



**Human Factors (HF);
Guidelines for the design of mobile ICT devices and their
related applications for people with cognitive disabilities**

Reference

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Foreword

This final draft ETSI Guide (EG) has been produced by ETSI Technical Committee Human Factors (HF), and is now submitted for the ETSI standards Membership Approval Procedure.

Modal verbs terminology

In the present document "**should**", "**should not**", "**may**", "**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).

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Introduction

Many people with physical or cognitive impairments do not find it easy and efficient to use mobile ICT devices and services manufactured for the mass market or for specific target groups such as young users.

The concept of cognitive impairment is very broad. In general, a person with a cognitive impairment has more difficulties with one or more types of mental tasks than the average person [i.36]. Cognitive impairments can be described as "a substantial limitation in one's capacity to think, including conceptualizing, planning, and sequencing thoughts and actions, remembering, interpreting subtle social cues, and understanding numbers and symbols" [i.1].

Cognitive impairments can include learning impairments (difficulty to learn in conventional ways), language impairments (difficulty to understand or producing language), or some form of ageing-related cognitive impairment (e.g. dementia - including Alzheimer's disease - memory loss, or lack of orientation). Individuals with cognitive impairments can face unique challenges that are often pervasive and changing throughout their lives.

A number of accessibility guidelines for mobile ICT exist (from ETSI and other standards bodies as well as from academic and industrial sources). They provide guidance to device and service developers to raise their awareness of problems frequently encountered by people with disabilities, and suggest ways of increasing the accessibility of their products. However, while there are many guidelines that focus on physical and/or sensory impairments, there is a lack of guidelines that explicitly target the requirements of people with cognitive impairments.

The present document is intended to fill this gap. Based on an analysis reported in ETSI TR 103 349 [i.8], the present document provides guidelines for the design of mobile ICT devices and services. In particular, the design guidelines in the present document are based upon the functional needs of persons with limited cognitive, language and learning abilities described in ETSI TR 103 349 [i.8]. The guidelines extend existing guidelines on usability and accessibility. This means that the cognitive impairment-specific guidelines in the present document apply in addition to guidelines on good user interface design and on design for all.

The guidelines in the present document are based on research studies and scientific papers used as sources for identifying relevant user needs and are complemented by others based on knowledge of best practice. For example, there are several general accessibility requirements in ETSI EN 301 549 [i.6] that support the needs of persons with cognitive impairments, as described in Annex B of ETSI EN 301 549 [i.6]. It is also worth noting that many persons with cognitive impairments also have other (physical and sensory) impairments. The requirements of ETSI EN 301 549 [i.6] support these additional needs.

1 Scope

The present document contains design guidelines for mobile devices and applications that will enable persons with limited cognitive, language and learning abilities (including people with age-related cognitive impairments) to have an improved user experience when using mobile ICT devices and applications.

The guidelines apply to the design of:

- mobile ICT devices;
- mobile applications (whether they are standalone or whether they provide access to related services).

The guidelines in the present document complement existing usability and accessibility guidelines.

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.

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3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the terms and definitions given in ETSI EG 201 013 [i.4] and the following apply:

activity limitation: difficulty an individual may have in executing an activity

NOTE: Source: [i.37].

approved platform or device based user authentication: device-based user authentication mechanism that is directly supported by a mobile device operating system or by device firmware

cognitive disability: activity limitations or participation restrictions that occur when factors in the environment constrain barriers for persons with cognitive impairments

cognitive impairment: substantial limitation in a person's capacity to think, including conceptualizing, planning, and sequencing thoughts and actions, remembering, interpreting subtle social cues, and understanding numbers and symbols

NOTE: Source: [i.1].

context: any information that can be used to characterize the state of entities that are considered relevant to the interaction between a user and an application, network function, service or device

NOTE: Source: ETSI TS 102 747 [i.9].

context of use: users, tasks, equipment (hardware, software and materials), and the physical and social environments in which a product is used

NOTE: Source: ISO 9241-110 [i.22].

dark pattern: user interfaces that are designed to trick people

NOTE: Source: [i.56].

episodic: containing or consisting of a series of separate parts or events

Information and Communication Technology (ICT): technology, equipment, or interconnected system or subsystem of equipment for which the principal function is the creation, conversion, duplication, automatic acquisition, storage, analysis, evaluation, manipulation, management, movement, control, display, switching, interchange, transmission, reception, or broadcast of data or information

NOTE: Examples of ICT are electronic content, telecommunications products, computers and ancillary equipment, software, information kiosks and transaction machines, videos, IT services, and multifunction office machines that copy, scan, and fax documents.

mobile ICT: ICT that uses mobile technologies

NOTE: Mobile technologies include, but are not limited to, mobile phones, smartphones, tablets, smart watches and services accessed through these devices.

mobile technologies: technologies that enable portability, wireless connectivity and functioning without external power

participation restriction: problem an individual may have in involvement in life situations

NOTE: Source: [i.37].

personally identifiable information: information that can be used on its own or with other information to identify, contact, or locate a single person, or to identify an individual in context

platform: mobile ICT device operating system or firmware

NOTE: Design conventions, recommendations and style guides are frequently associated with vendor-specific platforms.

platform software: collection of software components that runs on an underlying software or hardware layer, and that provides a set of software services to other software components that allows those applications to be isolated from the underlying software or hardware layer

NOTE 1: Source: ISO/IEC 13066-1 [i.59].

NOTE 2: A particular software component might play the role of a platform in some situations and a client in others.

usage need: specific support needed by an individual to overcome an activity limitation

NOTE 1: Defining usage needs from activities allows a "design for all" approach to be followed, as the usage needs are based on supporting users doing activities they have trouble with (reading, speaking, organizing, etc.) without the need to consider the reasons (the impairments or diagnoses) for those limitations.

NOTE 2: The usage needs in the present document are those that are relevant when individuals are interacting with mobile ICT.

user agent: software that retrieves and presents content for users

NOTE 1: Source: WCAG 2.0 [i.19].

NOTE 2: Software that only displays the content contained within it is treated as software and not considered a user agent.

NOTE 3: An example of software that is not a user agent is a calculator application that does not retrieve the calculations from outside the software to present it to a user. In this case, the calculator software is not a user agent, it is simply software with a user interface.

NOTE 4: Software that only shows a preview of content such as a thumbnail or other non-fully functioning presentation is not providing user agent functionality.

user interface: all components of an interactive system (software or hardware) that provide information and/or controls for the user to accomplish specific tasks with the interactive system

NOTE: Source: ISO 9241-110 [i.22].

user interface element: entity of the user interface that is presented to the user by the software

NOTE 1: Source: ISO 9241-171 [i.25].

NOTE 2: This term is also known as "user interface component".

NOTE 3: User-interface elements can be interactive or not.

web technologies: technologies that enable access through the HTTP protocol to content identified by URIs

3.2 Abbreviations

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

APA	Accessible Platform Architectures
ASD	Autism Spectrum Disorder
CAPTCHA	Completely Automated Public Turing test to tell Computers and Humans Apart
DIS	Draft International Standard
HTTP	Hypertext Transfer Protocol
ICF	International Classification of Functioning, Disability and Health
ICT	Information and Communication Technology
IT	Information Technology
PIN	Personal Identification Number
TF	Task Force
UAWG	User Agent Accessibility Guidelines Working Group
UI	User Interface
URI	Universal Resource Indicator
URL	Uniform Resource Locator
WCAG	Web Content Accessibility Guidelines
WG	Working Group

4 Overview

The present document provides guidelines for the design of mobile devices and applications for people with cognitive impairments. These guidelines specifically reflect the requirements of those users and are built on existing guidelines for more extended user groups, on existing research on the user needs of people with cognitive impairments, and on best practice and domain expertise.

Many of the guidelines in the present document support the needs of people who have impairments outside the scope of the present document. These guidelines have been included as they all directly support the cognitive usage needs identified in ETSI TR 103 349 [i.8] and included in Annex A of the present document.

In particular, good user interface design principles such as those specified in the ISO 9241 series form a solid basis of all interface design work for people with cognitive impairments. Furthermore, generic Design-for-All guidelines apply that aim at making "products and services accessible to as many people as possible, including elderly people and persons with disabilities, without the need for adaptation or specialized design" (ETSI EG 202 116 [i.2]).

Where applicable, the structure of the present document has been aligned with the one of ETSI EN 301 549 [i.6] facilitating the cross-reference to that document. This alignment will be beneficial to those who are trying to simultaneously meet the requirements in ETSI EN 301 549 [i.6] and apply the guidelines in the present document. The alignment would also facilitate the process of upgrading any guidelines in the present document to turn them into new requirements in a future revision of ETSI EN 301 549 [i.6].

For each guideline, relevant usage needs are listed. Annex A lists all of the usage needs and provides limited explanations. The usage needs are described in more detail in ETSI TR 103 349 [i.8]. That document also provides details on how the usage needs relate to specific conditions such as dementia or dyslexia.

For the purpose of the present document, mobile ICT devices are defined as personal and mobile devices for both indoor and outdoor use. Mobile technologies under the scope of the present document include, but are not limited to, mobile phones, smartphones, tablets, smart watches and services accessed through these devices. Outside of the scope of the present document are the more general aspects of the design of web-based services and of service provision (e.g. of relay services).

It is worth noting that the mobile ICT in some cases is also used by people providing human assistance and support to people with cognitive impairments. Those support could come from members of the user's family, by an individual assigned to provide general support to the user or it could be provided by an organization that looks after the interests of people who have a cognitive disability. The support provided could be in helping the user to configure the mobile ICT to meet their specific needs or it could be in helping them to learn how to use the mobile ICT effectively and safely.

5 Design challenges related to mobile ICT

Mobile ICT differs from stationary, fixed-network-based ICT in a number of important ways. Functionalities are accessed in many cases using smaller screens and without physical keys for entering information. For the latter, novel interaction technologies are offered such as voice-based or gesture-based input.

Mobile ICT is inherently complex involving a number of necessary components, including networks, coverage, batteries, roaming costs, and charging for using a network or service.

Operating systems and mobile applications are frequently updated. Some of those updates present significant changes in the mobile user interface that are undocumented or very briefly documented, leaving the user confused and sometimes helpless. Other confusion may arise through responsive design, which optimizes the display of content for the capabilities of the hardware of the displaying device. While this potentially improves the user experience, it frequently leads to differences in the arrangement of items e.g. in a smartphone and a PC.

Mobile applications are in many cases designed by (and for) young people and with little consideration of the preferences of adults or elderly users.

All of these characteristics of mobile ICT can be of relevance for any user, but some of them affect particularly heavily persons with cognitive impairments. Some examples of problems that persons with cognitive impairments face when using mobile ICT are: lack of discoverability of gestures, need to remember gestures, lack of feedback from tactile buttons, reduced amount of screen space for providing good explanations, modern flat buttons that are difficult to identify as interactive controls, etc. The guidelines in the remainder of the present document aim at improving mobile ICT to make it accessible also to users with cognitive impairments.

6 Guidelines applicable to any mobile ICT

6.1 General

This clause supplements the "Generic Requirements" clause 5 in ETSI EN 301 549 [i.6]. Guidelines for the use of language, which are applicable to all mobile ICT, are addressed in clause 7.

6.2 Applying usability principles

The mobile ICT should conform to the usability principles of ISO 9241-110 [i.22] and ISO/DIS 9241-112 [i.23].

NOTE 1: Usability is strongly associated to the ease of use of the mobile ICT and is therefore very important for persons with cognitive impairments.

NOTE 2: Applying the dialogue principles would include applying guidelines on good user interface design.

6.3 Applying accessibility guidelines

The mobile ICT should conform to the accessibility requirements of ETSI EN 301 549 [i.6] and any applicable technology-specific accessibility guidelines.

NOTE 1: There are several general accessibility requirements in ETSI EN 301 549 [i.6] that support the needs of persons with cognitive impairments, as described in Annex B of ETSI EN 301 549 [i.6].

NOTE 2: Many persons with cognitive impairments also have other (physical and sensory) impairments. The requirements of ETSI EN 301 549 [i.6] support these additional needs.

NOTE 3: Relevant accessibility guidelines include those issued by device manufacturers and by providers of operating systems.

EXAMPLE: For PDF technologies, the guidelines in ISO 14289-1 [i.24] apply.

6.4 Interoperability with assistive technologies

The mobile ICT should support interoperability with assistive technologies.

NOTE 1: Related usage needs: Reading, Writing, Receiving spoken language, Speaking, Producing gestures.

NOTE 2: Source: ETSI EG 202 116 [i.2].

NOTE 3: ETSI EN 301 549 [i.6] provides detailed guidance for assistive technology interoperability in clauses 8.1.2 (hardware interoperability) and 11.3 (software interoperability).

6.5 User authentication

6.5.1 General

The guidelines in clauses 6.5.2 to 6.5.7 require alternatives to authentication techniques that rely on different cognitive abilities. Having biometrics in addition to user identification methods (e.g. passwords or PIN) can be an effective way of meeting these guidelines.

Many mobile devices have biometric identification technologies that are linked to a secure chip in the device that acts as an approved platform or device based user authentication. Service providers that require user identity to be authenticated can do so by trusting approved platform or device based user authentication methods.

NOTE: Biometric techniques such as fingerprint recognition, iris recognition or electrocardiogram matching can be implemented more securely on a device if the comparison with a fingerprint, iris or electrocardiogram template is performed directly on the device than if the scan data is sent to a remote service that contains the fingerprint, iris or electrocardiogram template.

6.5.2 Methods that do not rely on character string memorization

The mobile ICT should offer at least one user authentication method that does not rely on a user's ability to memorize character strings.

NOTE: Related usage needs: Reading, Recognizing written language, Writing, Writing correctly, Recalling from long-term memory.

EXAMPLE: Mobile ICT that requires the user to enter a password relies on the user's ability to accurately recall the password from their long-term memory.

6.5.3 Methods that do not rely on selecting characters from a character string

The mobile ICT should offer at least one user authentication method that does not rely on a user's ability to correctly identify and enter numbered characters from a character string.

NOTE: Related usage needs: Reading, Recognizing written language, Writing, Writing correctly, Understanding simple maths, Recalling from short-term memory, Recalling from long-term memory.

EXAMPLE: Some mobile ICT asks a user to enter, say, the third, sixth and seventh characters from a word that they have previously chosen. A user who is unable to count to the correct characters and then hold them in short-term memory will be unable to correctly respond to the security challenge.

6.5.4 Methods that do not rely on the user performing calculations

The mobile ICT should offer at least one user authentication method that does not rely on a user's ability to perform calculations.

NOTE: Related usage needs: Calculating, Understanding simple maths, Recalling from short-term memory.

EXAMPLE: Some security challenges ask the user to enter the result of a simple calculation (such as adding two single digit numbers) that is presented on screen as an image. Users with limited ability to perform simple calculations will be unable to correctly respond to such security challenges.

6.5.5 Methods that do not rely on the user's ability to speak

The mobile ICT should offer at least one user authentication method that does not rely on a user's ability to speak.

NOTE: Related usage needs: Speaking.

EXAMPLE: Even where a user has been able to supply a voice sample for a speaker recognition identification mechanism, they may periodically lose the ability to speak and will need a different way to identify themselves.

6.5.6 Methods that do not rely on the user's ability to produce gestures

The mobile ICT should offer at least one user authentication method that does not rely on a user's ability to reliably produce gesture.

NOTE: Related usage needs: Producing gestures, Recalling from long-term memory.

EXAMPLE: Some user identification schemes ask a user to reproduce a gesture that they made (e.g. with fingers on a touchpad) when initially registering for the scheme. If the user is unable to reliably remember or reproduce the gesture that they initially registered they will be unable to correctly respond to the identification challenge.

6.5.7 Methods that do not rely on the user's ability to recognize and then enter characters

The mobile ICT and service providers should offer at least one user authentication method that does not rely on a user's ability to recognize characters presented on screen and then enter them into an input field.

NOTE 1: Related usage needs: Reading, Recognizing written language, Writing, Writing correctly, Recalling from short-term memory.

NOTE 2: CAPTCHAs are the most common case where the user is asked to recognize and then enter on-screen characters. The recognition task is normally made very difficult by the deliberate distortions that are designed to defeat automatic recognition software. For users who have greater than usual difficulty in reading, the additional difficulty created by the character distortions may make the task impossible.

6.6 Biometrics for control

The mobile ICT should enable the use of biological characteristics as an alternative to other means of user control of the mobile ICT.

NOTE 1: Related usage needs: Writing, Writing correctly, Speaking, Producing gestures.

NOTE 2: Biometric measures can assist caregivers in knowing the person's physical or mental state.

NOTE 3: Users who are less able to enter information or control software using keyboards, pointing devices or gestures may be able to perform some of the same operations using biometric means of control such as using gaze to select and operate on-screen controls.

NOTE 4: Biometric measures such as gaze detection, and biometric measures of arousal can be used to infer the degree to which a user is attending to and reacting to the output of the software. Negative levels of attention or apparently elevated states of arousal can be used to prompt the user or to offer assistance.

6.7 Retracing the dialogue path

The mobile ICT should enable the user to return to a recognizable point in an interactive dialogue.

NOTE 1: Related usage needs: Focusing attention, Making choices, Recalling from short-term memory.

NOTE 2: Source: ETSI EG 202 116 [i.2].

NOTE 3: The retracing can apply to many forms of interactive dialogue including hierarchies of menus and multi-step page-by-page dialogues.

6.8 Arrangement of user interface elements

The mobile ICT should arrange the user interface elements to reflect the logic of the tasks for which they are used.

NOTE 1: Related usage needs: Making choices, Initiating a task, Carrying out a task, Completing a task, Recalling from long-term memory.

NOTE 2: Source: ISO/DIS 9241-112 [i.23].

NOTE 3: For the purposes of this guideline, "user interface elements" includes hardware elements such as buttons.

6.9 Touch activation on up event

The mobile ICT should provide a mode of operation where the touch-based activation of user interface elements happens on the up event.

NOTE 1: Related usage needs: Making choices, Interpreting effects of choices, Initiating a task, Carrying out a task, Completing a task.

NOTE 2: Sources: [i.28] and [i.54].

NOTE 3: In a touchscreen, the up event is the event triggered when a finger is lifted from the touchscreen at the end of a tap.

NOTE 4: This guideline helps people with cognitive impairments by reducing the chance that a control will be accidentally activated or action will occur unexpectedly. In addition, individuals who are unable to detect changes of context are less likely to become disoriented while navigating a site.

6.10 Options for touch activation on down event

The mobile ICT should enable the user to select one of the following options, when touch-based activation on down event is necessary:

- a) The mobile ICT presents a confirmation alert that allows the user to change their mind.
- b) The mobile ICT includes an undo button or other mechanism that allows the user to reverse the action.
- c) The mobile ICT provides a setting in preferences that allows the user to choose whether activation happens on the down or up event.

NOTE 1: Related usage needs: Making choices, Interpreting effects of choices, Initiating a task, Carrying out a task, Completing a task.

NOTE 2: Sources: [i.28] and [i.54].

7 Guidelines for the use of language

7.1 General

The guidelines for the use of language in clauses 7.2 to 7.7 apply to both written and spoken language. Furthermore, all of the guidelines in clause 7 apply to both the language used in the user interface and the language used in the user documentation.

7.2 General language issues

7.2.1 Clarifying the purpose of written or spoken content

The mobile ICT should make clear the purpose of large volumes of textual content before presenting the details of the content.

NOTE 1: Related usage needs: Recognizing written language, Comprehending written language, Understanding spoken language.

NOTE 2: Source: ISO/DIS 9241-112 [i.23].

7.2.2 Sentence focus

The mobile ICT should address only one idea per sentence.

NOTE 1: Related usage needs: Comprehending written language, Understanding spoken language.

NOTE 2: Sources: [i.12], [i.14], [i.15], [i.16] and [i.17].

7.2.3 Unambiguous terms and concepts

The mobile ICT should avoid the use of vague and ambiguous terms and concepts.

NOTE: Related usage needs: Comprehending written language, Understanding spoken language.

EXAMPLE: Terms like "eventually", "somewhat", and "usually" may be unclear in some contexts.

7.3 Syntax

7.3.1 Simple language

The mobile ICT should use simple linguistic constructions and word forms.

NOTE 1: Related usage needs: Recognizing written language, Comprehending written language, Understanding spoken language.

NOTE 2: Source: ISO/DIS 9241-112 [i.23].

NOTE 3: Readability analysis and other methods can be used to enhance comprehension of a given text for a given audience.

EXAMPLE: In English, a sentence structure consisting of "subject - verb - object" is simpler than one that contains a relative clause.

7.3.2 Short sentences

The mobile ICT should use short sentences of no more than 15 words.

NOTE 1: Related usage needs: Recognizing written language, Comprehending written language, Understanding spoken language.

NOTE 2: Sources: ISO/DIS 9241-112 [i.23], [i.10], [i.12], [i.15], [i.18] and [i.58].

NOTE 3: Comprehension in English decreases dramatically when sentence length exceeds 12 words. Sentences used in instructions are understood best if they are shorter than eight words.

EXAMPLE: Short, concise sentences leave out superfluous details and filler words.

7.3.3 Essential information

The mobile ICT should not leave out important words in order to keep sentences short.

NOTE: Related usage needs: Recognizing written language, Comprehending written language, Understanding spoken language.

EXAMPLE: To avoid misinterpretation, important words are repeated even if the resulting text may appear repetitive.

7.3.4 Consistent grammar

The mobile ICT should use a grammar that is consistent for similar items of information.

NOTE 1: Related usage needs: Recognizing written language, Comprehending written language, Understanding spoken language.

NOTE 2: Source: ISO/DIS 9241-112 [i.23].

NOTE 3: Grammatical format includes verb tense, sentence structure, etc.

EXAMPLE: In the user interface of a software, actions (e.g. "open", "print") are always referred to using the imperative. Contractions are either used or avoided (see also clause 7.5.3).

7.3.5 Simple sentence structure

The mobile ICT should use a simple sentence structure (subject, verb, object) with subjects and objects kept close to their verbs.

NOTE 1: Related usage needs: Recognizing written language, Comprehending written language, Understanding spoken language.

NOTE 2: Source: [i.10].

7.3.6 Preferred sentence structure

The mobile ICT should use sentences with a structure that follows the preferred ordering of the language being used.

NOTE 1: Related usage needs: Recognizing written language, Comprehending written language, Understanding spoken language.

NOTE 2: Source: ISO/DIS 9241-112 [i.23].

EXAMPLE: In several languages (English included) the ordering of subject - verb - object improves readability. Some languages have different preferred sentence structures (e.g. verb - subject - object in Arabic).

7.3.7 Variation in sentence length and structure

The mobile ICT should vary sentence length and sentence structure in order to keep the text interesting.

NOTE 1: Related usage needs: Focusing attention, Comprehending written language, Understanding spoken language.

NOTE 2: Sources: [i.11] and [i.18].

NOTE 3: This guideline does not improve legibility for all people with cognitive impairments. In some cases, repetition and/or monotonous sentence lengths and structure are better than variety.

7.3.8 Relative clauses

The mobile ICT should avoid more than one relative clause per sentence.

NOTE 1: Related usage needs: Recognizing written language, Comprehending written language, Understanding spoken language.

NOTE 2: Source: [i.26].

7.3.9 Nested sentences

The mobile ICT should avoid nested sentences.

NOTE 1: Related usage needs: Recognizing written language, Comprehending written language, Understanding spoken language.

NOTE 2: Source: [i.27].

NOTE 3: This is a more frequent problem in some languages than in others.

NOTE 4: It is a good strategy to divide a nested sentence into multiple simple sentences.

EXAMPLE: "The patient who the nurse who the clinic had hired admitted met Jack". Better is "Jack met the patient who was admitted by the nurse who the clinic had hired", or "The clinic hired the nurse. The nurse admitted the patient to the clinic. Jack met the patient".

7.3.10 Position of modal and auxiliary verbs

The mobile ICT should avoid sentence constructions that remove an auxiliary or modal verb too far from the main verb.

NOTE 1: Related usage needs: Recognizing written language, Comprehending written language, Understanding spoken language.

NOTE 2: This is a more frequent problem in some languages than in others.

EXAMPLE: The following is an example of a sentence that fails this guideline: "The cable must always - with the exception of the cases described in chapter 15 - be connected with the server."

7.3.11 Active voice

The mobile ICT should employ active voice in its texts and messages.

NOTE 1: Related usage needs: Recognizing written language, Comprehending written language, Understanding spoken language.

NOTE 2: Sources: [i.10], [i.11], [i.16] and [i.17].

NOTE 3: In addition to being easier to understand, active voice is the best way to identify who is responsible for what action.

EXAMPLE: "Remove lid" as opposed to "The lid has to be removed".

7.3.12 Present tense

The mobile ICT should, wherever possible, express text in present tense.

NOTE 1: Related usage needs: Recognizing written language, Comprehending written language, Understanding spoken language.

NOTE 2: Source: [i.10].

NOTE 3: A document written in present tense appears for many readers as immediate and less complicated.

7.4 Semantics

7.4.1 Concrete and specific wording

The mobile ICT should formulate instructions and descriptions in concrete and specific wording that avoids ambiguous phrasing.

NOTE 1: Related usage needs: Recognizing written language, Comprehending written language, Understanding spoken language.

NOTE 2: Sources: [i.10], [i.21] and [i.58].

NOTE 3: Short, simple words are concrete instead of abstract. In the case of the English language, the Saxon word is preferred to the Romance word.

EXAMPLE: "help" instead of "assist"; "youths" instead of "adolescents"; "try" instead of "attempt"; "find out" instead of "ascertain"; "show" instead of "exhibit".

7.4.2 Figurative language

The mobile ICT should not include text that uses figurative language.

NOTE 1: Related usage needs: Recognizing written language, Comprehending written language, Understanding spoken language.

NOTE 2: Sources: [i.49], [i.50], [i.51], [i.52] and [i.53].

NOTE 3: Figurative language is language that uses words or expressions with a meaning that is different from the literal interpretation. Figurative language includes, but is not limited to, metaphor, sarcasm, simile, personification, hyperbole, symbolism, idioms, and cliché.

EXAMPLE: "I've told you a million times to clean your room!", "The sun is like a yellow ball of fire in the sky", "You are what you eat", "busy as a bee" are a few of the many examples of figurative language in common usage.

NOTE 4: Some users, particularly those on the autism spectrum, will have difficulty with figurative language as they will try to interpret it literally. This will frequently lead to the user failing to comprehend the intended meaning and may instead act as a source of stress and confusion.

7.4.3 Terminology of the user

The mobile ICT should present information using terminology and language from the user's domain of expertise.

NOTE 1: Related usage needs: Recognizing written language, Comprehending written language, Understanding spoken language.

NOTE 2: Source: ISO/DIS 9241-112 [i.23].

NOTE 3: In some cases, it is not possible to change a technical and/or foreign word for another with the same meaning. In those cases, the guideline in clause 7.4.6 applies.

7.4.4 Consistent terminology

The mobile ICT should use a terminology that is consistent throughout the interactive system.

NOTE 1: Related usage needs: Recognizing written language, Comprehending written language, Understanding spoken language.

NOTE 2: Sources: ISO/DIS 9241-112 [i.23], [i.10], [i.11], [i.12], [i.13], [i.14], [i.15], [i.16], [i.17] and [i.18].

NOTE 3: This includes terminology for object names, classes of objects, actions and events, command / control names, control options and attributes, abbreviations, instructions and prompts, feedback and error messages, and status reports.

7.4.5 Avoidance of novel or proprietary terms

The mobile ICT should avoid novel or proprietary terms, wherever possible.

NOTE 1: Related usage needs: Recognizing written language, Comprehending written language, Understanding spoken language.

NOTE 2: Sources: [i.10], [i.12], [i.13] and [i.14].

NOTE 3: Some widely used terms, e.g. those depicting a type of technology or functionality (e.g. Bluetooth™) cannot be avoided, as using alternative terms may lead to confusion.

7.4.6 Explaining novel or proprietary terms

The mobile ICT should define novel or proprietary terms prominently and early in the text or application.

NOTE 1: Related usage needs: Recognizing written language, Comprehending written language, Understanding spoken language.

NOTE 2: Sources: [i.10], [i.12], [i.13] and [i.14].

EXAMPLE: Novel and proprietary terms used in a software product are defined and explained in the help function and the user guide of the product.

7.4.7 Avoidance of jargon or specialist language

The mobile ICT should avoid technical jargon and specialist language.

NOTE 1: Related usage needs: Recognizing written language, Comprehending written language, Understanding spoken language.

NOTE 2: Sources: [i.10], [i.12], [i.13] and [i.14].

7.5 Orthography and abbreviations

7.5.1 Consistent spelling

The mobile ICT should apply consistent spelling rules throughout the documentation and application.

NOTE 1: Related usage needs: Recognizing written language, Comprehending written language.

NOTE 2: Spelling rules are best defined in the form of a style guide or terminology that applies to all developers and authors of the documentation (including the specification of national or regional spelling rules and the application of the use of punctuation marks).

7.5.2 Full word labels

The mobile ICT should provide full word labels instead of acronyms or initials.

NOTE 1: Related usage needs: Recognizing written language, Comprehending written language, Understanding spoken language.

NOTE 2: Source: ETSI EG 202 116 [i.2].

7.5.3 Contractions and abbreviations

The mobile ICT should avoid contractions and abbreviations.

NOTE 1: Related usage needs: Recognizing written language, Comprehending written language, Understanding spoken language.

NOTE 2: Sources: [i.15], [i.16], [i.17], [i.18] and [i.58].

NOTE 3: Some sources may recommend the use of contractions and abbreviations to improve readability for the general audience, but they have negative effects for some users with cognitive impairments.

EXAMPLE: "Do not" instead of "don't", "for example" instead of "e.g.".

7.5.4 Meaning of abbreviations and symbols

The mobile ICT should make clear to the user the meaning of abbreviations, acronyms and symbols.

NOTE 1: Related usage needs: Recognizing written language, Comprehending written language, Understanding spoken language.

NOTE 2: Source: ISO/DIS 9241-112 [i.23].

NOTE 3: This can involve ensuring that common conventions familiar to the intended user group are used.

EXAMPLE 1: The first time an acronym is used in a large piece of text where it will be used repeatedly, it is preceded in the text by the complete set of words that it represents.

EXAMPLE 2: Positioning the mouse over an acronym found in a displayed text has the system present the complete set of words that it represents.

7.6 Style / use of words

7.6.1 Labels for action controls

Where the mobile ICT presents controls that initiate actions, the mobile ICT should begin their labels with a verb that unambiguously represents the outcome of the command to be performed by activating the control.

NOTE 1: Related usage needs: Comprehending written language, Understanding spoken language.

NOTE 2: Source: ISO/DIS 9241-112 [i.23].

NOTE 3: This guideline is language-dependant (it is applicable to occidental languages such as English, Spanish, and Russian).

EXAMPLE: Examples of controls that initiate actions are command buttons and menu items that initiate actions ("Send", "Save", etc.).

7.6.2 Consistent verb forms

The mobile ICT should use verb forms consistently.

NOTE: Related usage needs: Recognizing written language, Comprehending written language, Understanding spoken language.

EXAMPLE: Either imperatives or infinitives are acceptable forms for instructions, but mixing the two forms makes it less easy to distinguish an instruction from other text.

7.6.3 Labels for controls leading to objects

Where the mobile ICT presents controls that lead to objects, the mobile ICT should use in their labels nouns and suitable modifiers that unambiguously identify the object represented.

NOTE 1: Related usage needs: Comprehending written language, Understanding spoken language.

NOTE 2: Source: ISO/DIS 9241-112 [i.23].

NOTE 3: This guideline is language-dependant (it is applicable to occidental languages such as English, Spanish, and Russian).

EXAMPLE: An example of a control leading to an object is a button labelled "My profile", which leads to a screen where the user can see the information of their profile.

7.6.4 Labels for choices representing states

Where the mobile ICT presents choices that represent states, the mobile ICT should label these choices using adjectives that unambiguously represent the state.

NOTE 1: Related usage needs: Comprehending written language, Understanding spoken language.

NOTE 2: Source: ISO/DIS 9241-112 [i.23].

NOTE 3: This guideline is language-dependant.

7.6.5 Verbal style

The mobile ICT should employ a verbal style in its texts and messages, as opposed to a nominal style.

NOTE 1: Related usage needs: Recognizing written language, Comprehending written language, Understanding spoken language.

NOTE 2: Sources: [i.11] and [i.58].

NOTE 3: In verbal style, verbs - not nouns - carry the weight of the sentence.

EXAMPLE: "The phone works in an easy way" (verbal style) instead of "The functioning of the phone is easy" (nominal style), or "Draft regulations to protect the rights of laboratory animals" (verbal style) instead of "Draft laboratory animal rights protection regulation" (nominal style).

7.6.6 Articles and relative pronouns

The mobile ICT should use articles and relative pronouns where required.

NOTE: Related usage needs: Recognizing written language, Comprehending written language, Understanding spoken language.

EXAMPLE: "Insert the USB stick into a free USB port" rather than "Insert USB stick into free USB port".

7.6.7 Avoidance of pronouns

The mobile ICT should avoid the use of pronouns.

NOTE 1: Related usage needs: Recognizing written language, Comprehending written language, Understanding spoken language.

NOTE 2: Source: [i.10].

EXAMPLE: "Remove the wrapping from the CD-ROM and insert the CD-ROM into the CD drive" as opposed to "Remove the wrapping from the CD-ROM and insert it into the CD drive".

7.6.8 Use of pronouns

The mobile ICT should use pronouns in such a way that they clearly refer to a specific noun (if using pronouns cannot be avoided altogether).

NOTE 1: Related usage needs: Comprehending written language, Understanding spoken language.

NOTE 2: Source: [i.10].

EXAMPLE: "After the Administrator appoints an Assistant Administrator, he or she assigns ..." Better: "After the Administrator appoints an Assistant Administrator, the Assistant Administrator assigns ...".

7.6.9 Use of conjunctions

The mobile ICT should use conjunctions (but, as, because, since) to connect subsequent sentences related to the same topic.

NOTE: Related usage needs: Recognizing written language, Comprehending written language, Understanding spoken language.

7.6.10 Use of "must"

The mobile ICT should use the word "must" to indicate requirements.

NOTE 1: Related usage needs: Comprehending written language, Understanding spoken language.

NOTE 2: Sources: [i.10] and [i.58].

NOTE 3: The word "must" conveys that the reader has to do something.

EXAMPLE: "You must insert the SIM card before turning on the phone for the first time."

7.6.11 Cultural conventions and language styles

The mobile ICT should use language that respects cultural conventions and language styles.

NOTE 1: Related usage needs: Recognizing written language, Comprehending written language, Understanding spoken language.

NOTE 2: Culturally sensitive issues include referring to body parts (e.g. depicting lips to denote a "mute" function or potentially provocative date examples (e.g. 4th of July).

7.6.12 Simple paragraph structure

The mobile ICT should use paragraphs of no more than five sentences.

NOTE 1: Related usage needs: Recognizing written language, Comprehending written language, Understanding spoken language.

NOTE 2: Source: [i.48].

7.6.13 Use of paragraphs to clarify logic

The mobile ICT should employ paragraphs to clarify the logic of the text and of the issue that is being described.

NOTE: Related usage needs: Recognizing written language, Comprehending written language.

7.6.14 One topic per paragraph

The mobile ICT should limit each paragraph to one topic.

NOTE 1: Related usage needs: Recognizing written language, Comprehending written language, Understanding spoken language.

NOTE 2: Source [i.10] and [i.14].

7.6.15 Topic of paragraph

The mobile ICT should let every paragraph begin with a sentence that introduces the topic of the paragraph.

NOTE 1: Related usage needs: Recognizing written language, Comprehending written language, Understanding spoken language.

NOTE 2: Source [i.11].

7.6.16 Simple instructions

The mobile ICT should describe only one instruction per sentence, except when two things have to be done simultaneously.

NOTE: Related usage needs: Comprehending written language, Understanding spoken language.

7.6.17 Consistent structures for instructions

The mobile ICT should use one consistent way of structuring instructions to facilitate comprehension.

NOTE: Related usage needs: Comprehending written language, Understanding spoken language.

EXAMPLE: In the online help for a software, all instructions are structured in the same way (e.g. preconditions, step 1, step 2, results).

7.7 Addressing the audience

7.7.1 Suitable level of formality for the audience

The mobile ICT should choose the right level of formality for the target audience.

NOTE 1: Related usage needs: Comprehending written language, Understanding spoken language.

NOTE 2: Sources: [i.11] and [i.13].

NOTE 3: This guideline is particularly relevant for languages with formal and informal personal pronouns.

NOTE 4: Not all languages differentiate between formal and informal addressing.

EXAMPLE: "Vous pouvez ..." vs. "Tu peux ..."; "Sie können ..." vs. "Du kannst ...".

7.7.2 Direct addressing of readers

The mobile ICT should address users / readers directly as opposed to using descriptive language.

NOTE 1: Related usage needs: Comprehending written language, Understanding spoken language.

NOTE 2: Sources: [i.10], [i.11], [i.12] and [i.16].

NOTE 3: Addressing the readers directly (e.g. "You can ...") engages them directly and lets them know what they are expected to do.

NOTE 4: In a question-and-answer type of format, the readers can be referred to by "I" (e.g. "What information do I have ready when setting up the new service?").

EXAMPLE: "You can store up to 3 000 addresses in the phone's address book" rather than "Up to 3 000 addresses can be stored in the phone's address book".

7.7.3 Addressing readers as individuals

The mobile ICT should address the reader as one person and not as a group, wherever possible.

NOTE 1: Related usage needs: Comprehending written language, Understanding spoken language.

NOTE 2: Sources: [i.10], [i.11], [i.12] and [i.16].

NOTE 3: This helps preventing confusion about whether a statement applies to the individual reader or not.

7.8 Presentation of language

7.8.1 Font size

The mobile ICT should enable the user to resize text up to 200 percent without loss of content or functionality and without using assistive technology.

NOTE 1: Related usage needs: Recognizing written language.

NOTE 2: Sources [i.14], [i.16], [i.17], [i.18] and [i.44].

NOTE 3: Recommendations related to printed text suggest that fonts up to 18 pt may help reading speed and comprehension for some people. The magnification range suggested in this guideline should allow a similarly large font to be achieved on screen fonts.

NOTE 4: Other platform-level magnification capabilities may allow non-text user interface elements to be magnified.

7.8.2 Font type

The mobile ICT should use frequently used fonts.

NOTE 1: Related usage needs: Recognizing written language.

NOTE 2: Source: [i.44].

NOTE 2: Examples of frequently used font types are the standard fonts of the operating system.

NOTE 3: Some sources (e.g. [i.14], [i.16], [i.17] and [i.18]) recommend using sans-serif fonts.

EXAMPLE: Using Arial or Helvetica fonts as they are frequently encountered in widely available operating systems.

7.8.3 Character stroke thickness

The mobile ICT should use fonts without variation in character stroke thickness (i.e. without differences in weight within the strokes).

NOTE 1: Related usage needs: Recognizing written language.

NOTE 2: Fonts with variation in character stroke thickness may be more difficult to read for people with cognitive impairments.

7.8.4 Italics

The mobile ICT should avoid presenting text in italics.

NOTE 1: Related usage needs: Recognizing written language.

NOTE 2: Sources: [i.16] and [i.44].

NOTE 3: Boldface is better suited for highlighting than italics ([i.44]).

7.8.5 Text colour contrast

The mobile ICT should present text with a contrast ratio of at least 7:1 between the foreground and background colours.

NOTE 1: Related usage needs: Recognizing written language.

NOTE 2: Sources: WCAG 2.0 [i.19] and [i.47].

NOTE 3: Good colour contrast enhances readability for everyone, including persons with limited ability to recognize written characters and words. Some authors claim that too much contrast (i.e. 100 % black text over 100 % white background) reduces readability, but there is no scientific evidence of this fact [i.44].

7.8.6 Line spacing

The mobile ICT should present text with a line spacing of at least 1.3.

NOTE 1: Related usage needs: Recognizing written language.

NOTE 2: Sources: [i.12], WCAG 2.0 [i.19] and [i.44].

NOTE 3: Some sources recommend a minimum line spacing of 1.5.

7.8.7 Headings and subheadings

The mobile ICT should use headings and subheadings in texts in order to structure the information.

NOTE 1: Related usage needs: Recognizing written language, Comprehending written language.

NOTE 2: Sources: [i.14], [i.16] and [i.17].

7.8.8 Bullet points and numbered lists

The mobile ICT should use lists of bullet points (or numbered lists) to separate and structure information, wherever suitable.

NOTE 1: Related usage needs: Recognizing written language, Comprehending written language.

NOTE 2: Sources: [i.14], [i.17] and [i.18].

7.8.9 Numerals

The mobile ICT should express numerals in integral digits, not in words.

NOTE 1: Related usage needs: Recognizing written language, Comprehending written language, Understanding simple maths.

NOTE 2: Sources: [i.12], [i.16] and [i.17].

EXAMPLE: Write "8", not "eight".

7.8.10 Long numerals

The mobile ICT should express long numerals in both numbers and words.

NOTE 1: Related usage needs: Recognizing written language, Comprehending written language, Understanding simple maths.

NOTE 2: Source: [i.45].

EXAMPLE: Write "219 895 (two hundred nineteen thousand eight hundred ninety five)".

7.8.11 Roman numbers

The mobile ICT should not express numerals using roman numbers.

NOTE 1: Related usage needs: Recognizing written language, Comprehending written language, Understanding simple maths.

NOTE 2: Source: [i.45].

NOTE 3: Roman numbers are slower and more difficult to read than Arabic numbers.

EXAMPLE: Write "21" not "XXI".

7.8.12 Fractions

The mobile ICT should express fractions using words, not numbers.

NOTE 1: Related usage needs: Recognizing written language, Comprehending written language, Understanding simple maths.

NOTE 2: Source: [i.45].

EXAMPLE: Write "three quarters" not "3/4".

7.8.13 Consistent units of measurement

The mobile ICT should use units of measurement that are consistent within the interactive system, and where they can change, the mobile ICT should apply the change throughout the interactive system.

NOTE 1: Related usage needs: Recognizing written language, Comprehending written language, Calculating, Understanding simple maths, Understanding spoken language.

NOTE 2: Source: ISO/DIS 9241-112 [i.23].

EXAMPLE: A weather forecast application uses the same unit of measure (centigrade degrees) across all screens. The user can change the unit of temperature to Fahrenheit degrees, and the application applies the change to all the screens in the application. Even smarter applications will align their units with those already preselected in the device.

7.8.14 Display of calendar dates in long form

The mobile ICT should enable the expression of calendar dates in a long form.

NOTE 1: Related user needs: Recognizing written language, Comprehending written language, Calculating, Understanding simple maths.

NOTE 2: Source: [i.60].

NOTE 3: In some contexts, adding the weekday ("Monday 1st June, 2013") may further improve the understanding of calendar dates.

NOTE 4: The different ways of expressing calendar dates in the USA and the U.K. (MM/DD/YYYY vs DD/MM/YYYY) adds to the complexity of interpreting a calendar date in abbreviated form.

EXAMPLE: 01.06.2015 is expressed as June 1st, 2015, or 1st June, 2015.

8 Guidelines specific to mobile ICT with two-way voice communication

8.1 General

This clause corresponds to the "ICT with two-way voice communication" clause 6 in ETSI EN 301 549 [i.6]. The guidelines in this clause apply where the ICT provides two-way voice or video communication.

8.2 Guidelines

8.2.1 Alternatives to voice-based services

The mobile ICT should offer users a means to access information and carry out tasks provided by voice-based services without them having to understand spoken language or provide spoken input.

NOTE 1: Related usage needs: Receiving spoken language, Understanding spoken language, Speaking.

NOTE 2: Source: ETSI EN 301 549 [i.6].

EXAMPLE 1: Examples of voice-based services are: voice mail, auto-attendant and interactive voice response facilities.

EXAMPLE 2: Solutions capable of handling text- or symbol-based communication could satisfy this guideline.

8.2.2 Alternatives to video-based services

The mobile ICT should offer users a means to access information and carry out tasks related to video-based services:

- a) for audible information, without them having to understand spoken language;
- b) for spoken commands, without them having to provide spoken input;
- c) for visual information, without them having to understand visual information.

NOTE 1: Related usage needs: Receiving spoken language, Understanding spoken language, Understanding body gestures, Understanding symbols, Understanding drawings and photographs, Speaking.

NOTE 2: Source: ETSI EN 301 549 [i.6].

EXAMPLE 1: Examples of video-based services are: answering machine, auto attendant or interactive response facilities.

EXAMPLE 2: Solutions capable of generating real-time captions or handling real-time text could satisfy the above guideline.

8.2.3 Text messaging for asynchronous chat

The mobile ICT should allow the use of asynchronous chat via text messaging.

NOTE 1: Related usage needs: Shifting attention, Recognizing written language, Comprehending written language, Writing correctly, Producing written language, Recalling from short-term memory.

NOTE 2: Source: [i.38].

NOTE 3: This guideline also addresses ICF activities: d 350 "Conversation", d 355 "Discussion", d 360 "Using communication devices and techniques".

NOTE 4: Some people with ASD (including Asperger Syndrome) find synchronous communication difficult due to the complex social cues; asynchronous chat via text messaging can be used discreetly.

8.2.4 Photo-based call directory

The mobile ICT should allow accessing a phone call directory based on contacts' photo and accessing contacts through images.

NOTE 1: Related usage needs: Reading, Recognizing written language, Comprehending written language, Recalling from long-term memory.

NOTE 2: Source: see [i.34].

NOTE 3: Informal observations suggested that photos increased response speed and certainty.

EXAMPLE: A user accesses the contact details of an individual via the photo library of the mobile phone or based on the photo associated with that individual.

9 Guidelines specific to mobile ICT with media playing and recording capabilities

9.1 General

This clause corresponds to the ICT with video capabilities clause 7 in ETSI EN 301 549 [i.6].

9.2 Guidelines

9.2.1 Always visible playback controls

The mobile ICT should make the main media playback controls (play, pause and stop) always visible.

NOTE 1: Related usage needs: Making choices, Interpreting effects of choices, Initiating a task, Carrying out a task, Completing a task, Managing time, Adapting to time demands, Recalling from long-term memory.

NOTE 2: Media players that hide playback controls until a user taps on the screen are confusing for some users with cognitive impairments, because it is difficult for them to know if they can control the playback and how they can control it.

10 Guidelines specific to hardware of mobile ICT

10.1 General

This clause corresponds to the "Hardware" clause 8 in ETSI EN 301 549 [i.6].

10.2 Guidelines

10.2.1 Standard connections

The mobile ICT should provide at least one input and/or output connection that conforms to an industry standard non-proprietary format, directly or through the use of commercially available adapters.

NOTE 1: Related usage needs: Reading, Writing, Making choices, Understanding symbols, Speaking, Recalling from long-term memory.

NOTE 2: Source: ETSI EN 301 549 [i.6].

NOTE 3: The intent of this guideline supports people who do not understand or cannot easily recognize how to connect an external device to the mobile ICT.

NOTE 4: The word connection applies to both physical and wireless connections.

EXAMPLE: Current examples of industry standard non-proprietary formats are USB and Bluetooth.

10.2.2 Symmetrical connections

The mobile ICT should provide at least one symmetrical physical connection point.

NOTE 1: Related usage needs: Reading, Making choices, Understanding symbols, Recalling from long-term memory.

NOTE 2: The intent of this guidelines is to enable the users to easily connect hardware, without worrying about the orientation of the connectors and the ICT.

NOTE 3: The symmetrical physical connection point can be provided directly or through the use of a commercially available adapter.

EXAMPLE: One example of an industry standard non-proprietary symmetrical connector is USB-C.

10.2.3 Discernibility of touch controls

The mobile ICT should provide a mode of operation where the user can discern touch controls in two or more modalities and without performing the action associated with the touch controls.

NOTE 1: Related usage needs: Making choices, Interpreting effects of choices, Initiating a task, Carrying out a task, Completing a task, Understanding symbols, Recalling from long-term memory.

NOTE 2: Some users with cognitive impairments can accidentally activate non-touch touch controls that are not easy to discern and understand before activating them.

EXAMPLE: A touch control has an optional activation mode based on two touches. The first touch identifies the touch control by voice and visually. The second touch activates the function of the touch control.

10.2.4 Low-reflectance screens

The mobile ICT should have a low-reflectance screen to avoid glare that may obscure text and essential user interface components.

NOTE 1: Related usage needs: Focusing attention, Directing attention, Shifting attention, Reading, Recognizing written language, Comprehending written language, Understanding body gestures, Understanding symbols, Understanding drawings and photographs.

NOTE 2: Source: [i.28].

NOTE 3: Reflections can be distracting.

NOTE 4: Some of the effects of reflectance may be minimized by increasing screen brightness, but this will not compensate for high screen reflectance when the mobile ICT is used in bright ambient light.

EXAMPLE: Glossy screens make it difficult for users to understand visuals especially in areas that are exposed to large quantities of sunlight.

11 Guidelines specific to the mobile Web

This clause corresponds to the "Web" clause 9 in ETSI EN 301 549 [i.6].

If the mobile ICT is an application developed using web technologies, then the guidelines in clause 12 apply.

If the ICT is a web page that can be presented on mobile devices, then the webpage should follow the W3C guidelines on web content [i.19].

NOTE: There is a W3C Cognitive and Learning Disabilities Accessibility Task Force (Mobile A11y TF) [i.61] addressing the accessibility of mobile web content and applications.

12 Guidelines specific to mobile software

12.1 General

This clause corresponds to the "Software" clause 11 in ETSI EN 301 549 [i.6]. Clauses 12.2 to 12.10 contain guidelines that address the user needs identified in ETSI TR 103 349 [i.8] and listed in Annex A of the present document. The guidelines are subdivided into clauses that correspond to the accessibility principles taken from Guide 71 [i.43] plus two additional principles taken from ISO 9241-110 [i.22] and ISO/DIS 9241-112 [i.23].

12.2 Conformity with user expectations

12.2.1 On focus

The mobile ICT should not initiate a change of context when a component receives focus.

NOTE 1: Related usage needs: Shifting attention, Making choices, Interpreting effects of choices, Initiating a task, Carrying out a task, Completing a task.

NOTE 2: Source: ETSI EN 301 549 [i.6].

NOTE 3: Some compound documents and their user agents are designed to provide significantly different viewing and editing functionality depending upon what portion of the compound document is being interacted with (e.g. a presentation that contains an embedded spreadsheet, where the menus and toolbars of the user agent change depending upon whether the user is interacting with the presentation content, or the embedded spreadsheet content). If the user uses a mechanism other than putting focus on that portion of the compound document with which they mean to interact (e.g. by a menu choice or special keyboard gesture), any resulting change of context would not be subject to this success criterion because it was not caused by a change of focus.

NOTE 4: This guideline corresponds to WCAG 2.0 [i.19], Success Criterion 3.2.1 On focus.

NOTE 5: This Success Criterion helps people with visual impairments, cognitive limitations, and motor impairments by reducing the chance that a change of context will occur unexpectedly [i.20].

12.2.2 On input

The mobile ICT should not automatically change the context when the user changes the setting of any user interface component, unless the user has been advised of the behaviour before using the component.

NOTE 1: Related usage needs: Shifting attention, Making choices, Interpreting effects of choices, Initiating a task, Carrying out a task, Completing a task.

NOTE 2: Source: ETSI EN 301 549 [i.6].

NOTE 3: This guideline corresponds to WCAG 2.0 [i.19], Success Criterion 3.2.2 On input.

NOTE 4: This Success Criterion helps users with disabilities by making interactive content more predictable. Unexpected changes of context can be so disorienting for users with visual disabilities or cognitive limitations that they are unable to use the content [i.20].

NOTE 5: Some individuals with low vision, with reading and intellectual disabilities, and others who have difficulty interpreting visual cues can benefit from additional cues in order to detect changes of context [i.20].

12.2.3 Consistent attributes

Where the software uses attributes to encode properties of pieces of information, the software should use these attributes consistently throughout the interactive system.

NOTE 1: Related usage needs: Recognizing written language, Comprehending written language, Making choices, Interpreting effects of choices, Initiating a task, Carrying out a task, Completing a task, Understanding spoken language, Understanding symbols, Understanding drawings and photographs, Recalling from long-term memory.

NOTE 2: Source: [i.32].

NOTE 3: These attributes include: data formats, visual locations, shapes, sizes, colours, fonts (including variations such as bold and italics), capitalization, etc.; auditory order of presentation, volumes, tones, frequencies, etc.; tactile locations, shapes, vibrations, pressures, etc.

12.2.4 Consistent gestures

The mobile ICT should use gestures whose meaning is consistent throughout the interactive system.

NOTE 1: Related usage needs: Making choices, Interpreting effects of choices, Initiating a task, Carrying out a task, Completing a task, Understanding body gestures, Producing gestures, Recalling from long-term memory.

NOTE 2: Source: ISO/DIS 9241-112 [i.23].

12.2.5 Consistent behaviour

The user interface elements should demonstrate a consistent behaviour throughout the interactive system.

NOTE 1: Related usage needs: Making choices, Interpreting effects of choices, Initiating a task, Carrying out a task, Completing a task, Recalling from long-term memory.

NOTE 2: Source: ISO/DIS 9241-112 [i.23].

12.2.6 Consistent layout

The mobile ICT should use relative positioning and layout of user interface elements that are consistent throughout the interactive system.

NOTE 1: Related usage needs: Recognizing written language, Comprehending written language, Making choices, Interpreting effects of choices, Initiating a task, Carrying out a task, Completing a task, Understanding spoken language, Understanding symbols, Understanding drawings and photographs, Recalling from long-term memory.

NOTE 2: Source: ISO/DIS 9241-112 [i.23].

12.2.7 Consistent individualization

The mobile ICT should apply individualization actions with a behaviour that is consistent throughout the interactive system.

NOTE 1: Related usage needs: Making choices, Interpreting effects of choices, Initiating a task, Carrying out a task, Completing a task, Recalling from long-term memory.

NOTE 2: Source: ISO/DIS 9241-112 [i.23].

12.2.8 Platform conventions

The mobile ICT should follow the platform conventions for information presentation.

NOTE 1: Related usage needs: Recognizing written language, Comprehending written language, Making choices, Interpreting effects of choices, Initiating a task, Carrying out a task, Completing a task, Understanding spoken language, Understanding symbols, Understanding drawings and photographs, Recalling from long-term memory.

NOTE 2: Adapted from: [i.32].

12.2.9 Breaking platform conventions

The mobile ICT should notify the user if it is breaking with platform conventions.

NOTE 1: Related usage needs: Recognizing written language, Comprehending written language, Making choices, Interpreting effects of choices, Initiating a task, Carrying out a task, Completing a task, Understanding spoken language, Understanding symbols, Understanding drawings and photographs, Recalling from long-term memory.

NOTE 2: Adapted from: [i.32].

12.2.10 Respecting users' intentions

The mobile ICT should respect users' intentions and not try to make them have outcomes that they neither requested nor expected.

NOTE 1: Related usage needs: Recognizing written language, Comprehending written language, Making choices, Interpreting effects of choices, Understanding spoken language, Understanding symbols, Understanding drawings and photographs.

NOTE 2: The use of "dark patterns" [i.56] is unethical and against the interests of all users. However, users with cognitive impairments are less likely to be able to identify these "dark patterns" and thus realize that they are being tricked into something that they neither requested nor expected. They will therefore be disproportionately more likely to be adversely affected.

EXAMPLE: If the default quantity in an order form is not what a user would normally expect (one in most cases) or if the quantity in the final order is greater than the value that was shown when the user pressed "Order", then the user will not get what they requested or expected and this guideline will not have been followed.

12.2.11 Maintaining privacy and security

The mobile ICT should ensure that personally identifiable information that is used to improve cognitive accessibility is not used for other purposes that may directly or indirectly compromise the user's privacy or security.

NOTE 1: Related usage needs: Making choices, Interpreting effects of choices.

NOTE 2: Some users with cognitive impairments will be unable to make appropriate judgements about levels of privacy and security risk. This makes it important that the mobile ICT minimizes security and privacy risks on the user's behalf.

12.2.12 Non-threatening user interfaces

The mobile ICT should employ user interface designs that are as non-threatening as possible.

NOTE 1: Related usage needs: Making choices, Interpreting effects of choices.

NOTE 2: Psychological barriers in a product or a service can exist in the form of threats that inhibit or prevent users from usage, or that harm self-determination, independence and satisfaction.

NOTE 3: Perceived barriers can exist as intrinsic feelings even when no physical threat exists. Some design patterns and shapes can be regarded as threatening by some users. The use of appropriate design, concepts and content can be used to build trust.

NOTE 4: Some examples of user interface design patterns that can be perceived as threatening include:

- the display of excessive information (in any modality) that can lead to sensory overload;
- certain types of sounds (e.g. continuous noises or beeps and buzzes);
- sharp angles and uncomfortable textures;
- user interface "anti-patterns" [i.57] will tend to undermine trust and increase the sense of threat.

12.3 Support for individualization

12.3.1 User-selectable options

The mobile ICT should enable the selection of preferences in at least one of the following four ways (in order of preference):

- 1) automatically, via a globally applicable individualization mechanism according to the preferences in a user's user profile;
- 2) automatically, via a service or device-specific individualization mechanism according to the preferences in a user's user profile;
- 3) by suggesting options to users as a result of observing user behaviours; or
- 4) by the user identifying and configuring settings in the "settings" page in one or more devices or services.

NOTE 1: Related usage needs: All usage needs.

NOTE 2: Sources: ETSI EG 202 325 [i.5], ETSI ES 202 746 [i.7] and ETSI TS 102 747 [i.9].

NOTE 3: Individualization is beneficial for all users as it allows them to adjust the user experience to better meet their preferences. However, it is especially beneficial when considering support for cognitive impairments as guidelines that are beneficial to some users who have specific user needs may actually impair the usability of the ICT for users who have very different user needs.

NOTE 4: Discovering and changing user-selectable options by means of "settings" pages is a challenging task for all users. Some users with cognitive impairments might find the task impossible.

EXAMPLE 1: The software might detect that the user is persistently having to re-enable full brightness after the software has dimmed the screen after a fixed period of inactivity. The software could offer to help the user to complete their task by significantly increasing the time period before the screen is dimmed. This is an example of how a user could be helped as a result of monitoring user behaviour.

EXAMPLE 2: An example of the third way of enabling the selection of preferences follows. A user is slowly reading a long document in a smartphone. In order to save battery, the phone is dimming the brightness of the screen every minute, and the user re-enables full brightness by touching the screen. After observing the user repeating this behaviour several times, the smartphone suggests the user an option to increase the timeout for reducing brightness.

12.3.2 Context sensitive individualization

The mobile ICT should enable the selection of those preferences that are consistent with the current context of use of the software.

NOTE 1: Related usage needs: All usage needs.

NOTE 2: Sources: ETSI EG 202 325 [i.5], ETSI ES 202 746 [i.7] and ETSI TS 102 747 [i.9].

NOTE 3: Most individualization mechanisms allow some degree of context-dependent individualization. The most sophisticated mechanisms put context at the centre of the individualization mechanism and allow for alternative sets of preferences to be applied to many aspects of the software behaviour according to the evaluation of the current context.

NOTE 4: Some users with cognitive impairments will be particularly sensitive to the need for the software to be configured to operate in a way that minimizes the impact of any aspects of the current context of use that are likely to interfere with the ability of the user to perform the required tasks with the software.

EXAMPLE 1: Two of the most common instances of context-sensitive individualization are when different settings are applied when the user is at a specific location or in a vehicle.

EXAMPLE 2: For users whose attention suffers in noisy environments, the mobile ICT could switch to a focus enhancing mode (e.g. applying some of the recommendations in clause 12.10.2 "Hiding non task-related content") if the ambient noise exceeds a threshold level.

12.3.3 Feedback modality selection

The mobile ICT should enable the user to select one or more modalities in which feedback and prompts should be provided.

NOTE 1: Related usage needs: Focusing attention, Directing attention, Shifting attention, Reading, Recognizing written language, Comprehending written language, Understanding simple maths, Making choices, Interpreting effects of choices, Initiating a task, Carrying out a task, Completing a task, Managing time, Adapting to time demands, Receiving spoken language, Understanding spoken language, Understanding body gestures, Understanding symbols, Understanding drawings and photographs.

NOTE 2: Sources: ETSI EG 202 325 [i.5], ETSI ES 202 746 [i.7] and ETSI TS 102 747 [i.9].

EXAMPLE: Multi-modal feedback can be a combination of auditory, visual and haptic (vibration, Braille, etc.) feedback depending on which feedback modalities the user has chosen to receive.

12.3.4 Input modality selection

The mobile ICT should enable the user to select one or more modalities for user input.

NOTE 1: Related usage needs: Writing, Writing correctly, Producing written language, Calculating, Initiating a task, Carrying out a task, Completing a task, Speaking, Producing gestures, Recalling from long-term memory.

NOTE 2: Sources: ETSI EG 202 325 [i.5], ETSI ES 202 746 [i.7] and ETSI TS 102 747 [i.9].

EXAMPLE: Multi-modal input can be a combination of typing, pen input, gestures and speech recognition.

12.3.5 Access to personal information

The mobile ICT should allow users to access their personal information and to copy and paste the results.

NOTE 1: Related usage needs: Writing, Writing correctly, Producing written language, Calculating, Carrying out a task, Completing a task, Managing time, Adapting to time demands, Recalling from long-term memory.

NOTE 2: Users with limited access to the long-term memory should be able to search for necessary information both in public and private data.

NOTE 3: Direct access to this and appropriate search engines should be direct on the user interface.

NOTE 4: Design guidelines dealing with the support of learning-related activities might be helpful for people with memory-related issues as well.

12.3.6 Behaviour-related warnings

The mobile ICT should be able to detect aberrations or abnormal patterns of activity based on the usage or location of the mobile device and trigger warnings that also propose appropriate ways to resolve the suspected problem.

NOTE 1: Related usage needs: Making choices, Interpreting effects of choices, Initiating a task, Carrying out a task, Completing a task, Managing time, Adapting to time demands.

NOTE 2: Sources: [i.29] and [i.35].

NOTE 3: This guideline also addresses ICF activity: d250 "Managing One's own Behaviour".

NOTE 4: This guideline provides support for persons who need assistance in managing their own behaviour.

NOTE 5: The warning may be sent to the mobile ICT user or to a person providing support to the user.

NOTE 6: An individualization setting could control the enabling or disabling of usage and location generated warnings.

EXAMPLE 1: A warning to the user is triggered when a user persistently and repeatedly presses a single button/key.

EXAMPLE 2: A warning is sent to a care giver when a user with dementia is wandering into unfamiliar locations.

12.4 Perceivability

12.4.1 Setting attention on important information

The mobile ICT should set the focus of attention on important information.

NOTE 1: Related usage needs: Focusing attention, Directing attention, Shifting attention, Recognizing written language, Comprehending written language, Making choices, Interpreting effects of choices, Understanding spoken language, Understanding body gestures, Understanding symbols, Understanding drawings and photographs.

NOTE 2: Source: ISO/DIS 9241-112 [i.23].

EXAMPLE 1: Important information is presented at the top centre of a page of visual information.

EXAMPLE 2: Important information is presented first in an audio announcement slowly and in easily understandable / acceptable languages of the users.

EXAMPLE 3: Important tactile/haptic information is presented using a higher intensity than less important information.

12.4.2 Presenting important information to stand out

The mobile ICT should present the most important information (including critical elements) to stand out from other presented items of information.

NOTE 1: Related usage needs: Focusing attention, Directing attention, Shifting attention, Recognizing written language, Comprehending written language, Making choices, Interpreting effects of choices, Understanding spoken language, Understanding body gestures, Understanding symbols, Understanding drawings and photographs.

NOTE 2: Source: ISO/DIS 9241-112 [i.23].

NOTE 3: The goal of this guideline is to secure the user's attention on important information.

EXAMPLE 1: Critical information is presented in larger, bold faced, visually contrasting text in a visual display.

EXAMPLE 2: Pauses are used to call attention to critical information in an audio announcement.

EXAMPLE 3: A special warning vibration precedes the presentation of critical information on a tactile/haptic display.

12.4.3 Highlighting of the currently spoken word

The mobile ICT should enable the user to activate a mode of operation in which the currently spoken word is highlighted when displayed text is also spoken.

NOTE 1: Related usage needs: Recognizing written language, Comprehending written language, Understanding spoken language, Recalling from short-term memory.

NOTE 2: Sources: [i.49], [i.50], [i.51], [i.52] and [i.53].

NOTE 3: Simultaneously presenting information in two modalities can significantly improve comprehension for some users.

12.4.4 Enabling repetition of information

The mobile ICT should enable the user to have information repeated.

NOTE 1: Related usage needs: Recognizing written language, Comprehending written language, Understanding spoken language, Recalling from short-term memory.

NOTE 2: Source: ISO/DIS 9241-112 [i.23].

EXAMPLE 1: The user can go back to a previous page of visual information.

EXAMPLE 2: The user can replay the last section of auditory information.

EXAMPLE 3: The user can replay the last sentence presented on a Braille display.

12.4.5 Interference with the presentation of important information

The mobile ICT should present information that is less important in a way that does not interfere with the presentation of important information.

NOTE 1: Related usage needs: Focusing attention, Directing attention, Shifting attention. Recognizing written language, Comprehending written language, Making choices, Interpreting effects of choices, Understanding spoken language, Understanding body gestures, Understanding symbols, Understanding drawings and photographs Recalling from short-term memory.

NOTE 2: Source: ISO/DIS 9241-112 [i.23].

EXAMPLE: Advertising material embedded in the main content is a major source of distraction.

12.4.6 Immediate response

The mobile ICT should respond within 0,1 seconds of a user input.

NOTE 1: Related usage needs: Focusing attention, Directing attention, Interpreting effects of choices, Carrying out a task, Completing a task, Managing time, Adapting to time demands.

NOTE 2: Source: ISO/DIS 9241-112 [i.23].

NOTE 3: The timing of the response can be influenced by connectivity delays.

NOTE 4: The minimum response is to acknowledge that the input has been entered. It is recognized that this type of response can precede other more complex responses.

EXAMPLE 1: Information entered into a field on a visual display appears as soon as it is received by the mobile ICT.

EXAMPLE 2: An audio sound is presented when information is received from the user by the mobile ICT.

EXAMPLE 3: A particular vibration pattern is presented when information is received from the user by the mobile ICT.

12.4.7 Busy indication

The mobile ICT should indicate when it is busy.

NOTE 1: Related usage needs: Focusing attention, Directing attention, Interpreting effects of choices, Carrying out a task, Completing a task, Managing time, Adapting to time demands.

NOTE 2: Source: ISO/DIS 9241-112 [i.23].

NOTE 3: It is helpful for this indication to include an estimate of the amount of time that the mobile ICT will remain busy, where such an estimate is possible.

NOTE 4: It is generally accepted that there is no need of indication if the time that the mobile ICT is busy is below 1 second [i.55].

EXAMPLE 1: The mobile ICT visually displays an hourglass to indicate that it is currently busy.

EXAMPLE 2: The mobile ICT produces a low volume hum to indicate that it is currently busy. The frequency of the hum increases as the estimated time that is remaining decreases.

EXAMPLE 3: The mobile ICT produces a low intensity vibration to indicate that it is currently busy. The frequency of the vibration increases as the estimated time that is remaining decreases.

12.4.8 Availability of frequent and critical controls

The mobile ICT should always make available the most frequent and critical controls.

NOTE 1: Related usage needs: Making choices, Initiating a task, Carrying out a task, Completing a task, Recalling from long-term memory.

NOTE 2: Source: ISO/DIS 9241-112 [i.23].

12.4.9 Occasional controls

The mobile ICT should hide controls that are only occasionally used and it should enable the user to get to them if needed.

NOTE 1: Related usage needs: Making choices, Initiating a task, Carrying out a task, Completing a task, Recalling from long-term memory.

NOTE 2: Source: ISO/DIS 9241-112 [i.23].

EXAMPLE 1: Controls not currently needed are removed from the visual display, but can be returned via a single control action.

EXAMPLE 2: Controls not currently needed are not listed in an audio menu, which also contains an option for presenting additional controls.

EXAMPLE 3: The user of a tactile device has the ability to use a single tactile control for multiple different control actions, depending on the current state of the device.

12.4.10 Non-allowed controls

The mobile ICT should hide the controls that the user is never allowed to use.

NOTE 1: Related usage needs: Making choices, Initiating a task, Carrying out a task, Completing a task, Recalling from long-term memory.

NOTE 2: Source: ISO/DIS 9241-112 [i.23].

NOTE 3: This can be done based on a various types of information including a user's current role, permissions, and/or profile.

EXAMPLE 1: Controls used only by administrators are not visually displayed to regular users.

EXAMPLE 2: Controls used only by administrators are not provided in an auditory menu to regular users.

EXAMPLE 3: States corresponding to different control actions that are only used by administrators cannot be entered by users of tactile devices.

12.4.11 Accessing non-presented parts of information

The mobile ICT should make the user aware that more information is available and describe how to access it when the mobile ICT is only presenting a part of a set of information or hiding some of the information.

NOTE 1: Related usage needs: Recognizing written language, Comprehending written language, Making choices, Understanding spoken language, Understanding body gestures, Understanding symbols, Understanding drawings and photographs, Recalling from short-term memory.

NOTE 2: Source: ISO/DIS 9241-112 [i.23].

EXAMPLE: A scroll bar on a visual display indicates that there is more information than is currently being displayed.

12.4.12 End of a set of information

The mobile ICT should make the user aware of the end of a set of information.

NOTE 1: Related usage needs: Recognizing written language, Comprehending written language, Making choices, Understanding spoken language, Understanding body gestures, Understanding symbols, Understanding drawings and photographs, Recalling from short-term memory.

NOTE 2: Source: ISO/DIS 9241-112 [i.23].

12.4.13 Multimodal feedback and prompts

The mobile ICT should be able to provide feedback and prompts in more than one modality at the same time.

NOTE 1: Related usage needs: Focusing attention, Directing attention, Shifting attention, Reading, Recognizing written language, Comprehending written language, Understanding simple maths, Making choices, Interpreting effects of choices, Initiating a task, Carrying out a task, Completing a task, Managing time, Adapting to time demands, Receiving spoken language, Understanding spoken language, Understanding body gestures, Understanding symbols, Understanding drawings and photographs.

NOTE 2: Source: ETSI EG 202 116 [i.2].

NOTE 3: Multi-modal feedback and prompts can be a combination of at least auditory, visual and haptic (vibration, Braille, etc.) depending on which modalities the user has chosen to receive.

EXAMPLE 1: When a user presses a physical key, the software generates a "tap" sound (auditory feedback) to supplement any visual and tactile feedback already provided by movement of the physical key.

EXAMPLE 2: When a user presses an on-screen key, the software generates a "tap" sound (auditory feedback) and a vibration (tactile feedback) to supplement any visual feedback already provided by the animation of the on-screen key.

12.4.14 Touchscreen vibration

The mobile ICT should be able to provide vibration feedback that can be perceived when the screen is touched.

NOTE 1: Related usage needs: Making choices, Interpreting effects of choices, Initiating a task, Carrying out a task, Completing a task, Recalling from short-term memory.

NOTE 2: Source: [i.28].

EXAMPLE: When a user presses an on-screen key, the software generates vibration (tactile feedback) that is intended to deliver a tactile sensation similar to that which occurs when pressing a physical key.

12.4.15 Structuring information

The mobile ICT should structure information in a consistent manner according to the semantic approach that best suits its use.

NOTE 1: Related usage needs: Recognizing written language, Comprehending written language, Making choices, Interpreting effects of choices, Initiating a task, Carrying out a task, Completing a task, Understanding spoken language, Understanding symbols, Understanding drawings and photographs, Recalling from short-term memory, Recalling from long-term memory.

NOTE 2: Source: ISO/DIS 9241-112 [i.23].

NOTE 3: ISO 14915-2 [i.42] identifies the following semantic approaches to structuring of information: task-based structuring (where the content structure is determined by the structure of the tasks of the application), usage-based structuring (where the structure is arranged in the order which users are expected to apply the content, e.g. by importance, frequency of use or individual viewpoints), time-ordered structuring (where the content is identified and structured based on times or dates that apply to the content) and information-model-based structuring (where the content structure is determined by a model of the information - e.g. in categories, entities and attributes, objects or classes of objects).

NOTE 4: This guideline refers only to presented information. For guidance on the arrangement of interactive user interface elements (buttons, fields...), see guideline in clause 6.8 "Arrangement of user interface elements".

12.4.16 Presentation of dissimilar items

The mobile ICT should use different presentation attributes for logically dissimilar items of information.

NOTE 1: Related usage needs: Recognizing written language, Comprehending written language, Making choices, Interpreting effects of choices, Initiating a task, Carrying out a task, Completing a task, Understanding spoken language, Understanding symbols, Understanding drawings and photographs, Recalling from short-term memory, Recalling from long-term memory.

NOTE 2: Source: ISO/DIS 9241-112 [i.23].

NOTE 3: The goal of this guideline is to make the differences between items obvious.

NOTE 4: The differences can be based on several presentation attributes, such as: locations, visual shapes, sizes, colours, typefaces, etc.; auditory order of presentation, volumes, tones, frequencies, etc.; tactile locations, shapes, vibrations, pressures, etc.

12.4.17 Presentation of similar items

The mobile ICT should use similar presentation attributes for logically similar items of information.

NOTE 1: Related usage needs: Recognizing written language, Comprehending written language, Making choices, Interpreting effects of choices, Initiating a task, Carrying out a task, Completing a task, Understanding spoken language, Understanding symbols, Understanding drawings and photographs, Recalling from short-term memory, Recalling from long-term memory.

NOTE 2: Source: ISO/DIS 9241-112 [i.23].

NOTE 3: The goal of this guideline is to draw attention to the similarities between items.

12.4.18 Distinguishable groups

The mobile ICT should present information in groups that the user can distinguish from one another.

NOTE 1: Related usage needs: Recognizing written language, Comprehending written language, Making choices, Interpreting effects of choices, Initiating a task, Carrying out a task, Completing a task, Understanding spoken language, Understanding symbols, Understanding drawings and photographs, Recalling from short-term memory, Recalling from long-term memory.

NOTE 2: Source: ISO/DIS 9241-112 [i.23].

12.4.19 Grouping by proximity

The mobile ICT should present items of information that belong together or that have similar properties in physical or temporal proximity to one another.

NOTE 1: Related usage needs: Recognizing written language, Comprehending written language, Making choices, Interpreting effects of choices, Initiating a task, Carrying out a task, Completing a task, Understanding spoken language, Understanding symbols, Understanding drawings and photographs, Recalling from short-term memory, Recalling from long-term memory.

NOTE 2: Source: ISO/DIS 9241-112 [i.23].

12.4.20 Separating groups

The mobile ICT should use physical or temporal spaces to separate groups of information.

NOTE 1: Related usage needs: Recognizing written language, Comprehending written language, Making choices, Interpreting effects of choices, Initiating a task, Carrying out a task, Completing a task, Understanding spoken language, Understanding symbols, Understanding drawings and photographs, Recalling from short-term memory, Recalling from long-term memory.

NOTE 2: Source: ISO/DIS 9241-112 [i.23].

12.4.21 Differentiating groups

The software should use colour to differentiate visual groups of information items.

NOTE 1: Related usage needs: Recognizing written language, Comprehending written language, Making choices, Interpreting effects of choices, Initiating a task, Carrying out a task, Completing a task, Understanding spoken language, Understanding symbols, Understanding drawings and photographs, Recalling from short-term memory, Recalling from long-term memory.

NOTE 2: Source: [i.46].

NOTE 3: The use of colour to differentiate groups is a complement to using proximity and spaces. Some users need colour to easily recognize groups of information and to easily remember the meaning of each group.

12.4.22 Maximum group size

The mobile ICT should present information in groups with a maximum size of five items.

NOTE 1: Related usage needs: Recognizing written language, Comprehending written language, Making choices, Interpreting effects of choices, Initiating a task, Carrying out a task, Completing a task, Understanding spoken language, Understanding symbols, Understanding drawings and photographs, Recalling from short-term memory.

NOTE 2: Source: ISO/DIS 9241-112 [i.23].

NOTE 3: Grouping of information can be used to structure information for ease of use (e.g. menus).

NOTE 4: Normally, the recommended size of groups is up to 7 items, but persons with cognitive impairments need smaller groups.

NOTE 5: Restricting the size of groups reduces memory load.

NOTE 6: Limiting the number of options is of particular importance for auditory menus.

12.4.23 Filtering of information

The mobile ICT should enable the user to filter large amounts of presented information.

NOTE 1: Related usage needs: Recognizing written language, Comprehending written language, Making choices, Interpreting effects of choices, Initiating a task, Carrying out a task, Completing a task, Understanding spoken language, Understanding symbols, Understanding drawings and photographs, Recalling from short-term memory.

NOTE 2: Source: ISO/DIS 9241-112 [i.23].

NOTE 3: The filtering could be based on a number of criteria including different levels of importance or relevance.

EXAMPLE: When a tag name is entered into a search box, only those information sources that have been tagged with the specified tag appear.

12.4.24 Adjustment of attributes of user interface elements

The mobile ICT should enable the user to adjust the attributes of common user interface elements.

NOTE 1: Related usage needs: Recognizing written language, Comprehending written language, Understanding spoken language, Understanding symbols, Understanding drawings and photographs.

NOTE 2: Source: ISO 9241-171 [i.25].

NOTE 3: Common attributes for a visual interface could include, but are not limited to, font type, font size, and font colour. For an auditory interface they could include, but are not limited to, aural cue type, rate, volume, pitch, position in 3D audio space. For a tactile interface they could include, but are not limited to, haptic object size, texture, xy- or xyz- position, pressure sensitivity, solidity.

NOTE 4: Platform software often supports these options for the standard uses interface elements (e.g. labels, check boxes, buttons) it provides. To enhance user experience, applications can use the settings defined at the platform level.

12.4.25 Adjustment of attributes of the cursor and pointer

The mobile ICT should enable the user to individualize attributes of all keyboard focus cursors, text cursors and pointers.

NOTE 1: Related usage needs: Recognizing written language, Comprehending written language, Making choices, Initiating a task, Carrying out a task, Completing a task, Understanding symbols, Understanding drawings and photographs.

NOTE 2: Source: ISO 9241-171 [i.25].

NOTE 3: Common attributes for cursors or pointers could include, but are not limited to, shape, size, stroke width, colour, blink rate (if any), and pointer trails (if any).

NOTE 4: Platform software often supports these options for standard cursors and pointers it provides, and software using these cursors and pointers can automatically comply with this requirement.

NOTE 5: The ability to set the cursor to non-blinking is important for users with attention deficits, who may be easily distracted.

NOTE 6: The colour aspect of this provision is not applicable if the presentation of the cursor or pointer is an inversion of the image and it has no colour.

EXAMPLE: Users who have difficulties in focusing attention can change a text cursor from blinking to non-blinking to avoid the text insertion cursor capturing their attention when they are trying to read other parts of the screen.

12.5 Understandability

12.5.1 Information on current states

The mobile ICT should provide information on the current states that affect interactions and processing.

NOTE 1: Related usage needs: Recognizing written language, Comprehending written language, Making choices, Interpreting effects of choices, Initiating a task, Organizing for a task, Carrying out a task, Completing a task, Understanding spoken language, Understanding symbols, Understanding drawings and photographs, Recalling from short-term memory.

NOTE 2: Source: ISO/DIS 9241-112 [i.23].

12.5.2 Context-sensitive help

The mobile ICT should provide context-sensitive help that includes information explaining the effect of activating a user interface function.

NOTE 1: Related usage needs: Recognizing written language, Comprehending written language, Making choices, Interpreting effects of choices, Initiating a task, Organizing for a task, Carrying out a task, Completing a task, Understanding spoken language, Understanding symbols, Understanding drawings and photographs, Recalling from long-term memory.

NOTE 2: Sources: ISO/DIS 9241-112 [i.23] and WCAG 2.0 [i.19].

NOTE 3: Where the mobile ICT has separate selection and activation user actions, the information about the effect of activating a user interface function can be provided when a user interface function is selected.

EXAMPLE: Information can appear as a tooltip when the pointer hovers over a user interface function.

NOTE 4: Where the mobile ICT does not have a default behaviour with separate selection and activation user actions, it will be necessary to activate a special accessibility service that allows a user interface function to be selected without it being activated.

NOTE 5: The accessibility service described in Note 4 is similar to accessibility services designed for blind users. Instead of announcing the identity of the widget as happens in the blind user accessibility services, a description of the result of activating the user interface function would be made available.

NOTE 6: Platform software often supports the options described in Notes 4 and 5 for the standard uses interface elements it provides. To enhance user experience, applications can use the settings defined at the platform level.

NOTE 7: This special accessibility service would need to be able to work alongside options provided for blind users so that a blind user with a cognitive impairment could have the identity read out to them together with a description of the result of the action also being read out.

12.5.3 Images for context comprehension

The mobile ICT should allow the use of images for context comprehension

NOTE 1: Related usage needs: Reading, Recognizing written language, Comprehending written language, Understanding spoken language, Understanding symbols, Understanding drawings and photographs.

NOTE 2: Sources: [i.39], [i.40] and [i.41].

NOTE 3: There is a strong preference for images that are clearly identifiable (objects at a distance that are shown in their entirety), naturally coloured images rather than digitally manipulated, images of people, photographic images rather than illustrations by people with down syndrome.

NOTE 4: Mobile devices should have the ability to make custom buttons with pictures, add text to the pictures to enable text to audio, visual display of custom buttons with scrolling ability, audible sentences stating the icon was touched.

EXAMPLE: Images can support and enable new forms of communication between non-verbal children (some cases with autism spectrum disorder) and their close people.

12.5.4 Symbols to enhance understanding of items

The software should add symbols to text-based items.

NOTE 1: Related usage needs: Recognizing written language, Comprehending written language, Making choices, recalling from long-term memory.

NOTE 2: Source: [i.46].

NOTE 3: Some persons with cognitive impairments have difficulties understanding written text. The combined used of symbols and text enhances the ease of understanding of information items.

EXAMPLE: This image shows a menu that combines text and symbols.



Figure 12.1: Examples of icons complementing text in menus [i.46]

12.5.5 Minimizing the amount of information

The mobile ICT should present the least amount of information that is needed at the moment of interaction.

NOTE 1: Related usage needs: Focusing attention, Directing attention, Recognizing written language, Comprehending written language, Making choices, Interpreting effects of choices, Initiating a task, Organizing for a task, Carrying out a task, Completing a task, Understanding spoken language, Understanding symbols, Understanding drawings and photographs, Recalling from short-term memory, Recalling from long-term memory.

NOTE 2: Source: ISO/DIS 9241-112 [i.23].

EXAMPLE: Only the supplementary information associated with the field that has the keyboard focus is presented when a user is filling in a form.

12.5.6 Unnecessary information

The mobile ICT should not present additional information that does not support the user's task.

NOTE 1: Related usage needs: Focusing attention, Directing attention, Recognizing written language, Comprehending written language, Making choices, Interpreting effects of choices, Initiating a task, Organizing For a Task, Carrying out a task, Completing a task, Understanding spoken language, Understanding symbols, Understanding drawings and photographs, Recalling from short-term memory, Recalling from long-term memory.

NOTE 2: Source: ISO/DIS 9241-112 [i.23].

EXAMPLE 1: Advertising material that is unrelated to the successful completion of a data input task is hidden or de-emphasized during the execution of that task.

EXAMPLE 2: Applications that open in full-screen mode help to minimize additional information that does not support the user's task.

12.5.7 Access to levels of information

The mobile ICT should enable users to access different amounts of information in order to meet their individual needs.

NOTE 1: Related usage needs: Focusing attention, Directing attention, Recognizing written language, Comprehending written language, Making choices, Interpreting effects of choices, Initiating a task, Organizing for a task, Carrying out a task, Completing a task, Understanding spoken language, Understanding symbols, Understanding drawings and photographs, Recalling from short-term memory, Recalling from long-term memory.

NOTE 2: Source: ISO/DIS 9241-112 [i.23].

NOTE 3: New users might have additional information needs (e.g. for guidance on how to use the system) that experienced users do not have.

12.5.8 Navigating and searching through information

The mobile ICT should provide the user with means of navigating and searching through information to identify the information that is important to the current task.

NOTE 1: Related usage needs: Making choices, Interpreting the effects of choices, Initiating a task, Organizing for a task, Carrying out a task, Completing a task.

NOTE 2: Source: ISO/DIS 9241-112 [i.23].

NOTE 3: The provision of multiple means to navigate and search will allow users to use the methods that match their personal preferences and the nature of the navigation or search task being performed.

EXAMPLE: The guidelines in clauses 12.3.5 and 12.6.23 to 12.6.31 are all examples of navigation and searching techniques.

12.5.9 Video prompts

The mobile ICT should enable the user to activate video prompts that provide guidance and supplement any existing imagery or audio prompts.

NOTE 1: Related usage needs: Reading, Recognizing written language, Comprehending written language, Making choices, Interpreting the effects of choices, Initiating a task, Organizing for a task, Carrying out a task, Completing a task, Receiving spoken language, Understanding spoken language.

NOTE 2: Sources: [i.29], [i.32], [i.33] and [i.30].

NOTE 3: This guideline is not applicable if the mobile ICT has no video capabilities.

NOTE 4: The mobile device should allow video prompts to be customized in terms of style, content and time of delivery.

12.5.10 Audio prompts

The mobile ICT should enable the user to activate audio prompts in multi-step dialogues to provide guidance and to supplement existing visual prompts.

NOTE 1: Related usage needs: Reading, Recognizing written language, Comprehending written language, Making choices, Interpreting the effects of choices, Initiating a task, Organizing for a task, Carrying out a task, Completing a task, Understanding body gestures, Understanding symbols, Understanding drawings and photographs.

NOTE 2: Sources: [i.30], [i.32] and [i.33].

NOTE 3: Audio prompts with neutral voices seem to be more effective. Familiar voices as prompts do not respond well because persons think that a known person calls them.

NOTE 4: Prompts can be given at different levels starting from audio with general instructions and ending with video-based instructions.

EXAMPLE 1: Audio prompt just as verbal advice: e.g. "*Type your first name*".

EXAMPLE 2: Audio prompt with more personal and specific detail. It addresses the person by their name and gives more detailed instructions on how to manage a specific task.

EXAMPLE 3: Audio prompt that explains to the person how to complete a task.

12.5.11 Practice mode

The mobile ICT should provide a "practice mode" that can be easily accessed from an application's help menu.

NOTE 1: Related usage needs: Making choices, Interpreting effects of choices, Initiating a task, Organizing for a task, Carrying out a task, Completing a task, Recalling from long-term memory.

NOTE 2: Once the practice mode is activated, all user actions would visually behave as normal but no changes would be made to the state of the system behind the user interface. E.g. if a swipe gesture deletes an item, the item would visually disappear whilst practicing, but would not actually be affected.

NOTE 3: If the user remains in practice mode and attempts to perform further actions, a warning might be required.

NOTE 4: Practice mode works equally well for explaining the effect of gestures that are otherwise not visible artefacts in the user interface to which help text can be attached.

NOTE 5: Once the user has left practice mode, the state of the user interface and of the underlying system should be restored to the exact state that it was in prior to the activation of the practice mode.

12.5.12 Activation and deactivation of the practice mode

The mobile ICT should make it easy to activate and deactivate the practice mode at any time.

NOTE 1: Related usage needs: Making choices, Interpreting effects of choices, Initiating a task, Organizing for a task, Carrying out a task, Completing a task, Recalling from long-term memory.

NOTE 2: A context-sensitive option in the help menu would be the preferred way of entering and leaving "practice" mode.

12.5.13 Visibility of the practice mode

The mobile ICT should clearly indicate that the ICT is in practice mode.

NOTE 1: Related usage needs: Making choices, Interpreting effects of choices, Initiating a task, Organizing for a task, Carrying out a task, Completing a task, Recalling from long-term memory.

NOTE 2: Unambiguously informing users that they are in practice mode is necessary to avoid either worrying the user that something unwanted might happen or to avoid misleading them that something has happened in the real world whereas it has only appeared to happen in the practice mode.

12.5.14 Ability to have mathematical notation read out

The mobile ICT should enable the option of having mathematical notation read out with text to speech to aid understanding.

NOTE 1: Related user needs: Calculating, Understanding simple maths.

NOTE 2: Source: [i.60].

NOTE 3: In some contexts, adding the weekday ("Monday" 1st June, 2013) may further improve the understanding of calendar dates.

NOTE 4: The different ways of expressing calendar dates in the USA and the U.K. (MM/DD/YYYY vs DD/MM/YYYY) adds to the complexity of interpreting a calendar date in abbreviated form.

EXAMPLE: A number entered into an electronic form (e.g. a postcode) is read out after the text entry has been completed.

12.5.15 Associating a photo with a contact

The mobile ICT should allow the association and editing of a photo with a contact, or a name with a photo.

NOTE 1: Related usage needs: Reading, Recognizing written language, Comprehending written language, Writing, Writing correctly, Producing written language, Making choices, Initiating a task, Carrying out a task, Completing a task.

NOTE 2: Source: [i.34].

NOTE 3: Informal observations suggested that photos increased response speed and certainty.

EXAMPLE: A user links a photo just taken or a photo from the photo library with the contact details of an individual.

12.5.16 Time display

The mobile ICT should provide options to display time. These might include:

- linear representation of time; e.g. a horizontal line that grows in length as time passes;
- a graphical representation of increasing time e.g. the number of illuminated lights in a column of lights increases with time;
- a graphical representation of decreasing time e.g. a coloured segment of a circle that grows until it fills the circle at the end of a specified time interval;
- audible representations of time e.g. a ticking to represent passing seconds or an alarm that sounds after a pre-determined interval has elapsed.

NOTE: Related usage needs: Understanding simple maths, Managing time, Adapting to time demands.

12.5.17 Time orientation

The mobile ICT should provide options to help users to orient themselves in time. These might include:

- the use of schemes, symbols and colours to structure time e.g. each day of the week could be associated with a unique colour to help people who are not able to work with named days;
- the highlighting of relevant tasks or activities e.g. "Today" is visually highlighted in a calendar app;
- the presentation of tasks and activities on a timeline or as a step-by-step sequence e.g. the next step could be to the right of the current step in a horizontal representation of all the steps of a multi-step process.

NOTE: Related usage needs: Understanding simple maths, Managing time, Adapting to time demands.

12.5.18 Time communication and management

The mobile ICT should provide options to communicate time or preferences for time management. These might include:

- supporting different input methods and input modalities e.g. being able to specify "tomorrow" rather than having to name a day of the week or input a numeric date;
- including user preferences about time representation in user profiles e.g. a user's preference for having dates presented in a non-numeric form could be stored in a user profile;

- supporting a range of time-related reminder functions e.g. users could be allowed to easily attach reminders to items in a list of tasks that they are expected to complete;
- the provision of mechanisms for reassurance and confirmation feedback on current time orientation e.g. some users would benefit from being able to easily activate a function that tells them whether it is day or night and what day of the week it is.

NOTE 1: Related usage needs: Understanding simple maths, Managing time, Adapting to time demands.

NOTE 2: Source: [i.35].

EXAMPLE: Specific support such as a whiteboard chart with a clock in the shape of a light bar and a light point descending every quarter of an hour can help in managing time when carrying out tasks.

12.5.19 Presentation of battery information

The mobile ICT should enable the user to select how battery information is presented, including but not limited to the following options:

- a) The percentage of battery left.
- b) The fraction of battery left.
- c) An estimation of the remaining running time.

NOTE 1: Related usage needs: Recognizing written language, Comprehending written language, Understanding simple maths, Making choices, Interpreting effects of choices, Understanding symbols, Understanding drawings and photographs.

NOTE 2: Different ways of indicating that a battery is partially drained and showing the estimated time remaining will be of benefit to users who have difficulties in understanding such simple mathematical concepts.

12.5.20 Low battery guidance

The mobile ICT should inform users when the battery level is low and tell them that they need to connect the mobile ICT to a power source.

NOTE 1: Related usage needs: Recognizing written language, Comprehending written language, Understanding simple maths, Making choices, Interpreting effects of choices, Initiating a task, Understanding symbols, Understanding drawings and photographs.

NOTE 2: Giving guidance about connecting the mobile ICT to a power source ensures that there is no ambiguity about how to deal with the low battery level. Such direct instruction will be beneficial to users who have difficulties initiating a task.

12.6 Controllability

12.6.1 Time limits

The mobile ICT should avoid setting time limits.

NOTE 1: Related usage needs: Focussing attention, Directing attention, Shifting attention, Recognizing written language, Comprehending written language, Writing correctly, Producing written language, Making choices, Interpreting effects of choices, Initiating a task, Carrying out a task, Completing a task, Managing time, Adapting to time demands, Understanding spoken language, Understanding body gestures, Understanding symbols, Understanding drawings and photographs, Speaking, Producing gestures, Recalling from short-term memory.

NOTE 2: Source: WCAG 2.0 [i.19].

NOTE 3: This guideline does not apply in the case of non-interactive synchronized media (e.g. a video without active links) and real-time events.

NOTE 4: Service providers may consider that adding a time limit is an essential part of the task (e.g. session timeouts in online banking services). In such cases, the guideline in clause 12.6.2 applies.

12.6.2 Timing adjustable

The mobile ICT should ensure that at least one of the following should be true for each time limit set by the mobile ICT:

- a) **Turn off:** The user is allowed to turn off the time limit before encountering it.
- b) **Adjust:** The user is allowed to adjust the time limit before encountering it over a wide range that is at least ten times the length of the default setting.
- c) **Extend:** The user is warned before time expires and given at least 20 seconds to extend the time limit with a simple action (for example, "press the space bar"), and the user is allowed to extend the time limit at least ten times.
- d) **Real-time exception:** The time limit is a required part of a real-time event (for example, an auction), and no alternative to the time limit is possible.
- e) **Essential exception:** The time limit is essential and extending it would invalidate the activity. or
- f) **20-h exception:** The time limit is longer than 20 hours.

NOTE 1: Related usage needs: Focussing attention, Directing attention, Shifting attention, Recognizing written language, Comprehending written language, Writing correctly, Producing written language, Making choices, Interpreting effects of choices, Initiating a task, Carrying out a task, Completing a task, Managing time, Adapting to time demands, Understanding spoken language, Understanding body gestures, Understanding symbols, Understanding drawings and photographs, Speaking, Producing gestures, Recalling from short-term memory.

NOTE 2: Source: ETSI EN 301 549 [i.6].

NOTE 3: This guideline helps ensure that users can complete tasks without unexpected changes in content or context that are a result of a time limit. Clauses 12.2.1 (On focus) and 12.2.2 (On input), also put limits on changes of content or context as a result of user action.

NOTE 4: This guideline corresponds to WCAG 2.0 [i.19], Success Criterion 2.2.1 Timing Adjustable replacing "the content" with "the software".

NOTE 5: Some people with cognitive impairments can require more time to read and understand content or to perform functions such as filling out on-line forms. If the mobile ICT functions are time-dependent, it will be difficult for some users to perform the required action before a time limit occurs. This can render the service inaccessible to them [i.20].

NOTE 6: This guideline allows users with cognitive impairments to set a longer than usual timeout to enable them to input data at their own rate.

12.6.3 Adjustment of the timing adjustable extend option

The mobile ICT should provide a means for users to set a value, greater than the default value, for the time allowed to request that a time limit is extended.

NOTE 1: Related usage needs: Focussing attention, Directing attention, Shifting attention, Recognizing written language, Comprehending written language, Writing correctly, Producing written language, Making choices, Interpreting effects of choices, Initiating a task, Carrying out a task, Completing a task, Managing time, Adapting to time demands, Understanding spoken language, Understanding body gestures, Understanding symbols, Understanding drawings and photographs, Speaking, Producing gestures, Recalling from short-term memory.

NOTE 2: This guideline relates to the "Extend" option described in clause 12.6.2.

NOTE 3: Some users will require significantly more than the minimum time of 20 seconds specified in clause 12.6.2 to allow them to successfully request that the timeout should be extended.

12.6.4 Pause, stop, hide

The mobile ICT should ensure that all of the following are true:

- a) **Moving, blinking, scrolling:** For any moving, blinking or scrolling information that (1) starts automatically, (2) lasts more than five seconds, and (3) is presented in parallel with other content, there is a mechanism for the user to pause, stop, or hide it unless the movement, blinking, or scrolling is part of an activity where it is essential; and
- b) **Auto-updating:** For any auto-updating information that (1) starts automatically and (2) is presented in parallel with other content, there is a mechanism for the user to pause, stop, or hide it or to control the frequency of the update unless the auto-updating is part of an activity where it is essential.

NOTE 1: Related usage needs: Focusing attention, Directing attention, Shifting attention.

NOTE 2: Source: ETSI EN 301 549 [i.6].

NOTE 3: For requirements related to flickering or flashing content, refer to WCAG 2.0 [i.19], Guideline 2.3.

NOTE 4: This guideline is applicable to all content in the software (whether or not there is an alternate accessible mode of operation of the software) since any part of a software that does not meet this guideline can interfere with a user's ability to use the whole software (including a user interface element that enables the user to activate the alternate accessible mode of operation).

NOTE 5: Content that is updated periodically by software or that is streamed to the user agent is not required to preserve or present information that is generated or received between the initiation of the pause and resuming presentation, as this may not be technically possible, and in many situations can be misleading to do so.

NOTE 6: An animation that occurs as part of a preload phase or similar situation can be considered essential if interaction cannot occur during that phase for all users and if not indicating progress could confuse users or cause them to think that content was frozen or broken.

NOTE 7: This is to be applied to all content. Any content, whether informative or decorative, that is updated automatically, blinks, or moves may create an accessibility barrier.

NOTE 8: This guideline corresponds to WCAG 2.0 [i.19], Success Criterion 2.2.2 Pause, Stop, Hide replacing "page" and "Web page" with "software", removing "See Conformance Requirement 5: Non-Interference" in Note 2 of the success criterion, with the words "WCAG 2.0" added before the word "Guideline" in Note 3 above, with Note 4 above re-drafted to avoid the expression of requirements and with the addition of Note 7 above.

NOTE 9: Content that moves or auto-updates can be a barrier to anyone who has trouble reading stationary text quickly as well as anyone who has trouble tracking moving objects. Moving content can also be a severe distraction for some people. Certain groups, particularly those with attention deficit disorders, find blinking content distracting, making it difficult for them to concentrate on other parts of the Web page. Five seconds was chosen because it is long enough to get a user's attention, but not so long that a user cannot wait out the distraction if necessary to use the page [i.20].

NOTE 10: For certain groups, including people with low literacy, reading and intellectual impairments, and people with attention deficit disorders, content that blinks can make it difficult or even impossible to interact with the rest of the Web page [i.20].

12.6.5 Focus order

The mobile ICT should ensure that focusable components receive focus in an order that preserves meaning and operability, if the navigation sequences affect meaning or operation.

NOTE 1: Related usage needs: Focusing attention, Directing attention, Shifting attention, Recognizing written language, Comprehending written language, Making choices, Interpreting effects of choices, Initiating a task, Carrying out a task, Completing a task.

NOTE 2: Source: ETSI EN 301 549 [i.6].

NOTE 3: This guideline corresponds to WCAG 2.0 [i.19], Success Criterion 2.4.3 Focus order replacing "Web page" with "software".

NOTE 4: People with impairments that make reading difficult can become disoriented when tabbing takes focus to some unexpected place. They benefit from a logical focus order [i.20].

12.6.6 Link purpose

The mobile ICT should ensure that the purpose of each link is determinable from the link text alone, except where the purpose of the link would be ambiguous to users in general.

NOTE 1: Related user needs: Recognizing written language, Comprehending written language, Making choices, Interpreting effects of choices, Initiating a task, Carrying out a task, Completing a task, Understanding symbols, Understanding drawings and photographs.

NOTE 2: Source: ETSI EN 301 549 [i.6].

NOTE 3: In software, a "link" is any text string or image in the user interface outside a user interface control that behaves like a hypertext link. This does not include general user interface controls or buttons. An OK button, for example, would not be a link.

NOTE 4: This guideline corresponds to WCAG 2.0 [i.19], Success Criterion 2.4.9 Link purpose (Link Only), replacing both "web page" and "page" with "software" and with the addition of Note 3 above.

NOTE 5: Descriptive headings are especially helpful for users who have impairments that make reading slow and for people with limited short-term memory. These people benefit when section titles make it possible to predict what each section contains [i.20].

12.6.7 Headings and labels

The mobile ICT should ensure that headings and labels describe topic or purpose.

NOTE 1: Related user needs: Recognizing written language, Comprehending written language, Making choices, Interpreting effects of choices, Initiating a task, Carrying out a task, Completing a task, Understanding symbols, Understanding drawings and photographs, Recalling from long-term memory.

NOTE 2: Source: ETSI EN 301 549 [i.6].

NOTE 3: In software, headings and labels are used to describe sections of content and controls respectively. In some cases it may be unclear whether a piece of static text is a heading or a label. But whether treated as a label or a heading, the guidance is the same: that if they are present they describe the topic or purpose of the item(s) they are associated with.

NOTE 4: This guideline corresponds to WCAG 2.0 [i.19], Success Criterion 2.4.6 Headings and labels with the addition of Note 3 above.

NOTE 5: Descriptive headings are especially helpful for users who have impairments that make reading slow and for people with limited short-term memory. These people benefit when section titles make it possible to predict what each section contains [i.20].

12.6.8 Focus visible

The mobile ICT should ensure that any keyboard operable user interface has a mode of operation where the keyboard focus indicator is visible.

NOTE 1: Related user needs: Focusing attention, Directing attention, Shifting attention, Recognizing written language, Comprehending written language, Making choices, Interpreting effects of choices, Initiating a task, Carrying out a task, Completing a task.

NOTE 2: Source: ETSI EN 301 549 [i.6].

NOTE 3: This guideline corresponds to WCAG 2.0 Success Criterion 2.4.7 Focus visible [i.19].

NOTE 4: People with attention limitations, short term memory limitations, or limitations in executive processes benefit by being able to discover where the focus is located [i.20].

12.6.9 Multi-modal input

The mobile ICT should be able to accept and make use of user input in more than one modality at the same time.

NOTE 1: Related usage needs: Writing, Writing correctly, Producing written language, Calculating, Making choices, Initiating a task, Carrying out a task, Completing a task, Speaking, Producing gestures.

NOTE 2: Source: [i.30].

NOTE 3: Multi-modal input can be a combination of keyboard, pen input, gestures, and speech recognition depending on which modalities the user has chosen to use.

12.6.10 Word prediction

The mobile ICT should ensure that keyboard input has a mode of operation where word prediction is active.

NOTE 1: Related usage needs: Writing correctly, Producing written language.

NOTE 2: Word prediction enables users with limited ability to write to type faster and with fewer mistakes.

12.6.11 Voice recognition

The mobile ICT should be able to accept and make use of voice input.

NOTE 1: Related usage needs: Writing, Writing correctly, Producing written language, Making choices, Initiating tasks, Carrying out a task, Completing a task.

NOTE 2: Source: [i.30].

EXAMPLE: Phone functionalities are enabled by voice commands from the user.

12.6.12 Minimizing user actions

The software should minimize the number of elemental user actions required to complete tasks.

NOTE 1: Related usage needs: Making Choices, Interpreting Effects of Choices, Initiating a task, Carrying out a Task, Completing a Task, Recalling from Long-term Memory.

NOTE 2: Source: [i.46].

NOTE 3: Some persons with cognitive impairments have difficulties to remember and properly follow the required steps to perform a task. In addition, each step in a task represents a decision that the user has to take, and some persons with cognitive impairments have difficulties to take decisions.

NOTE 4: According to [i.46], a recommended number of elemental actions per task is 5.

12.6.13 Storing user input and system output locally

The mobile ICT should allow the user to store all recent input and output locally and to make that information available to the user on demand.

NOTE 1: Related usage needs: Writing, Writing correctly, Producing written language, Calculating, Initiating a task, Carrying out a task, Completing a Task, Recalling from short-term memory.

NOTE 2: Users who have difficulties with storing information to or retrieving information from short-term memory need alternative tools to access process-relevant information.

NOTE 3: Availability may mean presentation only but the possibility to copy and paste the information may be preferable.

NOTE 4: There are different ways of organizing the stored information, but the ability to present them in the temporal order in which they have been entered / stored may be preferable.

EXAMPLE: The system stores all relevant information (input and output) during the web-based booking of a flight. If in doubt, the user can review relevant information (e.g. travel dates) he has entered previously.

12.6.14 Making past information items accessible to the user

The mobile ICT should allow the user to store locally and access later several information items for direct access.

NOTE 1: Related usage needs: Writing, Writing correctly, Producing written language, Calculating, Initiating a task, Carrying out a task, Completing a Task, Recalling from short-term memory.

NOTE 2: The number of interaction items depends on the context of the interaction.

EXAMPLE: The system stores all relevant information (input and output) during the web-based booking of a flight. If in doubt, the user can review relevant information (e.g. travel dates) he has entered previously.

12.6.15 Marking content for later retrieval

The mobile ICT should enable the user to mark any content for later retrieval.

NOTE 1: Related usage needs: Writing, Writing correctly, Producing written language, Calculating, Initiating a task, Carrying out a task, Completing a Task, Recalling from short-term memory, Recalling from long-term memory.

NOTE 2: The user interface is needed to allow the user the selective marking of specific content for later retrieval.

EXAMPLE: A user marks a number of paragraphs of an on-line newspaper article for later access (e.g. for storing it or sending it in an email).

12.6.16 Direct access to stored information

The mobile ICT should enable the user to directly access the collected input and output history and any specially marked information.

NOTE 1: Related usage needs: Writing, Writing correctly, Producing written language, Calculating, Initiating a task, Carrying out a task, Completing a Task, Recalling from short-term memory.

NOTE 2: The access to store information is ideally always available and not hidden in a menu structure.

EXAMPLE: A user accesses previously stored information with a touch gesture on the screen.

12.6.17 Exporting and importing information

The mobile ICT should enable the user to export stored information and it also should enable the user to import information from external sources.

NOTE 1: Related usage needs: Writing, Writing correctly, Producing written language, Calculating, Initiating a task, Carrying out a task, Completing a Task, Recalling from short-term memory, Recalling from long-term memory.

NOTE 2: The possibility of exporting data already stored in one application and then importing that data into another application greatly reduces the need to re-introduce information, supporting the needs of persons with cognitive impairments.

EXAMPLE: An email application can export the information of the user's contacts, so that it can be imported by another email application.

12.6.18 Organization of the collected input and output history

The mobile ICT should allow the user to organize the collected input and output history and any marked information.

NOTE 1: Related usage needs: Writing, Writing correctly, Producing written language, Calculating, Initiating a task, Carrying out a task, Completing a Task, Recalling from short-term memory.

NOTE 2: Organization principles can be organization by time, by source, by topic, or by relevance.

EXAMPLE: A user reviews the I/O history of his interaction with an application step by step (i.e. in the order they took place).

12.6.19 Access to information about possible actions

The mobile ICT should enable the user to access information about what actions are currently possible.

NOTE 1: Related usage needs: Making choices, Initiating a task, Carrying out a task, Completing a task, Producing gestures, Recalling from long-term memory.

NOTE 2: Source: ISO/DIS 9241-112 [i.23].

NOTE 3: This guideline prevents the usage of "hidden" grammars (e.g. gestures) which the user may not be able to memorize.

NOTE 4: This guideline also deals with the problem of a user not being able to remember where specific actions are in e.g. a menu tree.

12.6.20 Auto-fill-in technologies

The mobile ICT should provide an auto-fill capability in form-based user interfaces.

NOTE 1: Related usage needs: Writing, Writing correctly, Producing written language, Calculating, Carrying out a task, Managing time, Adapting to time demands, Recalling from long-term memory.

NOTE 2: This guideline avoids the users having to recover data from long-term memory which they have already inserted earlier.

NOTE 3: This guideline is equally applicable in case of users with limited short-term memory.

NOTE 4: This avoids the users having to recover data from long-term memory, which they have already inserted earlier. This guideline is equally applicable in case of users with limited short-term memory.

NOTE 5: In some usage contexts it may be necessary to provide the user with a means to select the source of the data used to auto-fill fields.

NOTE 6: Issues of data protection and data integrity need to be taken into account. In particular, it should be possible to prevent/control any data storage in cloud-based systems or communication to service provider infrastructure.

12.6.21 Support for sub-dividing tasks

The mobile ICT should provide support that allows a user to divide a large task into a series of sub-tasks.

NOTE 1: Related usage needs: Making choices, Initiating a task, Organizing for a task, Carrying out a task, Completing a task.

NOTE 2: The application of this guideline should be especially beneficial for users who fail to initiate a task because they are overwhelmed by the apparent size of the task.

NOTE 3: This guideline can only be applied where the task can be logically sub-divided into discrete sub-tasks that are capable of being worked on independently.

NOTE 4: The guidelines in clauses 12.6.23 to 12.6.31 provide the support necessary to enable the user to work on and complete the full series of sub-tasks.

NOTE 5: Some users may not benefit from sub-dividing tasks as they might be daunted by the potential increase in complexity that replacing a single task with a series of sub-tasks represents.

12.6.22 Notification of the possibility for task sub-division

The mobile ICT should have a mode of operation in which a user is notified when it is possible to divide a task into a series of sub-tasks.

NOTE 1: Related usage needs: Making choices, Initiating a task, Organizing for a task, Carrying out a task, Completing a task.

NOTE 2: The application of this guideline should be especially beneficial for users who fail to initiate a task because they are overwhelmed by the apparent size of the task.

NOTE 3: This guideline can only be applied where the task can be logically sub-divided into discrete sub-tasks that are capable of being worked on independently.

NOTE 4: The guidelines in clauses 12.6.23 to 12.6.31 provide the support necessary to enable the user to work on and complete the full series of sub-tasks.

NOTE 5: Some users may not benefit from sub-dividing tasks as they might be daunted by the potential increase in complexity that replacing a single task with a series of sub-tasks represents.

12.6.23 Consistent navigation of episodic content or procedures

The mobile ICT should use consistent controls for navigating episodic content or procedures.

NOTE 1: Related usage needs: Comprehending written language, Initiating a task, Organizing for a task, Carrying out a task, Completing a task, Understanding spoken language, Understanding body gestures, Understanding symbols, Understanding drawings and photographs.

NOTE 2: Use of any platform specific standard for navigation controls enables this guideline to be followed.

12.6.24 Range of controls for navigation of episodic content or procedures

The mobile ICT should include, but not be restricted to, the following controls to enable the navigation of episodic content or procedures:

- go back a low-level step (e.g. paragraph, section, previous step);
- go back a higher level step (e.g. section, chapter, previous group of steps);
- go forward a low-level step (e.g. paragraph, section, previous step);
- go forward a higher level step (e.g. section, chapter, previous group of steps);
- go to the start of content or procedure;
- go to the end of content or procedure;
- pause content or procedure;
- restart content or procedure.

NOTE: Related usage needs: Comprehending written language, Initiating a task, Organizing for a task, Carrying out a task, Completing a task, Understanding spoken language, Understanding body gestures, Understanding symbols, Understanding drawings and photographs.

12.6.25 Identifying location within episodic content or procedures

The mobile ICT should show the user the current location within episodic content or procedures.

NOTE: Related usage needs: Comprehending written language, Initiating a task, Organizing for a task, Carrying out a task, Completing a task, Understanding spoken language, Understanding body gestures, Understanding symbols, Understanding drawings and photographs, Recalling from short-term memory, Recalling from long-term memory.

EXAMPLE: The use of "breadcrumbs" is one way of visually representing location within a sequence of procedural steps.

12.6.26 Identifying the end of episodic content or procedures

The mobile ICT should make the user aware of the end of episodic content or procedures.

NOTE: Related usage needs: Comprehending written language, Initiating a task, Organizing for a task, Carrying out a task, Completing a task, Understanding spoken language, Understanding body gestures, Understanding symbols, Understanding drawings and photographs.

12.6.27 Bookmarking episodic content or procedures

The mobile ICT should enable the user to insert bookmarks into episodic content or procedures.

NOTE 1: Related usage needs: Comprehending written language, Initiating a task, Organizing for a task, Carrying out a task, Completing a task, Understanding spoken language, Understanding body gestures, Understanding symbols, Understanding drawings and photographs, Recalling from short-term memory, Recalling from long-term memory.

NOTE 2: In practice, usually not all content is divided into sufficiently small and relevant episodes to allow the user the navigational control that they need. The ability to insert bookmarks allows the user to create their own signposts to assist them in navigating the content or procedures.

12.6.28 Presenting bookmarks of episodic content or procedures

The mobile ICT should present, on user's request, all the bookmarks in episodic content or procedures.

NOTE: Related usage needs: Comprehending written language, Initiating a task, Organizing for a task, Carrying out a task, Completing a task, Understanding spoken language, Understanding body gestures, Understanding symbols, Understanding drawings and photographs, Recalling from short-term memory, Recalling from long-term memory.

12.6.29 Jumping to bookmarks in episodic content or procedures

The mobile ICT should enable the user to jump to a specific bookmark in episodic content or procedures.

NOTE: Related usage needs: Comprehending written language, Initiating a task, Organizing for a task, Carrying out a task, Completing a task, Understanding spoken language, Understanding body gestures, Understanding symbols, Understanding drawings and photographs, Recalling from short-term memory, Recalling from long-term memory.

12.6.30 Automatic traversal of episodic procedures

The mobile ICT should be able to automatically advance to the next step of the procedure when there is a change in the external context and the episodic procedure relates to the external context of use.

NOTE: Related usage needs: Comprehending written language, Initiating a task, Organizing for a task, Carrying out a task, Completing a task, Understanding spoken language, Understanding body gestures, Understanding symbols, Understanding drawings and photographs.

EXAMPLE: In a series of navigation instructions, the software will automatically advance the instructions to instructions that apply to the current location.

12.6.31 Titling used within episodic content or procedures

The mobile ICT should use headings and labels that conform to the guideline in clause 12.6.7 for the identification of episodes in episodic content or procedures.

NOTE 1: Related usage needs: Comprehending written language, Initiating a task, Organizing for a task, Carrying out a task, Completing a task, Understanding spoken language, Understanding body gestures, Understanding symbols, Understanding drawings and photographs.

NOTE 2: Some users with cognitive impairments may find it difficult to recognize the scope of an episode within episodic content or procedures. Titles should clarify the scope of the episode.

12.6.32 Automatic entry of user data

The mobile ICT should offer the automatic entry (e.g. name, address, date of birth, account number) of data stored in a user profile.

NOTE 1: Related user needs: Reading, Recognizing written language, Comprehending written language, Writing, Writing correctly, Producing written language, Calculating, Understanding simple maths.

NOTE 2: Source: [i.60].

NOTE 3: This may include the use of automatic password management tools.

EXAMPLE: Users having difficulties reading or writing longer sequences of numbers can benefit from form fields being filled in automatically with data entered once previously.

12.6.33 Copy and paste of user data

The mobile ICT should allow the copying and pasting of personal data (e.g. name, address, date of birth, account number) into form fields.

NOTE 1: Related user needs: Reading, Recognizing written language, Comprehending written language, Writing, Writing correctly, Producing written language, Calculating, Understanding simple maths.

NOTE 2: Source: [i.60].

NOTE 3: This may include passwords and payment details.

NOTE 4: In some usage contexts it may be necessary to provide the user with a means to select from a number of possible alternative items to paste (e.g. whether to enter a private address or a work address into an address field).

EXAMPLE: Users having difficulties reading or writing longer sequences of numbers can benefit from form fields being filled in automatically with data entered once previously.

12.6.34 Predicting task duration

The mobile ICT should make available a prediction of how long a task might take to complete based on how long the user has taken to complete this same task in the past.

NOTE 1: Related usage needs: Carrying out a task, Completing a task, Managing time, Adapting to time demands.

NOTE 2: This guideline can only be achieved by mobile ICT that tracks, analyses and tries to interpret user behaviour.

NOTE 3: The provision of advance information about what may follow will be particularly re-assuring to many people on the autism spectrum.

NOTE 4: Providing progress indication when little progress has been made could act as a disincentive for task completion. It might be appropriate to delay prominent display of task progress to some users until significant (perhaps 50 %) progress has been made. The choice of such a delay in presentation would have to be made a user configurable option.

NOTE 5: Clauses 12.6.25 and 12.6.26 provide similar progress feedback for users progressing through episodic procedures.

12.6.35 Indicating task progress

The mobile ICT should, where task progress can be measured, show a visible indication of the progress towards the completion of a task.

NOTE 1: Related usage needs: Carrying out a task, Completing a task, Managing time, Adapting to time demands.

NOTE 2: This guideline can only be achieved by mobile ICT that tracks, analyses and tries to interpret user behaviour.

NOTE 3: The provision of advance information about what may follow will be particularly re-assuring to many people on the autism spectrum.

NOTE 4: Providing progress indication when little progress has been made could act as a disincentive for task completion. It might be appropriate to delay prominent display of task progress to some users until significant (perhaps 50%) progress has been made. The choice of such a delay in presentation would have to be made a user configurable option.

NOTE 5: Clauses 12.6.25 and 12.6.26 provide similar progress feedback for users progressing through episodic procedures.

12.6.36 Additional support related to time demands

The mobile ICT should provide options to support users in adapting to time demands. These might include:

- the display or provision of information that might affect previously made plans as soon as possible e.g. early notification that plans may have to be changed will allow a user to either re-plan themselves or seek help about how their plan may need to be adapted;
- the use of known information to provide context-sensitive options or calls for action e.g. the load on a user will be minimized if the amount of and relevance of information provided to them is only related to the specific context in which the information is being given;
- the use of forecasts and predictions to create awareness prior to the need to adapt to time demands e.g. the provision of advance information about what may follow will be particularly re-assuring to many people on the autism spectrum;
- the display of a crisis plan that can be activated under specific circumstances e.g. a third party may have prepared a crisis plan for the user which can be automatically activated if the particular crisis arises;

- the provision of real time monitoring and real time support to help users to adapt to time demands e.g. a function that detects apparently abnormal user behaviour or inactivity when activity is required could be used to offer the user the opportunity to communicate with a human helper (using text chat or voice according to the user's preference stored in their user profile).

NOTE: Related usage needs: Managing time, Adapting to time demands.

12.7 Error tolerance

12.7.1 Error identification

The mobile ICT should identify and describe in text input errors that are automatically detected.

NOTE 1: Related usage needs: Writing correctly, Producing written language, Calculating, Making choices, Interpreting effects of choices, Carrying out a task, Completing a task, Understanding spoken language, Understanding body gestures, Understanding symbols, Understanding drawings and photographs, Speaking, Producing gestures.

NOTE 2: Source: ETSI EN 301 549 [i.6].

NOTE 3: This guideline corresponds to WCAG 2.0 Success Criterion 3.3.1 [i.19], Error identification.

NOTE 4: This Success Criterion can help people with cognitive, language, and learning impairments who have difficulty understanding the meaning represented by icons and other visual cues [i.20].

12.7.2 Error suggestion

The mobile ICT should provide suggestions for correction when it has automatically detected an input error and a suggestion for correction exists.

NOTE 1: Related usage needs: Writing correctly, Producing written language, Calculating, Making choices, Carrying out a task, Completing a task, Speaking, Producing gestures.

NOTE 2: Source: ETSI EN 301 549 [i.6].

NOTE 3: This guideline corresponds to WCAG 2.0 Success Criterion 3.3.3 [i.19], Error suggestion.

NOTE 4: This guideline does not apply if following it would jeopardize the security or purpose of the content.

EXAMPLE: Suggesting the correct password when one has been incorrectly entered would be a serious breach of security unless that password was securely stored in the mobile device.

NOTE 5: Clause 12.7.1 provides for notification of errors. However, persons with cognitive limitations may find it difficult to understand how to correct the errors [i.20].

NOTE 6: In the case of an unsuccessful form submission, users can abandon the form because they are unsure of how to correct the error even though they are aware that it has occurred [i.20].

12.7.3 Auto correction of errors

The mobile ICT should provide the option of automatically correcting input errors, when the mobile ICT has automatically detected an input error with a known solution.

NOTE: Related usage needs: Writing correctly, Producing written language, Calculating, Making choices, Carrying out a task, Completing a task, Speaking, Producing gestures.

EXAMPLE: The user writes a name of a city with orthographic errors ("Stokholm") and the mobile ICT corrects the error by providing the suggested correct word ("Stockholm").

12.7.4 Error prevention (legal, financial, data)

The mobile ICT should ensure that at least one of the following is true for user input that causes legal commitments or financial transactions, or that modifies or deletes user-controllable data in data storage systems, or that submits user test responses:

- a) Reversible: Submissions are reversible.
- b) Checked: Data entered by the user is checked for input errors and the user is provided an opportunity to correct them.
- c) Confirmed: A mechanism is available for reviewing, confirming, and correcting information before finalizing the submission.

NOTE 1: Related usage needs: Recognizing written language, Comprehending written language, Writing, Writing correctly, Producing written language, Calculating, Making choices, Interpreting effects of choices, Carrying out a task, Completing a task, Understanding spoken language, Understanding body gestures, Understanding symbols, Understanding drawings and photographs, Speaking, Producing gestures.

NOTE 2: Source: ETSI EN 301 549 [i.6].

NOTE 3: This guideline corresponds to WCAG 2.0 Success Criterion 3.3.4 Error prevention (legal, financial, data) replacing "web pages" with "software".

NOTE 4: People with reading impairments can transpose numbers and letters [i.20].

NOTE 5: Providing the ability to reverse actions allows users to correct a mistake that can result in serious consequences. Providing the ability to review and correct information gives the user an opportunity to detect a mistake before taking an action that has serious consequences [i.20].

NOTE 6: Providing safeguards to avoid serious consequences resulting from mistakes helps users with all disabilities who are more likely to make mistakes [i.20].

12.8 Compatibility with other systems

Clause 6.4 includes the relevant guidance related to the interoperability with assistive technologies.

12.9 Suitability for learning

12.9.1 Labels or instructions

The mobile ICT should provide labels or instructions when content requires user input.

NOTE 1: Related usage needs: Recognizing written language, Comprehending written language, Making choices, Interpreting effects of choices, Initiating a task, Carrying out a task, Completing a task, Understanding symbols, Recalling from long-term memory.

NOTE 2: Source: ETSI EN 301 549 [i.6].

NOTE 3: This guideline corresponds to WCAG 2.0 Success Criterion 3.3.2 [i.19], Labels or instructions.

NOTE 4: Simple instructions visually connected to form controls can assist users with cognitive impairments or those accessing a page using a screen magnifier [i.20].

NOTE 5: Providing examples of expected data formats help users with cognitive, language and learning disabilities to enter information correctly [i.20].

12.10 Freedom from distraction

12.10.1 Restart

The mobile ICT should enable the user to:

- save the current state of interaction and its related data;
- quit the current use of the system and;
- restart the use of the system based on the saved state of interaction.

NOTE 1: Related usage needs: Focusing attention, Directing attention.

NOTE 2: Source: ISO/DIS 9241-112 [i.23].

NOTE 3: This guideline is especially relevant for persons with attention-related usage needs, in the case where an external distraction happens. There are some situations where external distractions which cannot be minimized to an acceptable level might hamper use of a system. In these situations, it is best to allow the user to stop interaction with a system until either the distraction is reduced or the system is moved to a location where the distraction is not present.

12.10.2 Hiding non task-related content

The mobile ICT should provide a clearly visible control that allows all content, not related to a task, to be hidden.

NOTE 1: Related usage needs: Focusing attention, Directing attention, Recognizing written language, Comprehending written language, Making choices, Interpreting effects of choices, Initiating a task, Organizing for a task, Carrying out a task, Completing a task, Understanding spoken language, Understanding symbols, Understanding drawings and photographs, Recalling from short-term memory, Recalling from long-term memory.

NOTE 2: Content not related to a task includes:

- windows or panes associated with different tasks and;
- unrelated content such as advertisements, or links to unrelated tasks, contained within the same pane or window as the task-related content.

NOTE 3: The hiding of panes or windows that are not associated with the task provides an opportunity to maximize the size of the task-related pane or window. This will eliminate potentially distracting empty borders around the pane or window associated with the task.

NOTE 4: The ability to hide content within the task pane or window that is unrelated to the task relies on the author of the content marking it in such a way that it can be identified as being unrelated to the task.

EXAMPLE: Where advertisements contain a heading that includes the word "Advertisement", the mobile ICT should be able to use this heading text to determine that the content is unrelated to the task.

NOTE 5: The means to restore the state of the displayed panes and windows to the layout that they were in before they were hidden according to this guideline is described in the guideline in clause 12.10.3.

12.10.3 Reinstating non task-related content

The mobile ICT should provide a clearly distinguishable control that allows non-task-related content that has been hidden by the user to be made visible in the same layout that it was in before it was hidden.

NOTE 1: Related usage needs: Focusing attention, Directing attention, Recognizing written language, Comprehending written language, Making choices, Interpreting effects of choices, Initiating a task, Organizing for a task, Carrying out a task, Completing a task, Understanding spoken language, Understanding symbols, Understanding drawings and photographs, Recalling from short-term memory, Recalling from long-term memory.

NOTE 2: This guideline specifies the mechanism needed to restore the state of the displayed panes and windows to the layout that they were in before the user used the functionality described in the guideline in clause 12.10.2.

13 Guidelines specific to documentation for mobile ICT

13.1 General

This clause corresponds to the "Documentation and support services" clause 12 in ETSI EN 301 549 [i.6].

General recommendations for the design of user documentation for ICT can be found in ETSI EG 202 417 [i.3].

13.2 Guidelines

13.2.1 Accessible documentation

The documentation for the mobile ICT should conform to clause 12.1.2 of ETSI EN 301 549 [i.6].

13.2.2 Use of language in documentation

The documentation for the mobile ICT should follow the guidelines in clause 7.

13.2.3 Results of user actions

The documentation for the mobile ICT should describe result of the action after listing a sequence of instructions.

NOTE: Related usage needs: Recognizing written language, Comprehending written language.

EXAMPLE 1: In a user guide, instructions include the steps to follow to achieve a certain result; these instructions are formatted consistently and include preconditions (if any), steps, and results.

EXAMPLE 2: "A window "Message sent" appears and the message is moved to the folder "Sent messages".

13.2.4 Font size for user documentation

The documentation for the mobile ICT should use a minimum font size of 12 pt for texts.

NOTE 1: Related usage needs: Recognizing written language, Comprehending written language.

NOTE 2: Sources: [i.14], [i.16], [i.17] and [i.18].

NOTE 3: The documentation can be in printed or electronic (e.g. PDF file) form.

NOTE 4: For some audiences, 14pt is even more suitable (some sources recommend a minimum font size of 16 pt).

13.2.5 Use of pictures for depicting simple actions

The documentation for the mobile ICT should include pictures for depicting simple actions wherever meaningful.

NOTE 1: Related usage needs: Recognizing written language, Comprehending written language, Making choices, Recalling from long-term memory.

NOTE 2: Sources: [i.12] and [i.13].

NOTE 3: Depending on the complexity of the ideas to be expressed, more than one picture may be required.

NOTE 4: Ideally, pictures complement the text and do not contradict it.

NOTE 5: Pictures can also be used as a "drawn headline" to sum up what the subsequent text will be about.

NOTE 6: Pictures can be enriched with elements such as bubbles (with additional pictures, not words), arrows, ticks and crosses, and thumbs up and thumbs down).

NOTE 7: Pictures are best placed left of or above the text they belong to.

NOTE 8: Photographs may be preferred for showing "real-life" events, people, and emotions, whereas drawings help avoiding unnecessary details.

13.2.6 Use of spoken user information

The documentation for the mobile ICT should offer a spoken version of the material, wherever meaningful.

NOTE 1: Related usage needs: Reading, Recognizing written language, Comprehending written language, Making choices, Interpreting effects of choices, Initiating a task, Organizing for a task, Carrying out a task, Completing a task, Understanding body gestures, Understanding symbols, Understanding drawings and photographs.

NOTE 2: Source: ETSI EG 202 417 [i.3].

NOTE 3: Spoken user documentation also supports visually impaired users.

Annex A:

List of Usage needs

The usage needs are explicitly but not exclusively related to eight cognitive impairments that have been used as the basis of our analysis. These are:

- Dementia and Alzheimers
- Intellectual Impairments
- Aphasia
- Speech and Language Impairments
- Autism Disorder
- Attention Deficit/Hyperactivity Disorder
- Dyslexia
- Dyscalculia

Each usage need has a unique short name to enable cross-referencing. For harmonization purposes, each usage need below has been mapped, where possible, to the relevant user needs of ISO/IEC TR 29138-1 [i.31] "Accessibility considerations for people with disabilities - Part 1: User needs summary".

The section below lists all the identified usage needs. The rationale for each user need, their detailed descriptions as well as their respective mapping with the ISO/IEC TR 29138-1 [i.31] can be found in ETSI TR 103 349 [i.8].

- **Focusing attention: usage with limited ability to focus attention.** Some users need an environment in which there are no stimuli unrelated to their current task.
- **Directing attention: usage with limited ability to direct attention.** Some users need specific support for maintaining attention on their current task.
- **Shifting attention: usage with limited ability to shift attention.** Some users need strong and multimodal stimuli to shift their attention from one task to another.
- **Reading: usage with no ability to read.** Some users need alternatives to the presentation of written language.
- **Recognizing written language: usage with limited ability to recognize written language.** Some users need the written language to be presented in a way that makes it easier to recognize letters and words.
- **Comprehending written language: usage with limited ability to comprehend written language.** Some users need the written language to be worded using an easy to read style.
- **Writing: usage with no ability to write.** Some users need alternatives to the input of written language.
- **Writing correctly: usage with limited ability to correctly write words and use punctuation.** Some users need specific support for correctly writing words and using punctuation.
- **Producing written language: usage with limited ability to produce written language.** Some users need support to express their ideas using written language.
- **Calculating: usage with no ability to calculate.** Some users need alternatives to the input of the result of calculations.
- **Understanding simple maths: usage with limited ability to understand simple mathematical concepts.** Some users need alternatives to the presentation of mathematical concepts.
- **Making choices: usage with limited ability to make a choice among options.** Some users need specific support for making choices among options.

- **Interpreting effects of choices: usage with limited ability to interpret the effects of choices taken.** Some users need specific support for interpreting the effects of the choices that they have taken.
- **Initiating a task: usage with limited ability to initiate a task.** Some users need specific support for initiating a task.
- **Organizing for a task: usage with limited ability to organize for a task.** Some users need specific support for organizing time, space and materials for a task.
- **Carrying out a task: usage with limited ability to carry out a task.** Some users need specific support for carrying out the current task.
- **Completing a task: usage with limited ability to complete a task.** Some users need specific support for completing a task.
- **Managing time: usage with limited ability to manage time.** Some users need specific support for managing time when carrying out tasks.
- **Adapting to time demands: usage with limited ability to adapt to time demands.** Some users need specific support for adapting their task performance when time limits change.
- **Receiving spoken language: usage with no ability to receive spoken language.** Some users need alternatives to the presentation of spoken language.
- **Understanding spoken language: usage with limited ability to understand spoken language.** Some users need the spoken language to be worded using an easy to understand style.
- **Understanding body gestures: usage with limited or no ability to understand body gestures.** Some users need alternatives to the presentation of body gestures.
- **Understanding symbols: usage with limited or no ability to understand symbols.** Some users need alternatives to the presentation of symbols.
- **Understanding drawings and photographs: usage with limited or no ability to understand drawings and photographs.** Some users need alternatives to the presentation of drawings and photographs.
- **Speaking: usage with limited or no ability to speak.** Some users need alternatives to the input of spoken language.
- **Producing gestures: usage with limited or no ability to produce gestures.** Some users need alternatives to the input of gestures.
- **Recalling from short-term memory: usage with limited ability to recall from short-term memory.** Some users need alternatives to the use of short-term memory.
- **Recalling from long-term memory: usage with limited long-term memory.** Some users need alternatives to the use of long-term memory.

Annex B: Accessibility principles

B.1 Introduction

Annex B contains a list of accessibility principles that have been used to organize clause 12. Except where noted, the principles are based upon the accessibility goals in ISO/IEC Guide 71 [i.43].

B.2 Principles

- **Conformity with user expectations:** A system conforms to user expectations if it is predictable based on the user's context of use, laws and standards, and/or commonly accepted conventions.
- **Support for individualization:** A system supports individualization if its components, functions or operations can be tailored to meet the needs of individual users.
- **Perceivability:** A system is perceivable if diverse users in diverse contexts can sense the information and functionalities it presents.
- **Understandability:** A system is understandable if its information and functionalities are interpretable by diverse users.
- **Controllability:** A system is controllable if the user is able to initiate and complete the interaction(s) required to accomplish the task.
- **Error tolerance:** A system has error tolerance if despite predictable errors, diverse users can complete the intended task or activity with either no, or minimal, corrective action or negative consequences.
- **Compatibility with other systems:** A system provides compatibility if it allows diverse users to use other systems as a means to interact with it to accomplish the task.
- **Suitability for learning:** A system is suitable for learning when it supports and guides the user in learning to use the system.

NOTE 1: Source: ISO 9241-110 [i.22].

- **Freedom from distraction:** Presented information is free from distractions if the information is presented so that required information will be perceived without other presented information interfering with its perception. Freedom from distraction involves minimizing and avoiding distractions.

NOTE 2: Source: ISO DIS 9241-112 [i.23].

Annex C:

Cross-reference between usage needs and guidelines

Tables C.1 to C.3 show which of the guidelines in the present document support which usage needs. The information in the tables is derived from the listings of "Related usage needs" in the notes to each guideline.

The following abbreviations have been used to represent the relationship between the guidelines in clauses 6 to 13 and the usage needs described in Annex A:

- P = Primary relationship. The guideline directly supports the usage need.
- S = Secondary relationship. The guideline provides partial support for the usage need because some users may benefit from the feature in specific situations.

Anyone interested to understand which guidelines have a strong relationship with a particular usage need (e.g. Focussing attention) can look down the column for that usage need and identify all of those guidelines that provide direct support related to that usage need (those with a P in the cell) and those that might provide some support for some users who have that usage need in some situations (those marked with an S in the cell).

A single table that contains the same cross-referencing between usage needs and guidelines is contained in archive eg_203350v010101m0.zip as an Excel file (Usage Needs Mapping Table.xlsx). This table contains row and column totals that make it possible to determine how many guidelines address a particular usage need (in a "Primary" or "Secondary" relationship). It is also possible to obtain a similar picture of how many usage needs a particular guideline addresses (at a "Primary" or "Secondary" level).

Table C.1: Cross reference between attention, reading and writing-related usage needs and guidelines

Guide-line Topic	Guide-line Clause	Guideline Text (abbrev.)	<u>Focusing attention</u>	<u>Directing attention</u>	<u>Shifting attention</u>	<u>Reading</u>	<u>Recognizing written language</u>	<u>Comprehending written language</u>	<u>Writing</u>	<u>Writing correctly</u>	<u>Producing written language</u>
Any mobile ICT	6.2	Applying usability principles	P	P	P	S	S	P	S	S	S
	6.3	Applying accessibility guidelines	P	P	P	P	S	P	P	S	S
	6.4	Interoperability with assistive techn.				P	S	S	P	S	S
	6.5.2	User authent.: char. memorization				P	P		P	P	
	6.5.3	User authent.: char. selection				P	P		P	P	
	6.5.4	User authent.: calculation									
	6.5.5	User authent.: speaking									
	6.5.6	User authent.: producing gestures									
	6.5.7	User authent.: entering characters				P	P		P	P	
	6.6	Biometrics for control	S	S	S				P	P	
	6.7	Retracing the dialogue path	p								
	6.8	Arrangement of UI elements				S		S			
	6.9	Touch activation on up event									
6.10	Touch activation on down event										
Use of language	7.2.1	Clarifying the purpose of content	S			S	P	P			
	7.2.2	Sentence focus						P			
	7.2.3	Unambiguous terms and concepts						P			
	7.3.1	Simple language					P	P			
	7.3.2	Short sentences					P	P			
	7.3.3	Essential information					P	P			
	7.3.4	Consistent grammar					P	P			
	7.3.5	Simple sentence structure					P	P			
	7.3.6	Preferred sentence structure					P	P			
	7.3.7	Variation in sentence length	P					P			
	7.3.8	Relative clauses					P	P			
	7.3.9	Nested sentence					P	P			
	7.3.10	Position of modal and aux. verbs					P	P			
	7.3.11	Active voice					P	P			
	7.3.12	Present tense					P	P			
	7.4.1	Concrete and specific wording					P	P			
	7.4.2	Figurative language					P	P			
	7.4.3	Terminology of the user					P	P			
	7.4.4	Consistent terminology					P	P			
	7.4.5	Avoidance of novel or prop. terms					P	P			
	7.4.6	Explaining novel or prop. terms					P	P			
	7.4.7	Avoidance of jargon/spec. language					P	P			
	7.5.1	Consistent spelling					P	P			
	7.5.2	Full word labels					P	P			
	7.5.3	Contractions and abbreviations					P	P			
	7.5.4	Meaning of abbrev. and symbols					P	P			
	7.6.1	Labels for action controls						P			
	7.6.2	Consistent verb forms						P	P		
	7.6.3	Labels for contr. leading to objects							P		
	7.6.4	Labels for choices repress. states							P		
	7.6.5	Verbal style						P	P		
	7.6.6	Articles and relative pronouns						P	P		
7.6.7	Avoidance of pronouns						P	P			
7.6.8	Use of pronouns						P	P			
7.6.9	Use of conjunctions						P	P			
7.6.10	Use of "must"							P			
7.6.11	Cultural and language styles						P	P			
7.6.12	Simple paragraph structure						P	P			
7.6.13	Use of paragraphs to clarify logic						P	P			
7.6.14	One topic per paragraph						P	P			
7.6.15	Topic of paragraph						P	P			
7.6.16	Simple instructions							P			

Guide- line Topic	Guide- line Clause	Guideline Text (abbrev.)											<u>Focusing attention</u>	<u>Directing attention</u>	<u>Shifting attention</u>	<u>Reading</u>	<u>Recognizing written language</u>	<u>Comprehending written language</u>	<u>Writing</u>	<u>Writing correctly</u>	<u>Producing written language</u>
	7.6.17	Consistent structures for instruct.																P			
	7.7.1	Level of formality for audience																P			
	7.7.2	Direct addressing of readers																P			
	7.7.3	Addressing readers as individuals																P			
	7.8.1	Font size															P	S			
	7.8.2	Font type															P	S			
	7.8.3	Character stroke thickness															P	S			
	7.8.4	Italics															P	S			
	7.8.5	Text colour contrast															P	S			
	7.8.6	Line spacing															P	S			
	7.8.7	Headings and subheadings															P	P			
	7.8.8	Bullet points and numbered lists															P	P			
	7.8.9	Numerals															P	P			
	7.8.10	Long numerals															P	P			
	7.8.11	Roman numbers															P	P			
7.8.12	Fractions															P	P				
7.8.13	Consistent units of measurement															P	P				
7.8.14	Calendar dates in long form															P	P				
Mobile ICT with two- way communication, media playing and recording, hardware of	8.2.1	Alternatives to voice-based services																			
	8.2.2	Alternatives to video-based services																			
	8.2.3	Text mess. for asynchronous chat				P		P	P										P	P	
	8.2.4	Photo-based call directory					P	P	P												
	9.2.1	Always visible playback controls	S	S				S	S												
	10.2.1	Standard connections					P	S	S	P	S	S									
	10.2.2	Symmetrical connections					P	S	S												
	10.2.3	Discernibility of touch controls	S	S	S																
	10.2.4	Low-reflectance screens	P	P	P	P		P	P												
	Mobile software	12.2.1	On focus																		
12.2.2		On input																			
12.2.3		Consistent attributes															P	P			
12.2.4		Consistent gestures																			
12.2.5		Consistent behaviour																			
12.2.6		Consistent layout				S			P	P											
12.2.7		Consistent individualization																			
12.2.8		Platform conventions				S			P	P											
12.2.9		Breaking conventions				S			P	P											
12.2.10		Respecting users' intentions							P	P											
12.2.11		Maintaining privacy and security							S	S											
12.2.12		Non-threatening user interfaces							S	S											
12.3.1		User-selectable options	P	P	P	P		P	P	P	P	P	P	P	P	P	P	P	P	P	P
12.3.2		Context sensitive individualization	P	P	P	P		P	P	P	P	P	P	P	P	P	P	P	P	P	P
12.3.3		Feedback modality selection	P	P	P	P		P	P												
12.3.4		Input modality selection																	P	P	P
12.3.5		Access to personal information																	P	P	P
12.3.6		Behaviour-related warnings	S	S	S																
12.4.1		Setting attention on imp. information	P	P	P				P	P											
12.4.2		Important information to stand out	P	P	P				P	P											
12.4.3		Highlighting of spoken word							P	P											
12.4.4		Enabling repetition of information							P	P											
12.4.5		Interference with important info.	P	P	P				P	P											
12.4.6		Immediate response	P	P																	
12.4.7		Busy indication	P	P																	
12.4.8		Availability of freq. and crit. controls																			
12.4.9		Occasional controls							S	S											
12.4.10		Non-allowed controls							S	S											
12.4.11		Accessing non-presented info.	S	S	S				P	P											
12.4.12		End of a set of information	S	S	S				P	P											
12.4.13	Multimodal feedback and prompts	P	P	P	P			P	P												
12.4.14	Touchscreen vibration																				

Guide-line Topic	Guide-line Clause	Guideline Text (abbrev.)	<u>Focusing attention</u>	<u>Directing attention</u>	<u>Shifting attention</u>	<u>Reading</u>	<u>Recognizing written language</u>	<u>Comprehending written language</u>	<u>Writing</u>	<u>Writing correctly</u>	<u>Producing written language</u>
	12.4.15	Structuring information			S		P	P			
	12.4.16	Presentation of dissimilar items			S		P	P			
	12.4.17	Presentation of similar items			S		P	P			
	12.4.18	Distinguishable groups			S		P	P			
	12.4.19	Grouping by proximity			S		P	P			
	12.4.20	Separating groups			S		P	P			
	12.4.21	Differentiating groups	S	S	S		P	P			
	12.4.22	Maximum group size	S	S	S		P	P			
	12.4.23	Filtering of information					P	P			
	12.4.24	Attributes of user interface elements					P	P			
	12.4.25	Attributes of the cursor and pointer	S	S	S		P	P			
	12.5.1	Information on current states	S	S			P	P			
	12.5.2	Context-sensitive help					P	P			
	12.5.3	Images for context comprehension				P	P	P			
	12.5.4	Symbols to enhance understanding					P	P			
	12.5.5	Minimizing the amount of info.	P	P			P	P			
	12.5.6	Unnecessary information	P	P			P	P			
	12.5.7	Access to levels of information	P	P			P	P			
	12.5.8	Navig. and searching through info.					S	S			
	12.5.9	Video prompts				P	P	P			
	12.5.10	Audio prompts				P	P	P			
	12.5.11	Practice mode					S	S			
	12.5.12	Activation of the practice mode					S	S			
	12.5.13	Visibility of the practice mode					S	S			
	12.5.14	Mathematical notation read out									
	12.5.15	Associating a photo with a contact				P	P	P	P	P	P
	12.5.16	Time display									
	12.5.17	Time orientation									
	12.5.18	Time communic. and managem.									
	12.5.19	Presentation of battery information					P	P			
	12.5.20	Low battery guidance					P	P			
	12.6.1	Time limits	P	P	P		P	P		P	P
	12.6.2	Timing adjustable	P	P	P		P	P		P	P
	12.6.3	Timing adjustable extend option	P	P	P		P	P		P	P
	12.6.4	Pause, stop, hide	P	P	P		S	S			
	12.6.5	Focus order	P	P	P		P	P			
	12.6.6	Link purpose					P	P			
	12.6.7	Headings and labels					P	P			
	12.6.8	Focus visible	P	P	P		P	P			
	12.6.9	Multi-modal input							P	P	P
	12.6.10	Word prediction								P	P
	12.6.11	Voice recognition							P	P	P
	12.6.12	Minimize user actions									
	12.6.13	Storing input and system locally							P	P	P
	12.6.14	Making info. accessible to the user							P	P	P
	12.6.15	Marking content for later retrieval							P	P	P
	12.6.16	Direct access to stored information							P	P	P
	12.6.17	Exporting and importing information							P	P	P
	12.6.18	Collected input and output history							P	P	P
	12.6.19	Access to info. about actions									
	12.6.20	Auto-fill-in technologies							P	P	P
	12.6.21	Support for sub-dividing tasks	S	S							
	12.6.22	Possibility for task sub-division	S	S							
	12.6.23	Navigation of episodic content						P			
	12.6.24	Controls for episodic content						P			
	12.6.25	Location within episodic content						P			
	12.6.26	End of episodic content						P			
	12.6.27	Bookmarking episodic content						P			
	12.6.28	Press bookmarks of episodic cont.						P			

Guide-line Topic	Guide-line Clause	Guideline Text (abbrev.)	<u>Focusing attention</u>	<u>Directing attention</u>	<u>Shifting attention</u>	<u>Reading</u>	<u>Recognizing written language</u>	<u>Comprehending written language</u>	<u>Writing</u>	<u>Writing correctly</u>	<u>Producing written language</u>
	12.6.29	Jump. to bookmarks in epis. cont.						P			
	12.6.30	Automatic traversal of epis. proc.						P			
	12.6.31	Titling used within episodic content						P			
	12.6.32	Automatic entry of user data				P	P	P	P	P	P
	12.6.33	Copy and paste of user data				P	P	P	P	P	P
	12.6.34	Predicting task duration									
	12.6.35	Indicating task progress									
	12.6.36	Additional support for time demands									
	12.7.1	Error identification	S	S						P	P
	12.7.2	Error suggestion	S	S						P	P
	12.7.3	Auto correction of errors	S	S						P	P
	12.7.4	Error prevention (legal, financial)	S	S			P	P	P	P	P
	12.8	Compatibility with other systems									
	12.9.1	Labels or instructions					P	P			
	12.10.1	Restart	P	P							
	12.10.2	Hiding non task-related content	P	P			P	P			
	12.10.3	Reinstating non task-related content	P	P			P	P			
	Documentation for mobile ICT	13.2.1	Accessible documentation								
13.2.2		Use of language in documentation									
13.2.3		Results of user actions					P	P			
13.2.4		Font size for user documentation	S	S			P	P		S	S
13.2.5		Use of pictures for depicting actions		S	S		P	P			
13.2.6		Use of spoken user information				P	P	P			

Table C.2: Cross reference between calculating, decision-making, task and time-related usage needs and guidelines

Guide-line Topic	Guide-line Clause	Guideline Text (abbrev.)										
			<u>Calculating</u>	<u>Understanding simple maths</u>	<u>Making choices</u>	<u>Interpreting effects of choices</u>	<u>Initiating a task</u>	<u>Organizing for a task</u>	<u>Carrying out a task</u>	<u>Completing a task</u>	<u>Managing time</u>	<u>Adapting to time</u>
Any mobile ICT	6.2	Applying usability principles	S	S	P	P	P	P	P	P	P	P
	6.3	Applying accessibility guidelines	S	S	S	S	S	S	S	S	P	P
	6.4	Interoperability with assistive techn.										
	6.5.2	User authent.: char. memorization										
	6.5.3	User authent.: char. selection		P								
	6.5.4	User authent.: calculation	P	P								
	6.5.5	User authent.: speaking										
	6.5.6	User authent.: producing gestures										
	6.5.7	User authent.: entering characters										
	6.6	Biometrics for control										
	6.7	Retracing the dialogue path			P	S			S			
	6.8	Arrangement of UI elements			P	S	P	S	P	P		
	6.9	Touch activation on up event			P	P	P		P	P		
6.10	Touch activation on down event			P	P	P		P	P			
Use of language	7.2.1	Clarifying the purpose of content			S		S					
	7.2.2	Sentence focus										
	7.2.3	Unambiguous terms and concepts			S	S	S	S	S	S		
	7.3.1	Simple language			S	S						
	7.3.2	Short sentences			S	S						
	7.3.3	Essential information			S	S						
	7.3.4	Consistent grammar			S	S						
	7.3.5	Simple sentence structure			S	S						
	7.3.6	Preferred sentence structure			S	S						
	7.3.7	Variation in sentence length			S	S						
	7.3.8	Relative clauses			S	S						
	7.3.9	Nested sentence			S	S						
	7.3.10	Position of modal and aux. verbs			S	S						
	7.3.11	Active voice			S	S						
	7.3.12	Present tense			S	S						
	7.4.1	Concrete and specific wording			S	S						
	7.4.2	Figurative language			S	S						
	7.4.3	Terminology of the user			S	S						
	7.4.4	Consistent terminology			S	S						
	7.4.5	Avoidance of novel or prop. terms			S	S						
	7.4.6	Explaining novel or prop. terms			S	S						
	7.4.7	Avoidance of jargon/spec. language			S	S						
	7.5.1	Consistent spelling			S	S						
	7.5.2	Full word labels			S	S						
	7.5.3	Contractions and abbreviations			S	S						
	7.5.4	Meaning of abbrev. and symbols			S	S						
	7.6.1	Labels for action controls			S	S	S	S	S	S		
	7.6.2	Consistent verb forms			S	S						
	7.6.3	Labels for contr. leading to objects			S	S	S	S	S	S		
	7.6.4	Labels for choices repress. states			S	S	S	S	S	S		
7.6.5	Verbal style			S	S							
7.6.6	Articles and relative pronouns			S	S							
7.6.7	Avoidance of pronouns			S	S							
7.6.8	Use of pronouns			S	S							
7.6.9	Use of conjunctions			S	S							
7.6.10	Use of "must"			S	S	S	S	S	S			
7.6.11	Cultural and language styles			S	S							
7.6.12	Simple paragraph structure			S	S							
7.6.13	Use of paragraphs to clarify logic			S	S							
7.6.14	One topic per paragraph			S	S							

Guideline Topic	Guideline Clause	Guideline Text (abbrev.)	<u>Calculating</u>	<u>Understanding simple maths</u>	<u>Making choices</u>	<u>Interpreting effects of choices</u>	<u>Initiating a task</u>	<u>Organizing for a task</u>	<u>Carrying out a task</u>	<u>Completing a task</u>	<u>Managing time</u>	<u>Adapting to time</u>
	7.6.15	Topic of paragraph			S	S						
	7.6.16	Simple instructions			S	S	S	S	S	S		
	7.6.17	Consistent structures for instruct.			S	S	S	S	S	S		
	7.7.1	Level of formality for audience			S	S						
	7.7.2	Direct addressing of readers			S	S	S	S	S	S		
	7.7.3	Addressing readers as individuals			S	S	S	S	S	S		
	7.8.1	Font size			S	S						
	7.8.2	Font type			S	S						
	7.8.3	Character stroke thickness			S	S						
	7.8.4	Italics			S	S						
	7.8.5	Text colour contrast			S	S						
	7.8.6	Line spacing			S	S						
	7.8.7	Headings and subheadings			S	S						
	7.8.8	Bullet points and numbered lists			S	S						
	7.8.9	Numerals		P	S	S						
7.8.10	Long numerals		P	S	S							
7.8.11	Roman numbers		P	S	S							
7.8.12	Fractions		P	S	S							
7.8.13	Consistent units of measurement		P	S	S	S	S	S	S			
7.8.14	Calendar dates in long form		P	P	S	S						
Mobile ICT with two-way communication, media playing and recording, hardware of mobile ICT	8.2.1	Alternatives to voice-based services										
	8.2.2	Alternatives to video-based services										
	8.2.3	Text mess. for asynchronous chat			S	S						
	8.2.4	Photo-based call directory		S	S	S	S		S	S		
	9.2.1	Always visible playback controls			P	P	P		P	P	P	P
	10.2.1	Standard connections			P							
	10.2.2	Symmetrical connections			P	S						
	10.2.3	Discernibility of touch controls			P	P	P		P	P		
10.2.4	Low-reflectance screens											
Mobile software	12.2.1	On focus			P	P	P		P	P		
	12.2.2	On input			P	P	P		P	P		
	12.2.3	Consistent attributes			P	P	P		P	P		
	12.2.4	Consistent gestures			P	P	P		P	P		
	12.2.5	Consistent behaviour			P	P	P		P	P		
	12.2.6	Consistent layout			P	P	P		P	P		
	12.2.7	Consistent individualization			P	P	P		P	P		
	12.2.8	Platform conventions			P	P	P		P	P		
	12.2.9	Breaking conventions			P	P	P		P	P		
	12.2.10	Respecting users' intentions			P	P						
	12.2.11	Maintaining privacy and security		S	P	P						
	12.2.12	Non-threatening user interfaces		S	P	P						
	12.3.1	User-selectable options	P	P	P	P	P	P	P	P	P	P
	12.3.2	Context sensitive individualization	P	P	P	P	P	P	P	P	P	P
	12.3.3	Feedback modality selection		P	P	P	P		P	P	P	P
	12.3.4	Input modality selection	P				P		P	P		
	12.3.5	Access to personal information	P						P	P	P	P
	12.3.6	Behaviour-related warnings			P	P	P		P	P	P	P
	12.4.1	Setting attention on imp. information			P	P	S		S	S	S	S
	12.4.2	Important information to stand out			P	P	S		S	S	S	S
12.4.3	Highlighting of spoken word											
12.4.4	Enabling repetition of information											
12.4.5	Interference with important info.			P	P	S		S	S	S	S	
12.4.6	Immediate response				P			P	P	P	P	
12.4.7	Busy indication				P			P	P	P	P	
12.4.8	Availability of freq. and crit. controls			P		P		P	P			
12.4.9	Occasional controls		S	P		P		P	P			
12.4.10	Non-allowed controls		S	P		P		P	P			

Guide-line Topic	Guide-line Clause	Guideline Text (abbrev.)	Calculating	Understanding simple maths	Making choices	Interpreting effects of choices	Initiating a task	Organizing for a task	Carrying out a task	Completing a task	Managing time	Adapting to time	
	12.4.11	Accessing non-presented info.		S	P		S		S	S			
	12.4.12	End of a set of information		S	P		S		S	S			
	12.4.13	Multimodal feedback and prompts		P	P	P	P		P	P	P	P	
	12.4.14	Touchscreen vibration			P	P	P		P	P			
	12.4.15	Structuring information			P	P	P		P	P			
	12.4.16	Presentation of dissimilar items			P	P	P		P	P			
	12.4.17	Presentation of similar items			P	P	P		P	P			
	12.4.18	Distinguishable groups			P	P	P		P	P			
	12.4.19	Grouping by proximity			P	P	P		P	P			
	12.4.20	Separating groups			P	P	P		P	P			
	12.4.21	Differentiating groups			P	P	P		P	P			
	12.4.22	Maximum group size			P	P	P		P	P			
	12.4.23	Filtering of information			P	P	P		P	P			
	12.4.24	Attributes of user interface elements											
	12.4.25	Attributes of the cursor and pointer			P		P		P	P			
	12.5.1	Information on current states			P	P	P	P	P	P			
	12.5.2	Context-sensitive help			P	P	P	P	P	P			
	12.5.3	Images for context comprehension											
	12.5.4	Symbols to enhance understanding			P		S		S	S			
	12.5.5	Minimizing the amount of info.			P	P	P	P	P	P			
	12.5.6	Unnecessary information			P	P	P	P	P	P			
	12.5.7	Access to levels of information			P	P	P	P	P	P			
	12.5.8	Navig. and searching through info.			P	P	P	P	P	P			
Mobile software (cont.)	12.5.9	Video prompts			P	P	P	P	P	P			
	12.5.10	Audio prompts			P	P	P	P	P	P			
	12.5.11	Practice mode		S	P	P	P	P	P	P			
	12.5.12	Activation of the practice mode		S	P	P	P	P	P	P			
	12.5.13	Visibility of the practice mode		S	P	P	P	P	P	P			
	12.5.14	Mathematical notation read out	P	P									
	12.5.15	Associating a photo with a contact			P		P		P	P			
	12.5.16	Time display		P							P	P	
	12.5.17	Time orientation		P							P	P	
	12.5.18	Time communic. and managem.		P							P	P	
	12.5.19	Presentation of battery information		P	P	P							
	12.5.20	Low battery guidance		P	P	P	P						
	12.6.1	Time limits			P	P	P		P	P	P	P	
	12.6.2	Timing adjustable			P	P	P		P	P	P	P	
	12.6.3	Timing adjustable extend option			P	P	P		P	P	P	P	
	12.6.4	Pause, stop, hide											
	12.6.5	Focus order			P	P	P		P	P			
	12.6.6	Link purpose			P	P	P		P	P			
	12.6.7	Headings and labels			P	P	P		P	P			
	12.6.8	Focus visible			P	P	P		P	P			
	12.6.9	Multi-modal input	P		P		P		P	P			
	12.6.10	Word prediction											
	12.6.11	Voice recognition			P		P		P	P			
	12.6.12	Minimize user actions			P	P	P		P	P			
	12.6.13	Storing input and system locally	P				P		P	P			
	12.6.14	Making info. accessible to the user	P				P		P	P			
	12.6.15	Marking content for later retrieval	P				P		P	P			
	12.6.16	Direct access to stored information	P				P		P	P			
12.6.17	Exporting and importing information	P				P		P	P				
12.6.18	Collected input and output history	P				P		P	P				
12.6.19	Access to info. about actions			P		P		P	P				
12.6.20	Auto-fill-in technologies	P						P		P	P		
12.6.21	Support for sub-dividing tasks			P		P	P	P	P				
12.6.22	Possibility for task sub-division			P		P	P	P	P				

Guideline Topic	Guideline Clause	Guideline Text (abbrev.)	<u>Calculating</u>	<u>Understanding simple maths</u>	<u>Making choices</u>	<u>Interpreting effects of choices</u>	<u>Initiating a task</u>	<u>Organizing for a task</u>	<u>Carrying out a task</u>	<u>Completing a task</u>	<u>Managing time</u>	<u>Adapting to time</u>
	12.6.23	Navigation of episodic content					P	P	P	P		
	12.6.24	Controls for episodic content					P	P	P	P		
	12.6.25	Location within episodic content					P	P	P	P		
	12.6.26	End of episodic content					P	P	P	P		
	12.6.27	Bookmarking episodic content					P	P	P	P		
	12.6.28	Press bookmarks of episodic cont.					P	P	P	P		
	12.6.29	Jump. to bookmarks in epis. cont.					P	P	P	P		
	12.6.30	Automatic traversal of epis. proc.					P	P	P	P		
	12.6.31	Titling used within episodic content					P	P	P	P		
	12.6.32	Automatic entry of user data	P	P								
	12.6.33	Copy and paste of user data	P	P								
	12.6.34	Predicting task duration							P	P	P	P
	12.6.35	Indicating task progress							P	P	P	P
	12.6.36	Additional support for time demands									P	P
	12.7.1	Error identification	P		P	P			P	P		
	12.7.2	Error suggestion	P		P				P	P		
	12.7.3	Auto correction of errors	P		P				P	P		
	12.7.4	Error prevention (legal, financial)	P		P	P			P	P		
	12.8	Compatibility with other systems										
	12.9.1	Labels or instructions			P	P	P		P	P		
12.10.1	Restart											
12.10.2	Hiding non task-related content			P	P	P	P	P	P			
12.10.3	Reinstating non task-related content			P	P	P	P	P	P			
Documentation for mobile ICT	13.2.1	Accessible documentation										
	13.2.2	Use of language in documentation										
	13.2.3	Results of user actions			S	S	S	S	S	S		
	13.2.4	Font size for user documentation										
	13.2.5	Use of pictures for depicting actions			P		S		S	S		
	13.2.6	Use of spoken user information			P	P	P	P	P	P		

Table C.3: Cross reference between receiving speech, receiving non-verbal messages, speaking, producing non-verbal messages and memory-related usage needs and guidelines

Guideline Topic	Guideline Clause	Guideline Text (abbrev.)	<u>Receiving spoken language</u>	<u>Understanding spoken language</u>	<u>Understanding body gestures</u>	<u>Understanding symbols</u>	<u>Understanding drawings and</u>	<u>Speaking</u>	<u>Producing gestures</u>	<u>Recalling from short-term memory</u>	<u>Recalling from long-term memory</u>
Any mobile ICT	6.2	Applying usability principles	P	P	S	P	S	P	P	P	P
	6.3	Applying accessibility guidelines	P	P	S	S	S	P	S	S	S
	6.4	Interoperability with assistive techn.	P	S	S	S	S	P	P		
	6.5.2	User authent.: char. memorization									P
	6.5.3	User authent.: char. selection								P	P
	6.5.4	User authent.: calculation								P	
	6.5.5	User authent.: speaking						P			S
	6.5.6	User authent.: producing gestures							P		P
	6.5.7	User authent.: entering characters								P	
	6.6	Biometrics for control						P	P		
	6.7	Retracing the dialogue path								P	
6.8	Arrangement of UI elements				S	S				P	
6.9	Touch activation on up event							S			
6.10	Touch activation on down event							S			
Use of language	7.2.1	Clarifying the purpose of content		P						S	
	7.2.2	Sentence focus		P							
	7.2.3	Unambiguous terms and concepts		P							S
	7.3.1	Simple language		P						S	
	7.3.2	Short sentences		P						S	
	7.3.3	Essential information		P						S	
	7.3.4	Consistent grammar		P							S
	7.3.5	Simple sentence structure		P						S	
	7.3.6	Preferred sentence structure		P						S	
	7.3.7	Variation in sentence length		P							
	7.3.8	Relative clauses		P						S	
	7.3.9	Nested sentence		P						S	
	7.3.10	Position of modal and aux. verbs		P						S	
	7.3.11	Active voice		P						S	
	7.3.12	Present tense		P						S	
	7.4.1	Concrete and specific wording		P							
	7.4.2	Figurative language		P							
	7.4.3	Terminology of the user		P							S
	7.4.4	Consistent terminology		P							S
	7.4.5	Avoidance of novel or prop. terms		P							S
	7.4.6	Explaining novel or prop. terms		P							S
	7.4.7	Avoidance of jargon/spec. language		P							S
	7.5.1	Consistent spelling		P							
	7.5.2	Full word labels		P						S	S
	7.5.3	Contractions and abbreviations		P						S	S
	7.5.4	Meaning of abbrev. and symbols		P						S	S
	7.6.1	Labels for action controls		P							S
	7.6.2	Consistent verb forms		P						S	S
	7.6.3	Labels for contr. leading to objects		P							S
	7.6.4	Labels for choices repress. states		P							S
7.6.5	Verbal style		P						S		
7.6.6	Articles and relative pronouns		P								
7.6.7	Avoidance of pronouns		P						S		
7.6.8	Use of pronouns		P						S		
7.6.9	Use of conjunctions		P								
7.6.10	Use of "must"		P							S	
7.6.11	Cultural and language styles		P								
7.6.12	Simple paragraph structure		P						S		
7.6.13	Use of paragraphs to clarify logic		P								
7.6.14	One topic per paragraph		P						S		

Guideline Topic	Guideline Clause	Guideline Text (abbrev.)	Receiving	Understanding	Understanding	Understanding	Understanding	Speaking	Producing gestures	Recalling from	Recalling from
			spoken language	spoken language	body gestures	symbols	drawings and		gestures	short-term memory	long-term memory
	7.6.15	Topic of paragraph		P						S	
	7.6.16	Simple instructions		P							S
	7.6.17	Consistent structures for instruct.		P							S
	7.7.1	Level of formality for audience		P							
	7.7.2	Direct addressing of readers		P							S
	7.7.3	Addressing readers as individuals		P							S
	7.8.1	Font size									
	7.8.2	Font type									
	7.8.3	Character stroke thickness									
	7.8.4	Italics									
	7.8.5	Text colour contrast									
	7.8.6	Line spacing									
	7.8.7	Headings and subheadings									
	7.8.8	Bullet points and numbered lists									
	7.8.9	Numerals									
7.8.10	Long numerals										
7.8.11	Roman numbers										
7.8.12	Fractions										
7.8.13	Consistent units of measurement		P			S					S
7.8.14	Calendar dates in long form			P							
Mobile ICT with two-way communication, media playing and recording, hardware of mobile ICT	8.2.1	Alternatives to voice-based services	P	P				P			
	8.2.2	Alternatives to video-based services	P	P	P	P	P	P			
	8.2.3	Text mess. for asynchronous chat				S				P	
	8.2.4	Photo-based call directory									P
	9.2.1	Always visible playback controls	S	S	S	S	S				P
	10.2.1	Standard connections				P	S	P			P
	10.2.2	Symmetrical connections					P	S			P
	10.2.3	Discernibility of touch controls					P	S			P
10.2.4	Low-reflectance screens			P	P	P					
Mobile software	12.2.1	On focus								S	
	12.2.2	On input								S	
	12.2.3	Consistent attributes		P		P	P				P
	12.2.4	Consistent gestures			P				P		P
	12.2.5	Consistent behaviour									P
	12.2.6	Consistent layout		P		P	P				P
	12.2.7	Consistent individualization									P
	12.2.8	Platform conventions		P		P	P				P
	12.2.9	Breaking conventions		P		P	P				P
	12.2.10	Respecting users' intentions		P		P	P				
	12.2.11	Maintaining privacy and security		S		S	S				
	12.2.12	Non-threatening user interfaces		S		S	S				
	12.3.1	User-selectable options	P	P	P	P	P	P	P	P	P
	12.3.2	Context sensitive individualization	P	P	P	P	P	P	P	P	P
	12.3.3	Feedback modality selection	P	P	P	P	P				
	12.3.4	Input modality selection						P	P		P
	12.3.5	Access to personal information									P
	12.3.6	Behaviour-related warnings									
	12.4.1	Setting attention on imp. information		P	P	P	P				
	12.4.2	Important information to stand out		P	P	P	P				
	12.4.3	Highlighting of spoken word		P							P
	12.4.4	Enabling repetition of information		P							P
	12.4.5	Interference with important info.		P	P	P	P				P
	12.4.6	Immediate response									S
	12.4.7	Busy indication									S
12.4.8	Availability of freq. and crit. controls										P
12.4.9	Occasional controls			S	S	S	S				P
12.4.10	Non-allowed controls			S	S	S	S				P

Guide- line Topic	Guide- line Clause	Guideline Text (abbrev.)									
			<u>Receiving spoken language</u>	<u>Understanding spoken language</u>	<u>Understanding body gestures</u>	<u>Understanding symbols</u>	<u>Understanding drawings and</u> <u>Speaking</u>	<u>Producing gestures</u>	<u>Recalling from short-term memory</u>	<u>Recalling from long-term memory</u>	
	12.4.11	Accessing non-presented info.		P	P	P	P			P	
	12.4.12	End of a set of information		P	P	P	P			P	
	12.4.13	Multimodal feedback and prompts	P	P	P	P	P				
	12.4.14	Touchscreen vibration								P	
	12.4.15	Structuring information		P		P	P			P	P
	12.4.16	Presentation of dissimilar items		P		P	P			P	P
	12.4.17	Presentation of similar items		P		P	P			P	P
	12.4.18	Distinguishable groups		P		P	P			P	P
	12.4.19	Grouping by proximity		P		P	P			P	P
	12.4.20	Separating groups		P		P	P			P	P
	12.4.21	Differentiating groups		P		P	P			P	P
	12.4.22	Maximum group size		P		P	P			P	
	12.4.23	Filtering of information		P		P	P			P	
	12.4.24	Attributes of user interface elements		P		P	P				
	12.4.25	Attributes of the cursor and pointer				P	P				
	12.5.1	Information on current states		P		P	P			P	
	12.5.2	Context-sensitive help		P		P	P				P
	12.5.3	Images for context comprehension		P		P	P				
	12.5.4	Symbols to enhance understanding									P
	12.5.5	Minimizing the amount of info.		P		P	P			P	P
	12.5.6	Unnecessary information		P		P	P			P	P
	12.5.7	Access to levels of information		P		P	P			P	P
	12.5.8	Navig. and searching through info.		S		S	S				
	12.5.9	Video prompts	P	P							
	12.5.10	Audio prompts			P	P	P				
	12.5.11	Practice mode		S	S	S	S		S		P
	12.5.12	Activation of the practice mode		S	S	S	S		S		P
	12.5.13	Visibility of the practice mode		S	S	S	S		S		P
	12.5.14	Mathematical notation read out									
	12.5.15	Associating a photo with a contact									P
	12.5.16	Time display									
	12.5.17	Time orientation									
	12.5.18	Time communic. and managem.									
	12.5.19	Presentation of battery information				P	P				
	12.5.20	Low battery guidance				P	P				
	12.6.1	Time limits		P	P	P	P	P	P	P	
	12.6.2	Timing adjustable		P	P	P	P	P	P	P	
	12.6.3	Timing adjustable extend option		P	P	P	P	P	P	P	
	12.6.4	Pause, stop, hide		S	S	S	S			S	
	12.6.5	Focus order									
	12.6.6	Link purpose				P	P				
	12.6.7	Headings and labels				P	P				P
	12.6.8	Focus visible									
	12.6.9	Multi-modal input						P	P		
	12.6.10	Word prediction									
	12.6.11	Voice recognition									
	12.6.12	Minimize user actions									P
	12.6.13	Storing input and system locally								P	
	12.6.14	Making info. accessible to the user								P	
	12.6.15	Marking content for later retrieval								P	P
	12.6.16	Direct access to stored information								P	
	12.6.17	Exporting and importing information								P	P
	12.6.18	Collected input and output history								P	
	12.6.19	Access to info. about actions						P			P
	12.6.20	Auto-fill-in technologies									P
	12.6.21	Support for sub-dividing tasks									
	12.6.22	Possibility for task sub-division									

Guideline Topic	Guideline Clause	Guideline Text (abbrev.)	<u>Receiving spoken language</u>	<u>Understanding spoken language</u>	<u>Understanding body gestures</u>	<u>Understanding symbols</u>	<u>Understanding drawings and</u> <u>Speaking</u>	<u>Producing gestures</u>	<u>Recalling from short-term memory</u>	<u>Recalling from long-term memory</u>
	12.6.23	Navigation of episodic content		P	P	P	P			
	12.6.24	Controls for episodic content		P	P	P	P			
	12.6.25	Location within episodic content		P	P	P	P		P	P
	12.6.26	End of episodic content		P	P	P	P			
	12.6.27	Bookmarking episodic content		P	P	P	P		P	P
	12.6.28	Press bookmarks of episodic cont.		P	P	P	P		P	P
	12.6.29	Jump. to bookmarks in epis. cont.		P	P	P	P		P	P
	12.6.30	Automatic traversal of epis. proc.		P	P	P	P			
	12.6.31	Titling used within episodic content		P	P	P	P			
	12.6.32	Automatic entry of user data								
	12.6.33	Copy and paste of user data								
	12.6.34	Predicting task duration								
	12.6.35	Indicating task progress								
	12.6.36	Additional support for time demands								
	12.7.1	Error identification		P	P	P	P	P	P	
	12.7.2	Error suggestion						P	P	
	12.7.3	Auto correction of errors						P	P	
	12.7.4	Error prevention (legal, financial)		P	P	P	P	P	P	
	12.8	Compatibility with other systems								
	12.9.1	Labels or instructions				P				P
12.10.1	Restart									
12.10.2	Hiding non task-related content		P		P	P			P	P
12.10.3	Reinstating non task-related content		P		P	P			P	P
Documentation for mobile ICT	13.2.1	Accessible documentation								
	13.2.2	Use of language in documentation								
	13.2.3	Results of user actions								S
	13.2.4	Font size for user documentation								
	13.2.5	Use of pictures for depicting actions								P
	13.2.6	Use of spoken user information			P	P	P			

History

Document history			
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