



## Human Factors (HF); Guidelines to identify "Design for All" aspects in ETSI deliverables

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## Foreword

This ETSI Guide (EG) has been produced by ETSI Technical Committee Human Factors (HF).

The Text taken from ISO/IEC TR 29138-1:2009: "Information technology - Accessibility considerations for people with disabilities - Part 1: User needs summary" is reproduced with the permission of the International Organization for Standardization, ISO. This standard can be obtained from any ISO member and from the Web site of the ISO Central Secretariat at the following address: [www.iso.org](http://www.iso.org). Copyright remains with ISO.

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## Modal verbs terminology

In the present document "**shall**", "**shall not**", "**should**", "**should not**", "**may**", "**may not**", "**need**", "**need not**", "**will**", "**will not**", "**can**" and "**cannot**" are to be interpreted as described in clause 3.2 of the [ETSI Drafting Rules](#) (Verbal forms for the expression of provisions).

"**must**" and "**must not**" are **NOT** allowed in ETSI deliverables except when used in direct citation.

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## Introduction

The present document was prepared in response to Mandate M/473 [i.5] from the European Commission to CEN, CENELEC and ETSI.

Ageing and a better inclusion of people with various kinds of functional limitations represent key challenges in Europe and most other parts of the world. The fundamental objective of Mandate M/473 is to ensure that standardization deliverables are developed in a way that follows "Design for All" principles. Taking account of Design for All principles in the development of standardization deliverables, when appropriate, is intended to ensure that the use of those deliverables enables the development of products, services or systems that are also usable by and accessible to persons with disabilities and older persons.

The present document describes a relatively simple, checklist-based approach that provides ETSI groups with simple, but efficient and understandable tools to assist them to decide whether specific Design for All issues will need to be taken into account when drafting or updating standardization deliverables. The method of deployment has been specifically designed to be incorporated into ETSI's Technical Working Procedures with the minimum amount of change to existing working practices.

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# 1 Scope

The present document contains a Design for All (DfA) checklist to be used by ETSI groups to identify potential Design for All implications to be considered in the context of new ETSI work items.

Annex D contains references to guidelines related to the Design for All issues identified in applying the checklist.

NOTE: The present document can also be used in the context of the revision of already published ETSI deliverables for assessing whether there are any Design for All issues needed to be considered.

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# 2 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.

Referenced documents which are not found to be publicly available in the expected location might be found at <http://docbox.etsi.org/Reference>.

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

## 2.1 Normative references

The following referenced documents are necessary for the application of the present document.

Not applicable.

## 2.2 Informative references

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] ETSI EG 202 116: "Human Factors (HF); Guidelines for ICT products and services; "Design for All".
- [i.2] ETSI EG 202 670: "Human Factors (HF); User Experience Guidelines for real-time communication services expressed in Quality of Service terms".
- [i.3] ETSI EG 202 848: "Human Factors (HF); Inclusive eServices for all: Optimizing the accessibility and the use of upcoming user-interaction technologies".
- [i.4] ETSI EN 301 549: "Accessibility requirements suitable for public procurement of ICT products and services in Europe".
- [i.5] European Commission: "M/473 Standardization Mandate to CEN, CENELEC and ETSI to include 'Design for All' in relevant standardisation initiatives".
- [i.6] ISO/IEC TR 29138-1: "Information technology - Accessibility considerations for people with disabilities - Part 1: User needs summary".
- [i.7] ITU-T (2006) Series F: "Non-telephone Telecommunication Services: Audiovisual Services. Technical Paper FSTP-TACL Telecommunications Accessibility Checklist".
- [i.8] ISO 26800:2011: "Ergonomics - General approach, principles and concepts".
- [i.9] Recommendation ITU-T P.10/G.100 Amendment 2: "New definitions for inclusion in Recommendation ITU-T P.10/G.100", International Telecommunication Union, Geneva, Switzerland, 2008.

## 3 Definitions and abbreviations

### 3.1 Definitions

For the purposes of the present document, the following terms and definitions apply:

**accessibility:** extent to which products, systems, services, environments and facilities can be used by people from populations with the widest range of characteristics and capabilities, to achieve a specified goal in a specified context of use (from ISO 26800 [i.8])

**Design for All:** design of products to be accessible and usable by all people, to the greatest extent possible, without the need for specialized adaptation, EG 202 848 [i.3]

**ETSI deliverable:** document (GS, TS, TR, ES, EG, EN, or SR) produced as the result of an ETSI work item

**ETSI group:** any group within ETSI that produces or revises ETSI deliverables

**haptic:** passive perception through the sense of touch, EG 202 848 [i.3]

**input modality:** sense or channel through which a human can receive the output of an ICT device or service, EG 202 848 [i.3]

**modality:** See sensory modality.

**multimodal:** relating to multiple input modalities and/or output modalities, EG 202 848 [i.3]

**multimodality:** simultaneous support of multiple input modalities and/or output modalities, EG 202 848 [i.3]

**output modality:** channel through which a sensor, device or service can receive the input from the human, EG 202 848 [i.3]

**quality of experience (QoE):** overall acceptability of an application or service, as perceived subjectively by the end-user, EG 202 670 [i.2]

NOTE 1: Quality of experience includes the complete end-to-end system effects (client, terminal, network, services infrastructure, etc.).

NOTE 2: Overall acceptability may be influenced by user expectations and context.

NOTE 3: Recommendation ITU-T P.10/G.100 Amendment 2 [i.9] definition.

**sensory modality:** sense or channel through which a human can send input to or receive output from an ICT device or service, EG 202 848 [i.3]

**service:** complete capability, including terminal equipment functions, for communication between users, systems and applications, according to agreed protocols, EG 202 848 [i.3]

**tactile:** perception through the sense of touch while actively moving parts of the body, EG 202 848 [i.3]

**user:** person who interacts with the product, service or environment ISO/IEC TR 29138-1 [i.6]

**user interface:** physical and logical interface through which a user communicates with a device or service, EG 202 848 [i.3]

### 3.2 Abbreviations

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

AT	Assistive Technology
DfA	Design for All
ICT	Information and Communication Technology
TC	Technical Committee

## 4 Rationale

### 4.1 The role of standards

When followed, ETSI deliverables containing requirements will influence the characteristics of a product or service to which they are applied. Each ETSI deliverable will be written with the primary intention to influence the characteristics of some clearly defined aspects of a future product or service. The focus of the majority of ETSI deliverables are ICT products or services.

When a standard is being drafted, its authors have in mind the primary purpose of the standard and the primary entities that will be affected by application of the standard. What is more difficult to predict is the full range of secondary effects of applying the standard and sometimes these secondary effects are not correctly identified. Sometimes the application of a standard can have an unintended effect on an entity that was not considered during the drafting of a standard.

The focus of the present document is on the potential effect of ETSI deliverables on human users. Even though very many ETSI deliverables do not directly address an ICT product or service that has an obvious human user, and many define ICT that appears to be very remote from the user, the application of that deliverable will most frequently have some indirect impact on human users. Clause 4.2 identifies categories of users of ICT that are wider than those users who directly use an ICT product or service. These multiple categories of users affected by ICT are also the categories of user that need to be considered when drafting ETSI deliverables that define characteristics of ICT products and services.

### 4.2 Types of users

People affected by a technical infrastructure, product or service can be the providers thereof, the recipients for whom they have been created, or a combination of both:

- Providers are potentially affected by benefits such as jobs, income or influence.
- Recipients are directly or indirectly affected by potential benefits (or detriments) such as receiving support to achieve their goals or being offered entertainment.

**EXAMPLE:** Examples of people being affected both as providers and as recipients are technicians servicing switching systems or people working for the provider's telephone call centre.

In addition, technical infrastructures, products or services are, in many cases, used not only by the people from inside the intended user group but by other people as well. Therefore, the requirements and capabilities of all potential users have to be taken into account in technical standards and product / service specifications.

The impact of Design for All (DfA) issues on users depends on their involvement in the actual usage of the device or service. This involvement may be more or less direct; hence users can be defined as:

- Direct users: these can be defined as those users who directly interact with a device or service for their own benefit or someone else's.

**EXAMPLE:**

- A traveller buys a train ticket from a ticket vending machine.
- A woman uses her own mobile phone to call a friend to arrange a meeting.
- An elderly man draws some money from his current account using a bank teller machine.
- The son of an elderly woman prepares her new laptop computer for future use by her.
- Indirect users: these can be defined as those users who do not interact directly with a device or service but benefit directly or indirectly by another person using it.



**EXAMPLE:**

- An elderly woman sits next to her son who prepares her new laptop computer for future use by her, listening to his explanations and demonstrations.
  - People in a cinema watch a movie (the projector equipment is operated by someone else).
  - The participants of a symposium wear headphones and listen to the voice of an interpreter (who operates the equipment).
- Collateral users: collateral users are only remotely involved in another person using a device or service, and they usually do not benefit from that experience.

**EXAMPLE:**

- A lorry driver (direct user) engages the reverse gear which starts an acoustic warning, a person standing behind the lorry (indirect user) hears the warning and clears the area, another person in a building nearby is awoken by the noise (collateral user).
- A man sitting in a train talks into his mobile phone with a very loud voice (direct user), the person sitting in the row behind him (collateral user) feels molested by this.

All the user categories mentioned above are relevant for the assessment of the overall impact of a deliverable.

## 4.3 Design for All

The effect of technology (and technical standards) on individuals is related to the capabilities of those individuals. The capabilities of people using technology (directly or indirectly) or being affected by technology (e.g. the collateral users described in clause 4.2) vary widely in terms of their physical (e.g. seeing and hearing) and mental (e.g. remembering) abilities.

Design for All (DfA) is the design of products to be accessible and usable by all people, to the greatest extent possible, without the need for specialized adaptation. As standards define important characteristics of technical infrastructures, products and services, it is important to ensure that when those standards are developed DfA principles are applied when appropriate.

One of the most important things that needs to be identified when a proposal is made to create a standard or update an existing one, is whether a DfA approach needs to be adopted. It will not always be obvious whether specific actions to address DfA will be required as, in many cases, a standard may not appear to be strongly related to the needs of end users. However, even when a standard relates to some lower-level features of a network or service and the standard does not directly address end-user interaction issues, characteristics of these lower-level features can impact on users and can create conflicts with the users' abilities. It will be necessary to consider all of the categories of user described in clause 4.2 before concluding that a DfA approach is not relevant.

There has been a significant amount of work done, over many years, to develop standards and guidance that assist designers to apply DfA best practice. Annex C describes several sources that have been used in the present document. These documents provide the background information that will enable ETSI groups to:

- 1) Identify whether DfA issues may be relevant in the proposed standardization activity.
- 2) Help the ETSI group to identify the nature of the DfA issues and to offer some suggestions for how those issues might be addressed.

Clause 5 describes the process by which ETSI groups can perform the above two steps with the minimum amount of specialized knowledge and with the minimum disruption to existing ETSI working procedures.



## 5 Assessing the Design for All relevance of an ETSI deliverable

### 5.1 General

The relevance of Design for All (DfA) issues and user needs affected in the context of an ETSI deliverable to be developed or updated can be assessed by going through the procedure that is described in detail in the following clauses. It consists of the following three steps:

- 1) DfA checklist: the six topics listed in clause 5.2 are used to assess whether there is any DfA relevance in the proposed deliverable.
- 2) User needs: table 5.1 in clause 5.3 indicates which user needs are affected by the individual checklist topics.
- 3) DfA Guidance: annex D gives guidance on user interaction aspects relating to the user needs listed in table 5.1, allowing analysis of ways to address those user needs in the standard.

### 5.2 DfA checklist

In order to identify any Design for All (DfA) issues related to an ETSI deliverable to be developed or updated, the following six topics should be considered by the authors of the deliverable. The selection of those topics is based on the ITU-T "Telecommunications Accessibility Checklist" ([i.7], see table 5.1 for more details on the meaning of each topic).

**EXAMPLE:** A technical standard about mobile text messaging specifies some characteristics of the controls and indicators of a terminal supporting that standard. This standard would address topics: 1) Control of devices through a user interface, 2) Control of services, 4) Media entry by the user, and possibly issues 5) Media processing including transport, coding, transposition, etc. and 6) User and device profile management and use.

If the deliverable addresses any or all of the following topics, the steps specified in clause 5.3 should be taken. If the deliverable does not address any of the topics, the procedure should be completed by recording the results of the procedure as specified in clause 6.2.

#### 5.2.1 Control of devices through a user interface

A user interface represents the physical and logical interface through which a user communicates with a device or service. This includes the sum of all controls and indicators for the input and output of commands, including elements such as screens, hardkeys, softkeys, vibrating elements, Braille systems as output of text messages in control protocols and menu structures. Different user interaction technologies can be employed in a user interface, addressing different human sensory modalities (input modalities such as visual and auditory, and output technologies such as tactile/haptic or kinaesthetic).

**Assessment question:** Does the ETSI deliverable relate to or impact upon a device with a physical or logical user interface?

**NOTE 1:** The user interface can reside in a terminal device such as a smart phone, in a remote service or in the combination of the two.

**NOTE 2:** This topic also addresses the physical access to devices and services (e.g. covers, moveable parts, and peripherals).

## 5.2.2 Control of services

The concept of service refers to the complete capability, including terminal equipment functions, for communication between users, systems and applications, according to agreed protocols. User interaction technologies used for services are similar to those used for controlling devices.

Assessment question: Does the ETSI deliverable relate to or impact upon a service with a physical or logical user interface?

**NOTE:** The user interface can reside in a terminal device such as a smart phone, in a remote service or in the combination of the two. The user interface of a remote service could be diverse and include a visual web interface and a voice-driven dialogue.

## 5.2.3 Media presentation to the user

Media presentation to the user covers different human input modalities including auditory (e.g. voice, music or sounds), visual (e.g. text, symbols, images or moving images) and tactile (e.g. vibrating equipment, Braille systems) media. In the future, other human input modalities may be addressed as well. This category does not include the presentation of media that is an integral part of the operation of a user interface, as this presentation is part of the user control addressed in the first two topics.

Assessment question: Does the ETSI deliverable relate to or impact upon media presentation to the user?

**NOTE:** The presentation of media to a user does not necessarily imply an active interaction of the user with a user interface.

**EXAMPLE:** Train passengers waiting on a platform for a train hear voice announcements and see a visual display of information on train departure times.

## 5.2.4 Media entry by the user [media capture]

Media entry by the user covers different human output modalities including auditory (e.g. the user's voice), visual (e.g. the user's image or sign language as captured by a camera or moving pictures uploaded from a local storage device), kinaesthetic or biometric media. In the future, other human output modalities may be addressed as well. This category does not include the capture of voice commands, as this capture is part of the user control addressed in the first two topics.

Assessment question: Does the ETSI deliverable relate to or impact upon media entry by the user (media capture)?

**NOTE:** The entry of media from a user does not necessarily imply an active interaction of the user with a user interface. This would include a person being monitored by a media capture system.

**EXAMPLE:** The security system of an airport monitors the movements of people with a set of cameras to identify any suspicious patterns.

## 5.2.5 Media processing including transport, coding, transposition, etc.

This item covers any transport and/or manipulation of media, which may result in the media stream being altered, e.g. delayed, losing information, or synchronization.

Assessment question: Does the ETSI deliverable relate to or impact upon the transport and/or manipulation of media in a way that could potentially lead to an impoverished user experience?

**NOTE:** This category excludes lossless media transport where the media stream is not processed nor delayed by more than 100 ms.

**EXAMPLE:** A coding algorithm intended for reducing the visual data for two-way visual communications at a low bit rate can result in the reduction of the quality of the visual material sufficiently to make it unsuitable for sign language usage.