TECHNICAL SPECIFICATION

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Ergonomics of human-system interaction — Guidance on accessibility for human-computer interfaces

Ergonomie de l'interaction homme/système — Guidage relatif à l'accessibilité aux interfaces homme/ordinateur

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Foreword

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The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

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Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO/TS 16071 was prepared by Technical Committee ISO/TC 159, *Ergonomics*, Subcommittee SC 4, *Ergonomics of human-system interaction*.

Introduction

The purpose of this Technical Specification is to provide guidance to developers on designing human-system interfaces which can be used with as high a level of accessibility as possible. Designing human-system interactions to increase accessibility promotes increased effectiveness, efficiency, and satisfaction for people who have a wide variety of capabilities and preferences. Accessibility is therefore strongly related to the concept of usability (see ISO 9241-11).

The most important approaches to increase the accessibility of a human-system interface are

— task-oriented design of user interfaces,

— individualization (see ISO 9241-10),

— the use of human-centred design principles (see ISO 13407),

— individualized user instruction and training, and

— enabling the efficient use of assistive technologies.

The focus of this Technical Specification is the development of human-system interfaces to systems and products that are intended for use by the widest range of people with special needs. An important part of a human-centred design process for accessible systems is to develop human-system interfaces to meet accessibility goals that can be evaluated for a specific user or user category in a specified context of use.

This Technical Specification is based mainly on the prevalent knowledge of individuals who have sensory and/or motor impairments. However, accessibility is an attribute that affects a large variety of capabilities and preferences of human beings. These different capabilities may be the result of age, disease and/or disabilities. Therefore, accessibility addresses a widely defined group of users including

— people with physical, sensory and cognitive impairments at birth or acquired during life,

— elderly people who can benefit from new products and services but experience reduced physical, sensory and cognitive abilities,

— people with temporary disabilities, such as a person with a broken arm or someone who has forgotten his/her glasses, and

— people who experience difficulties in certain situations, such as a person who works in a noisy environment or has both hands occupied by other work.

It should be emphasized that having a disability should be regarded as a natural element of human life. Everyone can expect, during some period of life, to be affected by circumstances that make it difficult to access and use systems, products and services.

This Technical Specification recognizes that some users will always need assistive devices in order to use a system. Therefore, this Technical Specification includes, in the concept of accessibility, the capability of a system to connect and interact successfully with assistive technologies.

Guidance is provided for system design, appearance and behaviour. The guidance will allow software to be used by as broad an audience as possible. In addition, guidance will be provided on designing software that integrates as effectively as possible with common assistive technologies (e.g. speech synthesizers, Braille input and output devices) when they are available. Incorporating accessibility features early in the design process is relatively inexpensive compared to the cost of modifying products to make them accessible.

This Technical Specification addresses the increasing need to consider social and legislative demands to ensure accessibility by removing barriers that prevent people with special requirements from participating in life activities including the use of environment, services, products and information. Designing software-user interfaces for accessibility increases the number of people who can use systems by taking into account the varying physical and sensory capabilities of user populations. Designing for accessibility benefits disabled users by making software easier for them to use, or making the difference in whether they are able to use the software at all.

Many accessibility features also benefit users who do not have a disability, by enhancing usability and providing additional customization possibilities. They may also help to overcome a temporary defect (e.g. a broken arm or hand). They benefit designers and suppliers by expanding the number of potential users (and thus sales for their product) and often by making the product compliant with legal requirements for accessibility. They benefit companies buying software by expanding the number of employees who may use the software.

It is important to note that accessibility may be provided by a combination of both hardware and software. Assistive technologies typically provide specialized input and output capabilities not provided by the system. Software examples include on-screen keyboards that replace physical keyboards, screen-magnification software that allows users to view their screen at various levels of magnification, and screen-reading software that allows blind users to navigate through applications, determine the state of controls, and read text via text-to-speech conversion. Hardware examples include head-mounted pointers that replace mice and Braille output devices that replace a video display. There are many other examples not listed here. When users provide add-on assistive software and/or hardware, usability is enhanced to the extent that systems and applications integrate with those technologies. For this reason, operating systems may have to provide “hooks” or other features to allow software to operate effectively with add-on assistive software and hardware as recommended in these guidelines. If systems do not provide support for assistive technologies, the probability increases that users will encounter problems with compatibility, performance and usability. At the same time, if software applications do not use system-provided mechanisms (such as customization for colour, font, and audio, or system routines for keyboard navigation and text input), then users may find their access blocked.

This Technical Specification serves the following types of users:

— designers of user-interface development tools and style guides to be used by interface designers;

— user-interface designers, who will apply the guidance during the development process;

— developers, who will apply the guidance during design and implementation of system functionality;

— buyers, who will reference this Technical Specification during product procurement;

— evaluators, who are responsible for ensuring that products meet the recommendations of this Technical Specification.

The ultimate beneficiary of this Technical Specification will be the end user of the software. Although it is unlikely that the end-users will read this Technical Specification, its application by designers, developers, buyers and evaluators should provide user interfaces that are more accessible. These guidelines concern the development of software for user interfaces. However, those involved in designing the hardware aspects of user interfaces may also find them useful.

Ergonomics of human-system interaction — Guidance on accessibility for human-computer interfaces

1 Scope

This Technical Specification provides guidance on the design of accessible (work, home, education) software. It covers issues associated with designing accessible software for people with the widest range of visual, hearing, motor and cognitive abilities, including those who are elderly and temporarily disabled. This Technical Specification addresses software considerations for accessibility that complement general design for usability covered by ISO 9241-10 to ISO 9241-17 and ISO 13407.

This Technical Specification addresses the accessibility of interactive systems. It addresses a wide range of solutions, including office applications, web pages and multimedia. It does not provide recommendations for the design of hardware.

This Technical Specification promotes increased usability of systems in combination with assistive technologies, when they are required. It does not cover the behaviour or requirements of assistive technologies themselves (including assistive software).

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 9241-10:1996, *Ergonomic requirements for office work with visual display terminals (VDTs) — Part 10: Dialogue principles*

ISO 9241-11:1998, *Ergonomic requirements for office work with visual display terminals (VDTs) — Part 11: Guidance on usability*

ISO 9241-12:1998, *Ergonomic requirements for office work with visual display terminals (VDTs) — Part 12: Presentation of information*

ISO 9241-13:1998, *Ergonomic requirements for office work with visual display terminals (VDTs) — Part 13: User guidance*

ISO 9241-14:1997, *Ergonomic requirements for office work with visual display terminals (VDTs) — Part 14: Menu dialogues*

ISO 9241-15:1997, *Ergonomic requirements for office work with visual display terminals (VDTs) — Part 15: Command dialogues*

ISO 9241-16:1999, *Ergonomic requirements for office work with visual display terminals (VDTs) — Part 16: Direct manipulation dialogues*

ISO 9241-17:1998, *Ergonomic requirements for office work with visual display terminals (VDTs) — Part 17: Form filling dialogues*

ISO 13407:1999, *Human-centred design processes for interactive systems*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1
accelerator keys
key combinations (sometimes called “shortcut keys”) which invoke a menu option without displaying the menu on which the option appears or intermediate menus

[ISO 9241-14:1997, definition 3.1]

3.2
accessibility
usability of a product, service, environment or facility by people with the widest range of capabilities

NOTE Although “accessibility” typically addresses users who have a disability, the concept is not limited to disability issues.

3.3
activation
initiation of an action associated with a selected object

3.4
assistive technologies
hardware or software products used by people with disabilities to accomplish their tasks

EXAMPLES Braille displays, screen readers, screen magnification software, and eye tracking devices.

3.5
bounce keys
feature that allows users to set a delay after a keystroke during which an additional keystroke will not be accepted if it is identical to the previous keystroke

NOTE This feature is often implemented in the system software.

3.6
chorded key-press
keyboard or pointer-button presses where more than one button is held down simultaneously to invoke an action

3.7
contrast
⟨in a perceptual sense⟩ assessment of the difference in appearance of two or more parts of a field seen simultaneously or successively (hence: brightness contrast, lightness contrast, colour contrast, etc.)

NOTE Adapted from IEC 60050 (845-02-47):1987.

[ISO 13406-2:2001]

3.8
colour palette
⟨in computer graphics⟩ a fixed set or range of available colours that can be selected

3.9
cursor
visual indication of the focus for alphanumeric input

[ISO 9241-12:1998, definition 3.4]

NOTE See also **focus cursor** (3.12) and **text cursor** (3.35). Contrast with **pointer** (3.28).

3.10
disability
impairment that interferes with the customary manner in which a task is performed or that requires accommodation in order to perform a task

NOTE Note that the legal definitions of a disability vary from country to country, and may differ from the definition stated here.

3.11
explicit focus
setting in which the input focus is transferred in response to an explicit user action, not simply when the pointer passes or pauses over an object

EXAMPLE 1 Clicking when the pointer is over an object.

EXAMPLE 2 Pressing the alt-tab key combination.

NOTE Windows may have a limited area, such as a title bar or frame, in which explicit focus must be assigned.

3.12
focus cursor
indicator showing which user interface object within a window has focus

EXAMPLE A box or highlighted area around a text field, button, list, or menu option.

NOTE 1 Also called “location cursor”. See also input focus, text cursor, and focus indicator.

NOTE 2 The appearance of this indicator usually depends on the kind of object that has focus. The object with focus can be activated if it is a control (e.g. button, menu item) or selected if it is a selectable object (e.g. icon, list item).

3.13
focus indicator
indicator that shows which window or pane has focus

EXAMPLE 1 A change in border colour, so that the window with focus has a border of one colour and all other windows have a border of a single, noticeably different colour.

EXAMPLE 2 A change in visible detail, so that the window with focus shows the full details and shading of the title bar, scroll bars, etc., and all other windows show only the outlines.

NOTE See also **input focus** (3.17), **text cursor** (3.34) and **focus cursor** (3.12).

3.14
impairment
any deficit in psychological, physiological or anatomical structure or function

NOTE An impairment is not a disability if it does not interfere with task performance. See also **disability** (3.10).

3.15
implicit designator
mnemonic
menu mnemonic
portion of an option name or control label used for a keyboard

3.16
implicit focus
setting in which input focus is transferred when the pointer passes or pauses over a window or object

NOTE 1 Contrast with **explicit focus** (3.11). See also **keyboard focus** (3.20).

NOTE 2 Keyboard navigation provides implicit focus by giving focus to whatever object is currently indicated by the focus cursor.

3.17
input focus
current assignments of the input from an input device to a user-interface object

EXAMPLES Pointer focus and keyboard focus.

3.18
keyboard
hardware device (or logical equivalent) consisting of a number of mechanical buttons (keys) that the user presses to input characters to a system

NOTE Note that a logical keyboard may provide a representation of keys (e.g. on-screen keyboard) or it may not (e.g. voice recognition).

3.19
keyboard equivalents
keys or key combinations that provide keyboard access to functions usually activated by a pointing device

3.20
keyboard focus
current assignment of the input from the keyboard or equivalent to a user interface object

NOTE For a window, focus is indicated by a focus indicator; for an individual object, focus is indicated by a focus cursor.

3.21
latch

mode in which any modifier key remains logically pressed (active) in combination with a single subsequent non-modifier keypress

NOTE Contrast with **lock** (3.22).

3.22
lock
persistent mode in which any modifier key remains logically pressed (active) in combination with any number of subsequent key-presses until lock mode is turned off

NOTE Contrast with **latch** (3.21).

3.23
mnemonic code
code conveying information that is meaningful to the user and has some association with the words it represents

NOTE Mnemonic codes frequently consist of alphanumeric characters, making them easier to learn and recall. Many mnemonic codes are abbreviations.

[ISO 9241-12:1998, definition 3.2.1]

3.24
modifier key
keyboard key that changes the action or effect of another key or of the pointing device

EXAMPLE 1 The shift key extends the current selection in the direction of pointer movement, rather than moving the position of the text cursor.

EXAMPLE 2 The control or command key transforms the keyboard keys from text input into commands.