2 two very universal and unambiguous requirements were drafted. The first of these made the very simple statement that "Where ICT supports two-way voice communication in a specified context of use, the ICT shall allow a user to communicate with another user by RTT". The concept of "context of use" was included to ensure that a procurer's requirements or a suppliers product or service capability was clearly stated, to avoid any unrealistic expectations that an item of ICT will be able to support RTT communication regardless of the actual usage scenario in which it will be used.

Because of the realities of the marketplace, where products that are able to meet this requirement are not generally available out-of-the-box, a note was added to the requirement to indicate that it will be necessary to ensure that all appropriate software, hardware or services required to support RTT are available in order to demonstrate that the requirement has been met.

It proved very difficult to address real-time-text in an EN that had to be usable in an unregulated market and where developments of technologies were on-going. The concept of "a specified context of use" was introduced to address the real-world problem that there are no universally supported methods of delivering real-time text and where there were no regulatory obligations to support any specific means of interoperating between different technologies. Those technologies that were clearly specified in differing technology environments were specifically listed for use, but their exclusive use could not be mandated within a voluntary standard.

In the area of RTT used in the PSTN there was a clear need to provide a European solution differing from the unique US solution which uses the TIA 825-A Baudot standard [i.20]. V.18 is an established technical standard used globally and within Europe. It has the advantage that it can interwork with Baudot and other standards. With changes in network technology, further standards had to be considered.

In drafting EN 301 549 (V1.1.1) [i.3], the wide range of potential deployment approaches for RTT was taken into consideration. The range of possible interoperation scenarios included:

- RTT interoperability between different proprietary networks that use open standards to interoperate with other networks supporting the same open standards;
- RTT networks that interoperate using the RTT interoperability standards defined by a common network technology that they employ (e.g. IP Multimedia Subsystem (IMS) using IMS Multimedia Telephony).

## 5.7 Video communication (clause 6.6 of the EN)

The accessibility criteria for video communication were based upon Supplement 1 to Recommendations ITU-T H-Series "Application Profile - Sign Language and Lip-Reading Real Time Conversation Using Low Bit Rate Video Communication" [i.18].

## 5.8 Hardware (clause 8 of the EN)

### 5.8.1 Hardware products with speech output (clause 8.2 of the EN)

The requirements and tests related to the provision of magnetic coupling to hearing aids in ETSI ETS 300 381 [i.6] were initially included in the EN, but these tests are lengthy and already well-known in the appropriate industry. In view of this, and in response to those who commented on drafts of the EN, the detailed tests have been replaced by a reference to these freely available ETSI source documents. These documents will be known and in the possession of suppliers of products that fall under the scope of clause 8.2 of the EN.

ETSI ETS 300 381 [i.6] has been revised, as an outcome of the Mandate M 376 activity, and published as two-part standard: ETSI ES 200 381-1 [i.4] and ETSI ES 200 381-2 [i.5]. The rationale for the development of this two-part standard is described in clause 7.1 of the present document. It is expected that suppliers who previously had ETSI ETS 300 381 [i.6] will now have these newly developed standards.

### 5.8.2 Fixed-line devices (clause 8.2.2.1 of the EN)

When specifying the requirements for the provision of magnetic coupling to hearing aids, for fixed-line devices it was found that the test methods were out of date. Arrangements were therefore made for ETSI ETS 300 381 [i.6] to be amended and new tests were inserted into the EN. The requirement now notes that fixed-line devices made to the American standard TIA-1083-A [i.21] will give similar results.

### 5.8.3 Wireless communication devices (clause 8.2.2.2 of the EN)

It was realized that ETSI ETS 300 381 [i.6] was not suitable for the measurement of mobile telephones. Once again, working with ETSI STQ, arrangements were made to amend ETSI ETS 300 381 [i.6] and it is now a two-part standard that also applies to wireless devices.

The methods of measurement for wireless communication devices are different to those for wired devices; the mobile telephone industry used the American standard ANSI C63.19 (2011) [i.1] instead of TIA-1083-A [i.21]. The requirement therefore notes that wired devices made to the ANSI C63.19 (2011) [i.1] should give similar results.

### 5.8.4 Physical access to ICT (clause 8.3 of the EN)

The recommendations for physical access to ICT were based on the Americans with Disabilities Act (ADA) [i.24] which is the default standard on which many other national and regional standards are based. The recommendations in EN 301 549 (V1.1.1) [i.3] are a subset of the ADA requirements that relate to those aspects of the design and installation of installed and free standing ICT, which are integral to the ICT, and for which the suppliers are responsible. A supplier cannot be responsible for aspects external to the ICT that are outside their control e.g. any obstructions that may be in the vicinity of the ICT after it has been installed, but they can give advice on how to install the ICT so that it is accessible. Many of the recommendations are designed to ensure that features of the ICT itself do not create barriers to accessibility. These recommendations have been written to include wording such as "*obstruction which is integral to the ICT*" when modifying an ADA requirement that makes general reference to obstructions.

During the public consultation phases, a number of comments were received proposing that EN 301 549 (V1.1.1) [i.3] should contain "exceptions" based upon those that have been accepted for some time in the US Section 508 of the US Rehabilitation Act. What was not generally appreciated by those commenting is the different nature of Section 508 and of EN 301 549 (V1.1.1) [i.3]. Section 508 is legislation that contains both the technical requirements and the policy requirements, including policy exclusions. EN 301 549 [i.3] is a technical standard, and as such only contains technical accessibility recommendations and requirements and cannot contain policy statements. When European procurement policy or legislation is drafted it will be necessary for those drafting it to consider similar exclusions to those already embedded in the comparable US legislation.

Within the EN, the following guidance note was added to clause 8.3 "Physical access to ICT" as a means of highlighting the issue:

*"It may not be possible to apply all recommendations of 8.3 to all aspects of maintenance, repair, or occasional monitoring of equipment in all circumstances. Nevertheless, it is best practice to apply the recommendations in clause 8.3, where feasible and safe to do so."*

This text draws attention to the potential issues in these domains, without giving policy advice. It will be the responsibility of the procuring authority, or potentially of some policy setting authority above the procuring authority, to decide the exact nature of their own exclusion statement.

As an additional, related, action, the text "*repair or maintenance state where the ordinary set of input or output functions are not available*" was added as an exclusion to the scope. This exclusion reflects the fact that in many cases during maintenance it will not be possible for input or output functions to be performed and hence the provision of accessible alternative input or output functionality will also not be possible.

The recommendations in clause 8.3 were originally requirements, as they are in the US Section 508 of the US Rehabilitation Act. In response to comments during the Public Enquiry process, a JWG comment resolution meeting agreed to retain the clause but turn all of the requirements into recommendations.

The primary rationale for this change of status was that it was claimed that there could be a conflict between legal obligations about the accessibility of public spaces in some European countries and the requirements that were written in clause 8.3. In any instances where such accessibility laws apply to installed and free-standing ICT design, a procuring authority who used the EN to place requirements on the design of the ICT could be requiring that the procured ICT contravenes local law.

The degree to which national or regional standards or laws cover all of the aspects of the physical design of the external design of ICT that is addressed by clause 8.3 is unknown. It is therefore not possible to establish when and to what extent any conflict with such standards and laws might occur in practice. For example, where a national law specified the height of the screen of a wall-mounted ICT, it would be perfectly possible to meet such a requirement by ensuring that the ICT was installed in such a way that the screen height met the law. In contrast, it would not be possible to guarantee that the screen height of a floor-standing ICT device would meet the standard, as that height would purely be a factor of the ICT design.

Until some alternative to clause 8.3 exists, it will not be possible to refer to any European standard when specifying the design of installed or freestanding ICT in Europe. A procurer could request the supplier to conform to the recommendations in clause 8.3, but European procurement directives would not allow a procurer to reject the offer from a supplier because their ICT failed to meet these recommendations. In this interim period, procurers will be totally dependent on what exists in any local laws and also on legal judgements of whether the obligations in the law are intended to apply to the design aspects of supplied ICT equipment.

The current expectation is that a future standard, to be created as part of the Mandate 420 [i.10] activity, will apply to those aspects of the design of ICT equipment addressed by clause 8.3. Currently Mandate 420 only makes reference to "any technology products and services used in intelligent buildings". It is assumed that this scope will now be extended to make it clear that the new standard will cover ICT products such as kiosks and self-service terminals that are subsequently purchased for introduction into such buildings. The current proposals are that the Mandate 420 activity will be based upon ISO 21542 [i.12].

Clause 8.3 specifies all dimensions in SI units, as is required in European standards. In addition, the equivalent measures in inches are included, in brackets, after the primary SI unit measure. Although there was a significant feeling that these equivalent measures should be removed, it was unclear what the practical benefit of doing so would be. In contrast, the practical benefit of retaining those equivalent measures were that:

- the original measures from ADA 2010 were in inches;

- retaining these figures would make it obvious that an unusual looking value in SI units is equivalent to a simple measure in inches or fractions of inches;
- any supplier who was familiar with the original dimensions from Section 508 or ADA 2010 would instantly recognize the numbers with which they are already familiar.

It is clear that those writing standards for physical accessibility frequently choose simple rounded numbers in their native system of units. This becomes very apparent when values from the ADA are compared to values from ISO 21542 [i.12], on which any standard from Mandate 420 [i.10] is likely to be derived. In most cases, different values from these two standards appear to be related to how similar dimensions in both are rounded to simple numbers in mm or inches. Although claims are made that the more recently published ISO 21542 [i.12] presents superior dimensions to those from ADA 2010, all such claims were anecdotal and no concrete evidence of this has been found.

### 5.8.5 Mechanically operable parts (clause 8.4 of the EN)

A rearrangement and re-writing of requirements between clauses 8.4 and 5.5 enabled all the generic requirements related to operable parts to appear in clause 5 "Generic requirements" and enabling those requirements that relate to the forces and means needed to operate mechanical operable parts to be put into clause 8 "Hardware". As stated in clause 5.5, this separation was clarified by having separate definitions for "operable part" and "mechanically operating part".

Despite a request to include them, hardware requirements related to physical key size and spacing were not included in clause 8.4 as figures that are available are primarily taken from sources describing desktop keyboards and such dimensions are totally inappropriate to apply to small hand-held devices like mobile telephones. On such devices, software algorithms can often compensate for potential multi-button presses that can occur when smaller keys are used.

An earlier draft of the EN (V.4) included a clause 8.4.1 "Contrast" that stated "Passively illuminated characters and symbols on the ICT, that label operable parts, shall contrast visually from background surfaces with a reflectance contrast ratio of at least 3:1.". Extensive searches were made for standards that specify methods for testing contrast of characters on equipment under passive illumination conditions. There were also a number of enquiries to experts in the field.

Despite the existence of several standards for measuring contrast for actively illuminated displays, neither the searches nor the experts could identify standard measurement methods, or acceptable contrast measures for passive illumination conditions. Without any way of justifying a contrast ratio or a method by which it could be measured, a decision was reluctantly made to remove the contrast requirement (original clause 8.4.1).

If standards for testing reflective contrast, for colour contrast, and for accessible contrast values become available and accepted, a new contrast requirement could be added to later versions of EN 301 549 (V1.1.1) [i.3]. Clause 7.2.1 of the present document identifies the need for future research that can lead to the development of a new standard for reflective contrast.

Clause 8.4.2.2 specifies a force of 22,2N as the limit beyond which an alternative means of operating a mechanical part has to be provided. It is well recognized that this is a very large force and that it is unlikely to be encountered on many mechanically operable parts on ICT products. However, no alternative upper force limit could be found that would be generally applicable to the operation of mechanical parts on ICT. During the public enquiry comment resolution process the experts present all confirmed that there was no known alternative standardized force that could be used.

## 5.9 Web (clause 9 of the EN)

The requirements of clause 9.2 include all of the Level A and Level AA Success Criteria from the W3C Web Content Accessibility Guidelines (WCAG) 2.0 [i.25]. Clause 9.3 contains the WCAG 2.0 conformance requirements

WCAG 2.0 [i.20] is included as an electronic attachment to the EN as a PDF file in annex A. This is the only method of inclusion of the entire contents of a copyrighted standard that is permitted under the ETSI Drafting Rules.

The use of a direct reference to a defined version of WCAG and the use of the electronic attachment ensures that the requirement will remain stable and will not change if there is an update to WCAG 2.0. ISO/IEC 40500:2012 [i.16] has identical content to WCAG 2.0 and is listed in the same reference in clause 2.1 of the EN.

It would be expected that if there are significant changes in WCAG 2.0, the change would be incorporated into a revised version of the EN that references the updated version of WCAG and includes an updated attachment.

Many drafts of the EN made a single requirement that "Web content shall, as a minimum, conform to Level A and Level AA Success Criteria as defined by the Conformance Requirements specified in WCAG 2.0". This way of referencing the WCAG 2.0 success criteria was criticized as it did not provide good support for reporting of compliance with individual success criteria. The final version of the EN has a separate requirement for each Level A and Level AA success criterion and also for the WCAG 2.0 conformance requirements, with matching tests in clauses C.9.2 and C.3. Although the new structuring makes it possible to separately reference individual WCAG 2.0 success, those using clause 9 will still need to pay attention to those cases where there are interrelationships between the WCAG 2.0 success criteria.

The most critical issue in the all of the WCAG 2.0 based requirements was to try to establish clear boundaries between clauses 9, 10 and 11. New scoping text was included at clause 9.1 to try to identify what was and was not within the scope of this clause. Similar wording was added to clauses 10.1 and 11.1 to complement and reinforce the boundaries between these clauses.

The majority of the requirements in clauses 9.2, 10.2 and 11.2 are almost identical, as they all reference the same WCAG 2.0 success criteria. The scoping text referred to above was added to try to minimize uncertainty and to make it easier to read and interpret the EN. Where, despite the scoping text, a user of the EN is uncertain whether clause 9, 10 or 11 is applicable and they make what an expert would consider the "wrong" choice, it is reassuring to know that it would be quite rare that this "wrong" choice would lead to an outcome that would seriously compromise the assessment of the accessibility of the ICT.

## 5.10 Non-web documents (clause 10 of the EN)

Reflecting the changes that were proposed in the second 508/255 ANPRM [i.23], this requirement specifies the requirements for electronic content and documents by use of WCAG 2.0 [i.25]. Pre-publication drafts of EN 301 549 (V1.1.1) [i.3] referred to the same electronic attachment that is described in clause 5.9 of the present document, and identified how WCAG 2.0 could be applied to documents by means of proposed word replacements that the user of the EN would have to apply to each WCAG 2.0 success criterion. This approach was judged as placing too much burden on those using the EN and as having the potential to lead to fragmentation of how the word substitutions and other proposals would be applied. At a most basic level, the proposal in these drafts failed to include clearly written requirements that could be seen and used by both suppliers and procuring authorities.

One of the key objectives of Mandate M 376 [i.9] was that there should be global harmonization of accessibility requirements with other major markets in which the majority of ICT suppliers operate. One of the most specific targets with which harmonisation was sought was the US Section 508 second ANPRM. The US Access Board, in their second ANPRM, proposed that the WCAG 2.0 Success Criteria and Conformance Requirements should be applied to "electronic documents and applications". The aim of these changes was to reduce complexity for both procurers and suppliers by converging on a commonly accepted, used and understood set of accessibility requirements. After some initial consideration of the WCAG 2.0-based approach, it was concluded that it was possible and advantageous to adopt a similar strategy.

With the Section 508 and Mandate M 376 [i.9] teams both attempting to interpret the application of WCAG 2.0 to non-Web ICT, there was a significant risk that the potential harmonization would be compromised because of divergence in the way that these interpretations were made. Recognizing that risk, W3C proposed a new Task Force (WCAG2ICT) http://www.w3.org/WAI/GL/WCAG2ICT-TF/ to encourage global harmonization, with particular concern that the needs of Section 508 and Mandate M 376 would be met.

There was significant voluntary participation from members of the Mandate M 376 experts in the work of the WCAG2ICT Task Force, including the provision of a co-chair of the activity. Overall, there was a high degree of convergence on understanding how WCAG 2.0 could be applied to non-Web ICT. In particular, the W3C WCAG2ICT Task Force (TF) finally accepted the principle behind the separation of clauses 9, 10 and 11 that had been established in earlier drafts of EN 301 549 (V1.1.1) [i.3]. This acceptance enabled the final updates to the EN to be made without requiring any substantial revision to the already well adopted and reviewed structure of the EN.

The programme of work and the timetable of the WCAG2ICT Task Force was planned in such a way that a final draft of the W3C Working Group Note [i.26] was published just in time to ensure that the Mandate M 376 work could align with the final WCAG2ICT wording before the EN was finalized for Public Enquiry.

By default, the requirements in clauses 10 were aligned with the WCAG2ICT wording. Only small changes were made in a few places to incorporate internal cross-referencing within the EN to replace the external referencing to WCAG 2.0 that existed in the WCAG2ICT wording.

The WCAG 2.0 based "Document success criteria" were initially incorporated by including the text of each success criterion that is applicable to non-Web documents in a single table. For each success criterion in table 1, there was a table cell that could contain "Applicability notes" to provide additional information that explained how the success criterion applied. An additional table (table 2) was included to show the changes that had been made to the wording of the original WCAG 2.0 success criteria in order to form the document success criteria. Some success criteria were judged not to be applicable to documents, these were identified as such in table 2 and omitted from table 1.

The approach described above was seen to suffer from two major limitations. It was not possible for someone using the EN to make conformance claims about any specific document-related requirement as none of the requirements were individually numbered. The other deficiency that was identified was that it was difficult to correlate rows in table 1 with rows in table 2 when trying to look for changes from WCAG 2.0.

To overcome both of the above difficulties, the non-web document requirements were listed in individual clauses, within clause 10.2, like every other requirement in the EN. There was a combination of:

- some initial scoping text "*Where ICT is a non-web document,*";
- the requirement language "*it shall satisfy the success criterion in Table 10.x.*"
- a table, 10.x, that contained the relevant WCAG2ICT-agreed success criterion, together with some table notes.

The table notes contained notes that WCAG2ICT had agreed as part of the success criterion text, plus a description of the changes that had been made to the WCAG 2.0 success criterion (mainly by WCAG2ICT). This latter part of the note achieved what the original table 2 had done, and it kept all relevant information regarding the success criterion together in one place.

The WCAG2ICT Task Force identified what the WCAG 2.0 success criteria would mean if they were applied to non-Web ICT, but they did not try to mandate which success criteria should be applied to non-Web ICT. The decision to identify which success criteria should be applied to the different categories of non-Web ICT belonged exclusively to the team developing the EN and to the approval process within Mandate M 376.

WCAG2ICT identified a number of WCAG 2.0 success criteria that were only applicable to a "set of documents" or a "set of software programs". These "problem" success criteria were the ones that were reliant on the WCAG 2.0 concept of a "set of web pages". After considerable discussion, a decision was made not to include these success criteria in clauses 10 and 11. The primary rationale was that the WCAG2ICT definition of "set of documents" or a "set of software programs" were so tightly written that very few collections of documents and almost no software would ever fall into those categories. In at least one case, Success Criterion 2.4.5 for documents, even if it is applied to a "set of documents" the result would almost always be a pass.

Although it could be seen as harmless to include these success criteria, anyone who has a collection of documents or software would have to spend significant time examining the members of that collection to identify whether they had a "set". In almost every case the answer would be "no" and in some of the very rare cases where the answer was "yes" the success criterion would almost always be met by default.

## 5.11 Non-web software (clause 11 of the EN)

### 5.11.1 Software success criteria (clause 11.2 of the EN)

An identical approach to that described in clause 5.10, with a parallel history of the evolution of that approach, has been adopted for requirements to be applied to software that provides a user interface. The non-web software success criteria-based requirements are included in clauses 11.2.1 and 11.2.2 of the EN.

Dealing with the software requirements of clause 11.2 was a particularly difficult task. Many of the WCAG2ICT requirements are not applicable when the software is closed to certain types of assistive technologies, as the WCAG 2.0 [i.25] success criteria on which they are based assume things like programmatic access to the functionality of the software. For this reason, many requirements in clause 11.2.1 have complex self-scoping text that clarifies when a requirement is not applicable to a certain kind of closed functionality (e.g. closed to keyboards and keyboard interfaces).

Where a requirement in clause 11.2.1 is not applicable under certain types of closure of the software, a related subclause in clause 11.2.2 provides advice on how the same user accessibility need can be met by other means (where such a solution exists). The subclauses in clause 11.2.2 identify closed functionality requirements from clause 5.1 that address the same user accessibility need in a similar way when there is closed functionality. The requirements in clause 11.2.2:

- identify the closed functionality situation to which the requirement applies;
- specifiy any closed functionality requirement, from clause 5.1, that should be applied instead.

### 5.11.2 Interoperability with assistive technologies (clause 11.3 of the EN)

The requirements for interoperability with assistive technologies largely mirror those in the second 508/255 ANPRM. There have been some modifications and additions that have been influenced by some of the thinking contained in ISO/IEC 13066-1:2011 [i.15]. One addition to the provisions of the second 508/255 ANPRM is a requirement that software that provides a user interface makes use of platform and other accessibility services. Another addition is to require software to allow assistive technologies to modify states, properties, values and text (which existed in both the first and the second 508/255 ANPRM).

### 5.11.3 Authoring tools (clause 11.6 of the EN)

The requirements relating to authoring tools in the second 508/255 ANPRM were taken as the initial basis for the requirements included in clause 11.6 of EN 301 549 (V1.1.1) [i.3]. There was some concern that these did not reflect later thinking taking place in the ATAG Working Group http://www.w3.org/TR/ATAG20/. The requirements that were finally included were re-written taking both sources into account.

## 5.12 ICT providing relay or emergency service access (clause 13 of the EN)

Clause 13 of the EN includes accessibility requirements related to relay services and emergency services. Many of the requirements in the EN could be applicable to the accessibility of online services, with clause 9 being particularly relevant to the accessibility of all web-based services. For this reason, there was some uncertainty about why clause 13 was included to cover access to relay and emergency services.

Relay services can be an essential service to allow persons with disabilities to make use of mainstream communication services such as voice telephony. Relay services are therefore not a stand-alone service in the same way as e-health services but an enabling service for users to make use of communications and online services.

Access to emergency services was included as persons with disabilities may need to access emergency services and/or be contacted by emergency services using a means of communication not widely used by the majority of the population. It is therefore important to ensure that ICT does not create any barriers that prevent users from having two-way communication with emergency services using the means of communication that is appropriate to their needs.

## 5.13 Annex B

Table B.2 provides a mapping between the requirements of clauses 5 to 13 and the functional performance statements of clause 4. This mapping is described in more detail in clause 5.4.2.

In previous drafts of the EN, there were two separate tables in Annex B, one which mapped the requirements of clauses 5 to 8 and 12 to 13 to the functional performance statements and another that showed the mapping between the WCAG 2.0-based requirements of clauses 9 to 11 and the functional performance statements. The revision of clauses 9 to 11 to provide each requirement in a separate clause, to match the pattern in the rest of the EN, allowed the two tables to be merged into a single table covering all requirements.

## 5.14 Annex C

Annex C contains the tests for all of the requirements in clauses 5 to 13 of the EN. In the final draft of the EN significant effort went into reviewing and improving clause C.1, the introduction. The new text included information that could help the reader of the EN to understand:

- how accessibility may need to be evaluated on a combination of items of items of ICT that interoperate together to provide the services of the ICT to the user;
- that the EN does not prioritize one requirement over another and that any prioritization would be the responsibility of the user of the EN or of the procurer;
- advice on how compliance to the EN should be reported.

Clause C.1 indicates that it is frequently not possible to test every aspect of the user interface of very complex ICT and that, in those circumstances, sampling is a frequently used approach to judge how well the ICT complies with the requirements. The EN goes on to indicate that evaluation sampling techniques are context specific and that no specific techniques can be recommended. Clause 6.3 of the present document discusses the initial expectations about how selective testing techniques might have been addressed in the EN.

# 6 Documents used for the development of test procedures

## 6.1 Simple tests based on inspection or testing

Simple tests were generally derived in a logical manner from the words of the requirement and set out in Annex C of the EN. In a number of cases it was not found possible to specify completely objective tests, particularly in cases where human judgement is required to determine the result. Such a test can only be performed subjectively.

## 6.2 Tests with processes defined in other standards

There were some requirements found where it was not found possible to reproduce the test procedures in the EN mainly due to the length of the documentation resulting from the complexity of the test procedure, for example the test for magnetic coupling with hearing devices required by clauses 8.2.2.1 and 8.2.2.2 of the EN. The tests set out in clauses C.8.2.2.1 and C.8.2.2.2 require a check that the product meets both ETSI ES 200 381-1 [i.4] and ETSI ES 200 381-2 [i.5].

## 6.3 Selective testing

When testing ICT, and in particular software applications, there can be many instances of a particular user interface feature. For example, a user interface could contain many hundreds or even thousands of text fields. The only way to guarantee total compliance with the requirements of the EN would be to test every single text field, but this would be costly, time-consuming and, without an automated test system, almost impossible to achieve.

In drafting the requirements consideration has been given to avoiding reference to the testing of "each" instance of a user interface element if it is expected that there could be a large number. Instead, the wording of the tests would make it possible to pass the test by testing a suitable sample of the total number of a particular user interface element.

It would be valuable to have guidance for testers on how to sample the number of instances to test. In the Web domain, a methodology for evaluating the conformance of websites to WCAG 2.0 [i.25] is under development by the W3C and is available at: http://www.w3.org/TR/WCAG-EM/. It was hoped that this might offer suitable advice that could be used in the EN, but at the time of publication the work is not yet mature and its scope is too narrow to be able to be adopted and adapted for use as a general testing methodology in the EN. The ideal place in which to document advice on testing would be in a report that could be regularly updated as techniques for selective evaluation are developed. This advice could then be made available to testers by means of the interactive toolkit being developed as part of the Mandate M 376 work.

# 7 New tests and evaluation methods

## 7.1 New tests

As noted in clause 5.8.3 a revision of the ETSI ETS 300 381 [i.6] was found to be needed for several reasons. The test methods of handsets and earphones had changed since the creation of the initial ETS in December 1994 and the types of telephone that are required to be covered by this revised ES have evolved and some more recent types are missing.

The STF therefore took steps to arrange for this revision to be made in ETSI STQ and one of the team was rapporteur for this work.

As noted in clause 5.8.4 it was also found that there were no existing methods for testing mobile telephones. Once again steps were taken to arrange for work to be done in ETSI STQ to write such a standard with one of the team as rapporteur for the work.

These revisions resulted in a new two part document replacing ETSI ETS 300 381 [i.6] which has now been published as ETSI ES 200 381-1 [i.4] and ETSI ES 200 381-2 [i.5].

## 7.2 Further research

### 7.2.1 Contrast

As noted in clause 5.8.5, an early draft of EN 301 549 (V1.1.1) [i.3] contained clause 8.4.1 "Contrast" that stated "Passively illuminated characters and symbols on the ICT, that label operable parts, shall contrast visually from background surfaces with a reflectance contrast ratio of at least 3:1".

Extensive searches were made for standards that specify methods for testing contrast of characters on equipment under passive illumination conditions. There were also a number of enquiries to experts in the field.

Despite the existence of several standards for measuring contrast for actively illuminated displays, neither the searches nor the experts could identify standard measurement methods, or acceptable contrast measures for passive illumination conditions. Without any way of justifying a contrast ratio or a method by which it could be measured, a decision was reluctantly made to remove the contrast requirement (original clause 8.4.1).

This is an area where further research is needed, and representations will be made to the ISO that a new standard is required. If in the future, standards for testing reflective contrast and colour contrast, and for accessible contrast values are available and accepted, a new contrast requirement could be added to later versions of EN 301 549 (V1.1.1) [i.3].

### 7.2.2 Anthropometry

A comment made on an earlier draft of the EN pointed out that in the clauses on physical access it concentrated solely on the dimensions of ICT necessary to provide accessibility for users in wheelchairs, and did not consider provisions necessary for users on crutches or 4-wheeled frames (rollators) and for short people or persons with reduced dimensions of or reduced motion range of upper limbs e.g. shoulder, elbow, wrist, upper arm, forearm or arms.

Such users, even though not in a wheelchair, could still have difficulty in accessing some user controls. It was suggested that the EN should contain requirements ensuring the full accessibility of the ICT to such users.

To make provision for such users would require further research to collect the anthropometric data applicable to them and to determine the possible effect of such data on the requirements in the EN.

### 7.2.3 Usage with limited cognition

Another area requiring further research is the definition of testable requirements that provide adequate support for the wide range of user needs related to limited cognition. The functional performance statement describing the relevant user needs is set out in clause 4.2.10 of EN 301 549 (V1.1.1) [i.3]. Tables B.1 and B.2 of that EN, identify a number of requirements that provide partial support for limited cognition, such as speech output as a means to reinforce reading written text, captions and audio descriptions to enhance the understanding of media, consistent navigation mechanisms, consistent identification of user interface elements, error identification and suggestions.

The list of supporting requirements referred to above is not exhaustive and it is clear that further research is needed to understand the specific requirements that bring the maximum benefits to users with limited cognition.

### 7.2.4 Real-time text correctness

During the writing of the EN, a proposal was made to adopt a measure of Real-Time Text correctness based on character error rates, taken from Recommendation ITU-T F.700 [i.27] and Recommendation ITU-T F.703 [i.28]. Unfortunately, this was not considered a sufficiently clearly specified solution.

The above Recommendations relate RTT quality to an audio quality classification that is only described as applicable to specific audio codecs and is not related to quality degradation appearing from network transmission quality and level of robustness of audio codecs. In addition, it is not entirely clear how the quoted 0,2 % error rate would be measured.

It has not been possible to identify a quality measure for real-time text communication that adequately reflects the user perception of real-time text correctness. Therefore, until such a measure has been developed it is not considered advisable to recommend a test. Developing such a quality measure would be an important subject for further research and standardization.

### 7.2.5 The physical design of installed and free-standing ICT

Given the conversion of the requirements in clause 8.3 of the EN to recommendations, there is an urgent need to ensure that specific requirements in this area are rapidly developed to fill the potential vacuum created by this change. Although the laws regarding the accessibility of public spaces may provide some protection against the procurement of inaccessible ICT in some countries, there is currently no overall European standards or laws that fully cover the aspects addressed in clause 8.3 of the EN.

It is hoped that the work being undertaken within Mandate M 420 [i.10] can fill this void as soon as possible.

# History

| Document history | | |
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| V1.1.2 | May 2021 | Publication |
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