INTERNATIONAL STANDARD

ISO/IEC 20071-5

Information technology — User interface component accessibility —

Part 5:
Accessible user interfaces for accessibility settings on information devices

Technologies de l'information — Accessibilité du composant interface utilisateur —

Partie 5: Interfaces utilisateur accessibles pour le paramétrage de l'accessibilité d'appareils informatiques

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Foreword

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The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of document should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives or www.iec.ch/members_experts/refdocs).

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This document was prepared by Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 35, *User interfaces*.

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Introduction

People with disabilities (e.g. visual, hearing, physical) can experience difficulties in accessing information and communications technology (ICT) devices. Accessible user interfaces, as described in this document, can help them to operate devices.

To effectively operate accessible user interfaces, users need to be able to adjust accessibility settings first. If this is not possible, some people will not be able to access these devices without help from another party.

This document makes information technologies more accessible by ensuring that people with disabilities can adjust accessibility settings by themselves.

Information technology — User interface component accessibility —

Part 5:
Accessible user interfaces for accessibility settings on information devices

1 Scope

This document specifies requirements and recommendations for making accessibility settings accessible and usable. It provides guidance on specific accessibility settings, saving settings and modifying settings. It specifies how to access and operate the accessibility setting mode, and how to directly activate specific accessibility features.

This document applies to all operating system user interfaces on all types of information and communications technologies (ICTs) from the point where the operating system is fully functional and waiting for the user to interact with it.

This document does not apply to:

— storing and retrieving information from a stored user profile, including personally identifiable information;

— accessibility of the closed functionality that does not support access by assistive technology;

— accessibility of boot mode.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 9241-171:2008, *Ergonomics of human-system interaction — Part 171: Guidance on software accessibility*

3 Terms and definitions

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

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

NOTE   The terms BounceKeys™, StickyKeys™, SlowKeys™, FilterKeys™, MouseKeys™, RepeatKeys™, ToggleKeys™, SoundSentry™, and ShowSounds™ are all trademarks of the University of Wisconsin. However, use of the terms is permitted freely, without royalty or license, to describe user interface features that have the functionality and behaviour described in this document[1].

3.1
accessibility feature
feature that is specifically designed to increase the usability of products for persons with disabilities

[SOURCE: ISO 9241-171:2008, 3.3, modified — "persons with disabilities" was replaced by "those experiencing disabilities".]

3.2
accessibility setting
setting to make the user interface more accessible for people with disabilities

EXAMPLE   A setting is provided to turn large text or screen magnification ON for people with low vision.

Note 1 to entry: There are three types of accessibility settings:

— The settings for the operating system.

— The settings for the application by the operating system.

— The settings inside of the application.

3.3
accessibility setting mode
user interface where the user adjusts *accessibility settings* (3.2)

Note 1 to entry: A user can access almost all the accessibility settings and adjustments for the *accessibility features* (3.1) through this mode.

3.4
auditory feedback
feature that allows users to determine, by sound indication, relevant activities on the device (e.g. key input)

Note 1 to entry: Auditory feedback includes a beep sound with, e.g. key input, alarm sound, speech output. Audio feedback can be personalised by the user.

3.5
BounceKeys™
feature that only accepts a single keystroke at a time from a key

Note 1 to entry: BounceKeys™ is designed for users with a tremor or lack of dexterity that causes them to inadvertently strike a key extra times when pressing or releasing the key. Once a key is released it will not accept another stroke of the same key until a (user-settable) period of time has passed. BounceKeys™ has no effect on how quickly a person can type a different key.

Note 2 to entry: See ISO 9241-171:2008, E.3.4 (modified).

3.6
FilterKeys™
BounceKeys™ (3.5) and *SlowKeys™* (3.20) features combined

Note 1 to entry: The term FilterKeys™ is sometimes used for the BounceKeys™ and SlowKeys™ features packaged together. Some implementations make these two features mutually exclusive. However, they can also both be active at the same time (although SlowKeys™ will dominate).

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1) BounceKeys™, StickyKeys™, SlowKeys™, FilterKeys™, MouseKeys™, RepeatKeys™, ToggleKeys™, SoundSentry™, and ShowSounds™ are the trademarks of the University of Wisconsin. This information is given for the convenience of users of this document and does not constitute an endorsement by ISO or IEC of the product named. Equivalent products may be used if they can be shown to lead to the same results.

Note 2 to entry: See ISO 9241-171:2008, E.3.5.

3.7
gaze control
interaction through eye gaze or blink

3.8
home function
reserved operation of the user interface that moves all open applications to the background and returns visible and programmable focus to the home screen

Note 1 to entry: For some devices, the home function can be activated using the home button.

Note 2 to entry: The home function can be accessed within an application via a labelled button, such as a back button.

Note 3 to entry: The home function can be accessed by voice.

Note 4 to entry: The home function may be assigned to key combinations or gestures.

3.9
login mode
user interface for authentication to access the operating system

Note 1 to entry: The login mode includes, e.g. password input form, biometrics authentication, voice authentication. Login mode begins after *boot mode* (3.10).

3.10
boot mode
initialized mode of program operations when a computer is turned on

Note 1 to entry: The boot mode ends when the operating system of the device is loaded and is followed by *login mode* (3.9).

[SOURCE: ISO/IEC IEEE 24765:2017, 3.402, modified — "device" was replaced by "computer".]

3.11
MouseKeys™
feature that allows the user to control the mouse cursor and operate the mouse buttons via the keyboard (e.g. the numeric keypad)

Note 1 to entry: MouseKeys™ is designed for users who are physically unable to use a mouse.

Note 2 to entry: See ISO 9241-171:2008, E.3.6.

3.12
on-screen keyboard
virtual keyboard displayed on any type of screen

Note 1 to entry: On-screen keyboards are one specific type of virtual keyboard, probably the most common, that use a screen to display a visual keyboard.

Note 2 to entry: This type of virtual keyboard can be used on personal computer screens, on feature phones and tablets, mobile phones and tablets, TVs, kiosks, whiteboards.

[SOURCE: ISO/IEC 22121-2, 3.1[2)]]

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2) Under preparation. Stage at the time of publication: ISO/IEC DIS 22121-2.

3.13
operating system-specific key for invoking commands
special key to access capability to control the operating system (OS) function

Note 1 to entry: The name of the operating system-specific key for invoking commands differs depending on the OS. Some common names for this function include: "Logo key" and "Command key."

Note 2 to entry: Some devices have the same functionality by non-key user interfaces, including gesture.

3.14
pointing device
equipment to point to the location on the screen directly (e.g. finger, pen) or indirectly (e.g. mouse)

EXAMPLE   Mouse, track ball, touch pen, touch pad, touch panel, stylus, touch screen, routing keys, eye control.

3.15
RepeatKeys™
feature to control auto-repeat which evokes the same effect of repetitional key push by one push, repeat onset and repeat rate of keys

Note 1 to entry: RepeatKeys™ is designed to allow use of devices by people who cannot move quickly enough when pressing keys to keep them from auto-repeating. The feature to adjust repeat onset, repeat rate and to turn auto-repeat off are usually included as part of most keyboard *system settings* (3.24). If these features are not included, RepeatKeys™ provides them. RepeatKeys™ also ensures that the repeat delay and repeat interval can be personalized (if the standard maximum value for either of the regular key repeat settings is not long enough).

Note 2 to entry: See ISO 9241-171:2008, E.3.7.

3.16
screen magnifier
assistive technology that allows users to operate a software system with an enlarged presentation of screen content

Note 1 to entry: Users control the screen magnifier separately from the system by keyboard, *pointing device* (3.14), or gesture.

Note 2 to entry: Screen magnifiers can enlarge content up to 500 % or more. They provide additional visual features such as inverse video, colour replacement, and monitoring for system notifications and events.

Note 3 to entry: Some screen magnifiers also support text-to-speech.

3.17
screen reader
assistive technology that controls the system and provides information and feedback without the need for a visual display

Note 1 to entry: Screen readers display information through text-to-speech and/or dynamic braille output. Control is provided through either keyboard or gestures, or both.

Note 2 to entry: Screen readers rely on a data stream from the system that includes information from applications such as the name, role, status, and value of a user-interface element. This information stream is referred to as the "accessibility tree".

Note 3 to entry: Screen readers provide system feedback through auditory cues based on the user's preferences, e.g. feedback to changes between focus and browse modes, keypresses, gesture operations.

3.18
shortcut
operation that invokes an action without displaying intermediate information (e.g. menus) or requiring pointer movement or any other user activity

3.19
ShowSounds™
user-configurable system flag that is readable by application software and is intended to inform ShowSounds™-aware applications that all information conveyed audibly should also be conveyed visually

Note 1 to entry: ShowSounds™ is a feature for users who cannot clearly hear speech or cannot distinguish between sounds from a device (due to hearing loss, noisy environment, or an environment where sound is not allowed, such as a library or classroom). For example, a message or icon can be displayed when a sound is used to indicate that new mail has arrived.

Note 2 to entry: See ISO 9241-171:2008, E.3.10.

3.20
SlowKeys™
feature to ignore all keys that are bumped or pressed briefly

Note 1 to entry: SlowKeys™ is designed for users who have extra, uncontrolled movements that cause them to strike surrounding keys unintentionally when typing. Keystrokes are accepted only if keys are held down for a user-specified period of time.

Note 2 to entry: See ISO 9241-171:2008, E.3.3 (1).

3.21
SoundSentry™
feature providing a visual signal to indicate when the device is generating a sound

EXAMPLE   Screen flash, caption bar flash.

Note 1 to entry: SoundSentry™ is a feature for individuals who cannot hear system sounds (due to hearing loss, a noisy environment, or an environment where sound is not allowed, such as a library or classroom). SoundSentry™ works by monitoring the system sound hardware and providing a user-selectable indication whenever sound activity is detected. This feature cannot usually discriminate between different sounds, identify the sources of sounds, or provide a useful alternative for speech output or information encoded in sounds. Applications can support the *ShowSounds™* (3.19) feature to provide the user with a useful alternative to information conveyed using sound. SoundSentry™ is a system-level fallback for applications that do not support ShowSounds™.

Note 2 to entry: See ISO 9241-171:2008, E.3.9.

3.22
StickyKeys™
feature that allows users to press key combinations (e.g. Ctrl+Alt+Delete) sequentially rather than having to hold them all down together

Note 1 to entry: StickyKeys™ is designed for people who cannot use both hands, or who use a dowel or stick to type. StickyKeys™ works with those keys defined as "modifier" keys, such as the Shift, Alt and Ctrl keys. Usually the StickyKeys™ status is shown on-screen at the user's option.

Note 2 to entry: See ISO 9241-171:2008, E.3.2 (1).

3.23
switch control
feature that allows users to use switches to select, tap, or drag items, type, and freehand draw

Note 1 to entry: Item scanning, point scanning, and manual selection (head tracking) are possible strategies.

Note 2 to entry: The switch control method supports users who are not able to operate more than one single switch.

3.24
system settings
user interface where the user adjusts operating system settings

Note 1 to entry: The name of the system settings differs depending on the operating system. Some common names for this feature include: "control panel" and "system preferences."

3.25
tactile feedback
feature that allows users to determine, by touch, the indication of relevant activities on the device (e.g. key input)

EXAMPLE   Vibration, movement, temperature.

3.26
time out
feature that turns the *accessibility features* (3.1) off automatically after an adjustable time when no keyboard or mouse activity occurs

Note 1 to entry: Time out (accessibility features) is intended to be used on public or shared devices, e.g. in libraries, bookstores, where a user can leave the device with an access feature turned on, thus potentially confusing the next user or leading people to think the device was broken.

Note 2 to entry: See ISO 9241-171:2008, E.3.11 (1).

3.27
ToggleKeys™
feature alerting the user when the state of a locking key has changed

Note 1 to entry: ToggleKeys™ is a feature for users who cannot see the visual keyboard status indicators for locking (toggle) keys, e.g. CapsLock, ScrollLock, NumLock. ToggleKeys™ provides an auditory signal, such as a high beep, to alert the user that a toggle key such as the CapsLock has been locked, and a separate signal, such as a low beep, to alert the user that a toggle key has been unlocked.

Note 2 to entry: See ISO 9241-171:2008, E.3.8 (1).

3.28
visual emphasis
feature that allows users to change the visual aspects to improve visibility

EXAMPLE   Setting of character size, screen magnification, contrast, luminance, colour balance, colour tone inverse, gradation.

3.29
visual feedback
feature that allows users to determine, by vision indication, the relevant activities on the device

EXAMPLE   Displaying the visual representations of pushed keys.

3.30
voice command
spoken instruction to control the information and communications technology (ICT) system

[SOURCE: ISO/IEC 30122-1:2016, 4.1]

3.31
voice operation
feature that allows users to operate a device with *voice commands* (3.30)

EXAMPLE   Device command "Play music!" starts playing music.

Note 1 to entry: Voice commands usually follow an activation keyword (e.g. "Computer!") to distinguish them from other speech that is not intended as a voice command.

Note 2 to entry: Some voice operation requires high speed network connection for natural language recognition.

4 Requirements and recommendations

4.1 Accessibility setting mode

4.1.1 Contents and interface of the accessibility setting mode

4.1.1.1 General

The accessibility setting mode provides an interface to the accessibility settings described in 4.2 as an alternative to the accessibility setting shortcuts described in 4.3.

The accessibility setting interface shall be in accordance with the accessibility requirements of ISO 9241-171.

The accessibility setting mode should be visible also from the system setting mode and vice versa, because it is sometimes not clear for the users if settings (e.g. language or localization) belong to the system or accessibility setting.

The accessibility setting interface should be structured along different user needs. For example, the first level of the sub menu includes user needs, e.g. seeing, hearing, interaction and touch, learning, understanding, and language. The second level of the sub menu includes applicable system features, e.g. media, screen, sounds, TTS, voice control, authentication and braille.

NOTE   Most operating systems provide a unified approach to accessibility settings that applications can employ for their own settings, however in most cases, applications are free to implement their own application-specific accessibility settings, often so as to keep a consistent user interface across multiple operating systems.

Accessibility settings are:

a)   temporary,

b)   for the runtime of a specific application,

c)   for all instances of a specific application,

d)   for the current user session,

e)   for all user sessions of the user,

f)   system-wide for all users (system configuration),

g)   domain wide for all users on multiple systems.

The accessibility setting mode can offer many predefined system-wide user profiles dedicated to several user needs including colour blindness, low vision, very low vision, inverse video, extended timing, microgesture, switch control, no vision and vocalized.

Predefined system profiles are often used for public terminals but no longer used on personal devices, because the presettings often do not meet the individual's needs. Therefore, predefined system accessibility profiles shall be modifiable to individual user needs.

The accessibility setting mode shall provide a means to save the setting parameter (see 4.4).

The accessibility setting mode interface should provide a function to reset the accessibility setting to the default parameters.

4.1.1.2 Input

4.1.1.2.1 Input with visual feedback

a) Any devices that have gaze control functionalities, gaze control access to all settings shall be provided.

4.1.1.2.2 Audio (voice) input

a) Any devices that have voice command functionalities, voice operation access to all settings shall be provided to users.

b) Natural language should be used for voice operation.

c) The voice command settings shall be provided to users in an accessible manner.

4.1.1.2.3 Touch or movement input

a) Keyboard access to all settings shall be provided.

b) The keyboard access shall not require a user to press three or more keys simultaneously, and it should not require pressing two keys simultaneously.

> NOTE 1   a) and b) apply to devices that have a keyboard or that provide keyboard interface.

> NOTE 2   a) and b) do not apply to devices that provide keyboard interface for shorthand or braille cord keyboards or that have a keyboard switchable to such modes.

c) Pointing device access to all settings shall be provided.

> NOTE 3   c) applies to devices that equip a pointing device or that provide a pointing device interface.

d) The gesture command settings shall be provided to users in an accessible manner.

> NOTE 4   d) applies to devices that provide a gesture interface.

e) When choosing function keys for accessibility settings, care should be taken to choose appropriate key locations to minimise the risk that a user makes the system inaccessible to themselves by pressing the wrong key accidentally.

> EXAMPLE   On a QWERTY keyboard, the keys A, S, and D are adjacent. To support users who can accidentally hit an adjacent key, the keys used to activate different access features are set as A, D, and G rather than A, S, and D.

f) Settings for switch control, press or click delay, mouse or pointing parameters (e.g. sensitivity, speed) shall be provided.

g) Any devices that have switch control functionalities, switch control access to all setting items shall be provided by item scanning, point scanning, and manual selection (head tracking).

Related accessibility settings are:

— user selection of selection strategy (default scanning mode),

— adjustment of scanning speed,

— change of location of the selection control menu,

— turn sound or speech accompaniment on or off,

— turn off groups to scan items one at a time.

> NOTE 5   Item scanning highlights items or groups on the screen one at a time.

NOTE 6   Point scanning lets the user select an item on the screen by pinpointing it with scanning crosshairs.

NOTE 7   The camera on the device is used to track the movement of the head to control a pointer on the screen and track the user's facial movements to perform actions.

4.1.1.3   Output

4.1.1.3.1   Visual output

a) Each setting shall have an on-screen description presented in the system default language or selected natural language. This description can be an on-screen text, a sign language video, or pre-recorded audio track.
    NOTE 1   Hundreds of sign languages are used around the world. No one sign language is understood internationally. Communities with a common spoken language (e.g. English) often have different sign languages (e.g. American Sign Language, British Sign Language, Australian Sign Language, Irish Sign Language).

b) Text size in the accessibility setting mode shall be scalable up to 200 %. See Reference [7], 1.4.4 and 1.4.8.

c) Text on the screen should be presented using a legible font.

    NOTE 2   Sans-serif letters, space between characters, punctuation, and letters distinction (e.g. '1' vs 'l'),

    are aspects of legible fonts.

    NOTE 3   A user selected system font is preferred.

d) Contrast ratio of text on the screen should be 7:1, and it shall be at least 4.5:1. See Reference [7], 1.4.6.

e) Pictograms should be presented on screen for description of settings. Each pictogram shall have an alternative text describing the function.

f) The blink rate, contrast/colours, zoom, font, and pointer settings shall be provided.

g) Feedback of operations shall be provided to the user in a visual manner.

4.1.1.3.2   Audio output

a) Descriptions of settings in the natural language should be available as spoken text. This should not conflict with another accessibility function such as a screen reader.

b) The subtitles/captions, sound balance, mono/stereo, high-deep sound, ambisound, and object-based audio settings shall be provided.

c) Feedback of operations shall be provided to the user in an auditory manner.

4.1.1.3.3   Tactile and movement output

a) Descriptions of settings on the screen shall be presented in text or shall be provided with alternative text such that screen readers are able to programmatically convert the text to braille or to speech.

b) Feedback of operations should be provided to the user in a tactile manner.

EXAMPLE   Feedback of operation is vibration or force feedback.

NOTE   Requirements and recommendations on the accessible design of tactile/haptic devices can be found in ISO 9241-971.

4.1.1.4 Visual interface — Graphical User Interfaces (GUI) operation

The following is the requirement of GUI operation to access the accessibility setting mode.

a) The system settings shall provide access to the accessibility setting mode.

b) The accessibility settings shall be available at the root level of the system settings hierarchy.

c) The accessibility settings shall be labelled so that the user can understand it is accessibility settings.

EXAMPLE   The label includes, e.g. "accessibility settings, "accessibility", "assistive function features" (or language equivalent for each specific language).

NOTE   The accessibility settings are distinguishable from general settings items.

4.1.1.5 Audio interface — Voice operation

Saying specific command word(s) should open the accessibility setting mode.

NOTE   Examples of voice commands are shown in A.2.1.1.

4.1.1.6 Touch or movement interface

4.1.1.6.1 Keyboard operation

The following are the requirements and recommendations of keyboard operation to access the accessibility setting mode.

NOTE   Examples of shortcut keys, described as "the specific key" in the text body, are shown in A.2.2.1.

a) On systems that have an operating system-specific key for invoking commands, pressing this key together with the specific key shall provide access to the accessibility setting mode.

b) Operating systems should provide a mechanism for users to define a key sequence (not involving the operating system-specific key) as an alternative way to invoke the accessibility setting mode.

c) Pressing the specific modifier key several times quickly shall allow the user to turn StickyKeys™ on and off. The default behaviour for StickyKeys™ activation should be to show a dialog at activation. Before turning the feature on or off, the dialog should ask the user for confirmation. Whenever the StickyKeys™ feature dialog is open the user shall also have the option of opening the accessibility setting mode.

d) Pressing the specific modifier key for several seconds shall allow the user to turn BounceKeys™, SlowKeys™ or FilterKeys™ on and off. The default behaviour when pressing the specific modifier key for several seconds shall be to show an activation dialog box. Before turning the feature on or off, the dialog should ask the user for confirmation. Whenever the dialog is open the user shall also have the option of opening the accessibility setting mode.

e) Pressing the specific modifier key for several seconds shall provide access for a user to the accessibility setting mode.

f) Pressing the specific button or home function a few times shall provide access for a user to the accessibility setting mode.

g) Pressing the specific key or button should provide access for a user to the accessibility setting mode.

4.1.1.6.2   Home function operation

The following are the recommendations of home function operation to access the accessibility setting mode.

NOTE   An example of home function operation is shown in A.2.2.2.

a)   Activating the home function several times quickly should provide access for a user to the accessibility setting mode.

b)   Pressing the home function for several seconds should provide access for a user to the accessibility setting mode.

c)   Pressing the home function in the accessibility setting mode should go to the system home screen.

4.1.1.6.3   Touch panel operation

The following are the requirements of touch panel operation to access the accessibility setting mode.

a)   Swiping touch panel from the lower (upper) end to the upper (lower) end should provide access for a user to the accessibility setting mode.

b)   Tapping touch panel several times quickly should provide access for a user to the accessibility setting mode.

c)   Pressing touch panel for several seconds should provide access for a user to the accessibility setting mode.

4.1.1.6.4   Pointing device operation

The following is the recommendation for pointing device operation to access the accessibility setting mode.

If the pointing device has a secondary-button, operating the secondary-button from the root level should provide access for a user to the accessibility setting mode.

EXAMPLE   The secondary-button of a two-button mouse is the right button of the mouse.

4.1.2   Accessibility setting mode before login

4.1.2.1   General

The user shall be able to access the accessibility setting mode from the login mode. In this case, it is possible that the accessibility setting mode will not contain all of the settings, but it should contain at least a direct access to the settings to turn on and off the accessibility features.

NOTE 1   The status "before login" includes a personal login to the operating system. It does not include the step of unlocking the device's storage encryption during a cold start.

NOTE 2   This is applied to provide the user access to the accessibility setting mode from the login screen. After login, the device provides the accessibility setting features as described in 4.1.1.

4.1.2.2 Input

4.1.2.2.1 Visual input

The user should be able to access the visual input for accessibility setting from the login mode. The method used by the user to access the visual input for accessibility setting from the login mode shall be designed to be accessible to users with disabilities, such as gaze control.

EXAMPLE   The accessibility features of visual input that are available in the login mode include an on-screen keyboard so that a user with a gaze-based input device can access keyboard features.

4.1.2.2.2 Audio input

The user should be able to access the audio input for accessibility setting from the login mode. The method used by the user to access the audio input for accessibility setting from the login mode shall be designed to be accessible to users with disabilities, such as voice input.

EXAMPLE   The accessibility features of audio input that are available in the login mode include voice commands. Clapping or whistling can be used for the key to indicate the start of voice commands.

4.1.2.2.3 Touch or movement input

The login mode shall be by default accessible by keyboard alone.

The user should be able to access the touch or movement input for accessibility setting from the login mode. The method used by the user to access the touch or movement input for accessibility setting from the login mode shall be designed to be accessible to users with disabilities, e.g. commands available through pointing, switching and navigational keys, and basic guidance tools.

EXAMPLE   The accessibility features of touch or movement input that are available in the login mode include StickyKeys™, SlowKeys™, BounceKeys™.

4.1.2.2.4 Input language selection

The user should be able to access the input language selection for accessibility setting from the login mode. The method used by the user to access the input language selection for accessibility setting from the login mode shall be designed to be accessible to users with disabilities.

EXAMPLE   The user is able to select the keyboard layout.

4.1.2.3 Output

4.1.2.3.1 Visual output

The user should be able to access the visual output for the accessibility setting from the login mode. The method used by the user to access the visual output for accessibility setting from the login mode shall be designed to be accessible to users with disabilities. The contrast ratio shall be at least 7:1 for text, and at least 3:1 for non-text. See Reference [7], 1.4.6 and 1.4.11

EXAMPLE   The accessibility features of visual output that are available in the login mode include visual emphasis.

4.1.2.3.2 Audio output

The user should be able to access the audio output for the accessibility setting from the login mode. The method used by the user to access the audio output for the accessibility setting from the login mode shall be designed to be accessible to users with disabilities. The accessibility features of audio output that are available in the login mode include volume, balance, and stereo/mono output ("Play stereo audio as mono").

4.1.2.3.3 Tactile and movement output

The user should be able to access the tactile and movement output for the accessibility setting from the login mode. The method used by the user to access the tactile and movement output for the accessibility setting from the login mode shall be designed to be accessible to users with disabilities, such as a presentation producing a haptic feedback. The level of the haptic feedback should be configurable.

EXAMPLE   The accessibility features of tactile and movement output that are available in the login mode include braille display.

4.1.2.3.4 Output language selection

The user should be able to access the output language selection for the accessibility setting from the login mode. The method used by the user to access the output language selection for the accessibility setting from the login mode shall be designed to be accessible to users with disabilities.

4.2 Items of accessibility setting

4.2.1 Input

4.2.1.1 Visual input

4.2.1.1.1 On-screen keyboard

If the device has the feature of an on-screen keyboard:

a)   The system should provide the accessibility mode on-screen keyboard.

b)   The device shall provide the capability for a user to enable and disable the on-screen keyboard when there is an alternative input available.

c)   The device should provide the capability for a user to enable and disable the keyboard scanning feature.

NOTE   The keyboard scanning feature of the on-screen keyboard is a subset of switch control, and it automatically changes the key focus of the on-screen keyboard according to a defined sequence. This supports single switch users who are controlling the device by an on/off switch only.

4.2.1.2 Audio input — Voice operation

If the device has the feature of voice operation, the following requirements apply:

a)   The device shall provide the capability for a user to enable and disable voice operation by modifier keys combination.

b)   The device shall provide the capability for a user to set the sensitivity of the microphone.

c)   The device shall provide the capability for a user to select the voice command activation signal.

NOTE 1   In c), possible voice command activation signals include, e.g. a keyword (e.g. "Computer"), user-defined shortcut key.

NOTE 2   a) is required because there is a possibility that continuous use of voice recognition causes various trouble (e.g. privacy, unintended input).

4.2.1.3   Touch or movement input

4.2.1.3.1   StickyKeys™

If the device implements the StickyKeys™ feature, the following requirements and recommendations apply.

NOTE 1   Examples of shortcut keys and voice commands, described as "the specific modifier key" or "the specific word/phrase" in the text body, are shown in A.3.1.1.

Turning StickyKeys™ on and off:

a)   During the login phase, the StickyKeys™ feature shall be off by default with the option to turn on.

b)   The device shall provide the capability for a user to turn StickyKeys™ on and off from the user settings.

c)   Pressing the specific modifier key several times quickly with no intervening key presses or mouse clicks shall allow the user to turn StickyKeys™ on or off. Before turning the feature on or off, the device should (at the user's option) ask the user for confirmation. This dialog shall also provide the user with the option of opening the accessibility setting mode.

d)   The user shall be able to disable (and enable again) the confirmation dialog that appears after pressing the specific modifier key several times quickly. The confirmation dialog should be enabled by default. If disabled, StickyKeys™ is enabled or disabled immediately after the specific modifier key is pressed several times quickly.

e)   The user shall be able to disable (and enable again) the keyboard shortcut (pressing the specific modifier key several times quickly) for allowing the user to turn StickyKeys™ on or off. It should be enabled by default.

f)   Saying the specific phrase should allow the user to turn StickyKeys™ on and off.

g)   The device should be able to provide visual, auditory or tactile feedback when StickyKeys™ is turned on or off.

   NOTE 2   The visual feedback can include displaying a status indicator when StickyKeys™ is enabled.

   EXAMPLE 1   As auditory feedback, a low-high tone occurs when StickyKeys™ is turned on, and a high-low tone occurs when StickyKeys™ is turned off. See ISO 9241-171:2008, E.3.2.

h)   Pressing a modifier key and another key simultaneously shall turn off StickyKeys™. The user shall be able to toggle this function. It shall be enabled by default.

Latching a modifier key:

i)   When StickyKeys™ is enabled, pressing and releasing any modifier key once shall latch the key (as if the key was continuously held down). Each additional pressed modifier key is also latched. The next (single) non-modifier key pressed (or the next pointing device button action) is modified by the latched 'modifier' key(s) (as if all the keys had been pressed down together). This releases the latch. For continuous application of the modifier key, see "k)" below.

   NOTE 3   Modifier keys include (but are not limited to) Shift, Alt, Ctrl, Option, Command, Meta, Logo.

   NOTE 4   Multiple modifier keys can be latched at the same time in any combination.

j)   The device should be able to provide visual, auditory or tactile feedback when a key is latched.

   NOTE 5   The auditory feedback can include, e.g. beep, click sounds.

   EXAMPLE 2   As auditory feedback, a low-high tone occurs when a key is latched. See ISO 9241-171:2008, E.3.2.

k) When one or more modifier keys are in "latched" mode, pressing a non-modifier key (or pressing a pointing device button) shall modify the key and unlatch the modifier key(s).

Locking a modifier key:

l) When StickyKeys™ is enabled, pressing any modifier key twice sequentially shall lock the key. All subsequent non-modifier keys pressed, pointing device actions, and any software actions that are altered by modifier key state are modified by the locked modifier key(s).

> NOTE 6   Multiple modifier keys can be locked or latched simultaneously in any combination.

m) The device should be able to provide visual, auditory or tactile feedback when a key is locked or unlocked.

> EXAMPLE 3   As auditory feedback, a high tone occurs when a key is locked, and a low tone when it is unlocked. See ISO 9241-171:2008, E.3.2.

n) When in "locked" mode, pressing a modifier key once shall unlock it.

4.2.1.3.2   SlowKeys™

If the device implements the SlowKeys™ feature, the following requirements and recommendations apply.

> NOTE 1   Examples of shortcut keys and voice commands, described as "the specific modifier key" or "the specific word/phrase" in the text body, are shown in A.3.1.2.

Turning SlowKeys™ on and off:

a) The SlowKeys™ feature shall be off by default.

b) The device shall allow a user to turn SlowKeys™ on and off from the user settings.

c) Pressing the specific modifier key for several seconds shall allow the user to turn SlowKeys™ on or off. Before turning the feature on or off, the device shall (at the user's option) ask the user for confirmation. This dialog shall also provide the user with the option of opening the accessibility setting mode.

d) The user shall be able to disable (and enable again) the confirmation dialog that appears after pressing the specific modifier key for several seconds. It shall be enabled by default. If disabled, SlowKeys™ is enabled immediately after pressing the specific modifier key for several seconds.

e) The user shall be able to disable (and enable again) the keyboard shortcut (pressing the specific modifier key for several seconds) for allowing the user to turn SlowKeys™ on or off. It should be enabled by default.

f) Saying the specific phrase should allow the user to turn SlowKeys™ on and off.

g) The device should be able to provide visual, auditory or tactile feedback when SlowKeys™ is turned on or off.

> NOTE 2   For turning SlowKeys™ on by keyboard shortcut, ISO 9241-171:2008, Annex E suggests a double beep after 5 s to cause any inadvertent holding of the Shift key to be stopped; and a low-high tone after 8 s to indicate that SlowKeys™ has been turned on. A high-low tone is suggested when SlowKeys™ is turned off by keyboard shortcut.

h) SlowKeys™ shall be turned off when the device reboots.

> NOTE 3   SlowKeys™ is off at boot time because its features make the keyboard behave as if it is broken.

Operation of SlowKeys™:

i) When SlowKeys™ is turned on, the keyboard shall not accept any keystrokes unless keys are held down for the SlowKeys™ acceptance time.

j) Visual, auditory or tactile feedback should be provided when a key is pressed first (at the onset of the SlowKeys™ acceptance time), and when a key stroke is accepted (after the acceptance time has elapsed).

> EXAMPLE   As auditory feedback, a high tone can alert the user when a key is pressed first, and a low tone can alert the user when the key stroke is accepted. See ISO 9241-171:2008, E.3.3.

k) The user shall be enabled to set the SlowKeys™ acceptance time in a minimum range of 0,5 s to 2,0 s, with a default value of 0,75 s.

4.2.1.3.3   BounceKeys™

If the device implements the BounceKeys™ feature, the following requirements and recommendations apply.

NOTE 1   Examples of shortcut keys and voice commands, described as "the specific modifier key" or "the specific word/phrase" in the text body, are shown in A.3.1.3.

Turning BounceKeys™ on and off:

a) The BounceKeys™ feature shall be off by default.

b) The device shall allow a user to turn BounceKeys™ on and off from the user settings.

c) Pressing the specific modifier key for several seconds shall allow the user to turn BounceKeys™ on or off. Before turning the feature on or off, the device should (at the user's option) ask the user for confirmation. This dialog shall also provide the user with the option of opening the accessibility setting mode.

> NOTE 2   If SlowKeys™ and BounceKeys™ shortcuts are both enabled they will both be activated by holding the specific modifier key for several seconds. If both are activated, SlowKeys™ will naturally dominate. If only the BounceKeys™ feature is desired, then the SlowKeys™ shortcut is disabled in the system settings.

d) The user shall be able to disable (and enable again) the confirmation dialog that appears after pressing the specific modifier key for several seconds. It should be enabled by default. If disabled, BounceKeys™ is enabled immediately after pressing the specific modifier key for several seconds.

e) The user shall be able to disable (and enable again) the keyboard shortcut (pressing the specific modifier key for several seconds) for allowing the user to turn BounceKeys™ on or off. It should be disabled by default.

f) Saying the specific phrase should allow the user to turn BounceKeys™ on and off.

g) The device should be able to provide visual, auditory or tactile feedback when BounceKeys™ is turned on or off.

> NOTE 3   For turning BounceKeys™ on by keyboard shortcut, a double beep after 5 s can alert the user to a potentially inadvertent holding of the Shift key; and a low-high tone after 8 s to indicate that BounceKeys™ has been turned on. A high-low tone can alert the user when BounceKeys™ is turned off by a keyboard shortcut.

h) If the user-specified debounce time is more than 0,35 s, BounceKeys™ shall be turned off when the device reboots.

> NOTE 4   For long debounce times, BounceKeys™ is off at boot time because its features make the keyboard behave as if it is broken.

Operation of BounceKeys™:

i) When BounceKeys™ is turned on, any additional stroke of the same key shall be ignored if the time between the keystrokes is less than the BounceKeys™ debounce time.

NOTE 5   The user can still type as usual at full speed. Any rattling of keys will be ignored. To type two of the same letter in a row, the user simply waits briefly between keypresses (longer than the debounce setting time).

j) The device should be able to provide visual, auditory or tactile feedback when a keystroke is ignored because of rapid repetition of the same key.

EXAMPLE   As auditory feedback, a high tone alerts the user when a keystroke is ignored because of rapid repetition of the same key.

k) The device shall provide the capability for a user to set the BounceKeys™ delay time in a minimum range of 0,2 s to 1,0 s, with a default value of 0,5 s.

4.2.1.3.4   FilterKeys™

If the device implements the FilterKeys™ feature, the following requirements and recommendations apply.

FilterKeys™ shall be implemented as a combination of SlowKeys™ and BounceKeys™. All requirements and recommendations, as defined for SlowKeys™ (see 4.2.1.3.2) and BounceKeys™ (see 4.2.1.3.3), apply.

4.2.1.3.5   MouseKeys™

If the device implements the MouseKeys™ feature, the following requirements and recommendations apply.

NOTE 1   MouseKeys™ only works with a device that has a number pad. However, the device can have a keyboard that allows for emulation of number pad keys by other keys or the connection of a separate keypad.

NOTE 2   Examples of shortcut keys and voice commands, described as "the specific modifier key" or "the specific word/phrase" in the text body, are shown in A.3.1.4.

Turning MouseKeys™ on and off:

a) The MouseKeys™ feature should be off by default.

b) The device shall allow a user to turn MouseKeys™ on and off from the user settings.

c) Pressing the specific modifier keys combination should turn MouseKeys™ on and off (toggle).

d) Pressing the specific modifier key several times quickly should turn MouseKeys™ on and off (toggle).

e) The user should be able to disable (and enable again) some keyboard shortcut for turning MouseKeys™ on and off. The keyboard shortcut should be enabled by default.

f) Saying the specific phrase should allow the user to turn MouseKeys™ on and off.

g) When MouseKeys™ is on, the specific modifier key should switch the number pad back and forth between MouseKeys™ operation and one of the other two standard modes of number pad operation (number input or key navigation).

h) The device should allow a user to select whether MouseKeys™ is active when some lockable modifier key is on or off. The initial setting should be that MouseKeys™ is active when some lockable modifier key is on.

i) The device should be able to provide visual, auditory or tactile feedback when MouseKeys™ is turned on or off.

NOTE 3   The visual feedback can include displaying a status indicator when MouseKeys™ is enabled, and displaying the visual representations of pushed mouse keys.

NOTE 4   Auditory feedback can include, e.g. beeping, click sounds. In ISO 9241-171:2008, E.3.6, a low-high tone can alert the user when MouseKeys™ is turned on, and a high-low tone when MouseKeys™ is turned off.

Moving the mouse pointer with MouseKeys™:

j)   When MouseKeys™ is on, the number pad keys shall move the mouse pointer by one pixel, if the key is pressed and released; or repeatedly in increasing steps of pixels if the key is pressed and held down (repetition every 0,5 s in default setting).

k)   If MouseKeys™ is on, and the specific modifier key is held down, any of the number pad keys should cause the mouse pointer to jump by 20 pixels instead of one pixel, and by 20 times the regular step-size when acceleration kicks in.

l)   If MouseKeys™ is on, and the specific modifier key is held down, any of the number pad keys should cause the mouse pointer to move continuously without acceleration (by one pixel each time), no matter how long the movement key is held down.

m)   The device shall allow a user to set the following parameters for holding down a number pad key: repeat rate (in seconds), acceleration rate, and top mouse pointer speed (maximum speed in number of pixels per step that is reached when holding down a key for a long time).

Clicking and dragging with MouseKeys™:

n)   When MouseKeys™ is on, the number pad keys should select the mouse buttons for operation, and the number pad keys shall operate the mouse buttons.

o)   When MouseKeys™ is on and the number pad keys have not yet been pushed, pressing the specific number pad key should operate the primary mouse button, and a key combination of the specific number pad key and the specific modifier key should operate the secondary mouse button.

NOTE 5   If the user cannot operate a key combination of the specific number pad key and the specific modifier key simultaneously, the user actives StickyKeys™ and presses these keys sequentially.

p)   The device should be able to provide visual, auditory or tactile feedback about the mouse button(s) currently selected.

NOTE 6   The visual feedback can include displaying (a) visual representation(s) of the selected mouse button(s).

4.2.1.3.6   RepeatKeys™

If the device implements the RepeatKeys™ feature, the following requirements and recommendations apply.

Turning RepeatKeys™ on and off:

a)   The RepeatKeys™ feature should be off by default.

b)   The device shall allow a user to turn RepeatKeys™ on and off from the user settings.

Setting operation parameters of RepeatKeys™:

c)   The device shall allow a user to set the repeat onset delay, up to a maximum value of at least 2,0 s.

d)   The device shall allow a user to set the repeat interval, up to a maximum value of at least 2,0 s.

4.2.1.3.7   ToggleKeys™

If the device implements the ToggleKeys™ feature, the following requirements and recommendations apply.

Turning ToggleKeys™ on and off:

a) The ToggleKeys™ feature should be off by default.

b) The device shall allow a user to turn ToggleKeys™ on and off from the user settings.

Operation of ToggleKeys™:

c) When ToggleKeys™ is on, auditory or other selected feedback should be provided when any toggle key is locked or unlocked.

EXAMPLE   A high tone can alert the user when a toggle key is being locked, and a low tone can alert the user when the key is being unlocked. See ISO 9241-171:2008, E.3.8.

4.2.1.3.8   Touchpad

If the device has a touchpad in front of the keyboard, the device or operating system shall provide the capability for a user to enable and disable the touchpad.

NOTE   Touchpad sometimes causes an input error by mistouch.

4.2.1.4   Other input

4.2.1.4.1   Time out of accessibility features

Time out (of accessibility features) allows a system administrator to arrange that a device returns to "normal" settings after being unused for a period of time. This is applicable to shared devices in a business setting. This is generally restricted to administrators, since it is undesirable for individual users to accidentally have their settings changed when they are not expecting it.

If the device implements the time out (accessibility features) feature, the following requirements and recommendations apply.

a) The time out should be off by default.

b) The device shall allow an administrator to turn time out on and off from the system settings.

c) When time out is on, the following access features shall be automatically turned off after a period of keyboard and mouse inactivity: StickyKeys™, SlowKeys™, BounceKeys™, FilterKeys™, MouseKeys™, RepeatKeys™, ToggleKeys™, SoundSentry™, and ShowSounds™.

d) The device shall allow an administrator to set the period of inactivity before the access features are disabled, up to a maximum time of at least 30 min. The default value should be 10 min.

4.2.1.4.2   Language

The device shall provide the capability for a user to select the input language.

4.2.1.4.3   Long press delay

The device should provide the capability for a user to access press delay settings, so that users can choose the delay of a long press (for a validation command) and the delay of a tap/click (get information command or selection command).

4.2.1.4.4   Double click/press delay

The device should provide the capability for a user to access double tap/click settings, so that users can choose the delay of the double tap/click.

4.2.1.4.5 Shortcut settings

The device should provide the capability for a user to access shortcuts settings, so that users can choose the gestures/keys combinations/vocal commands that enable direct access to their preferred features.

4.2.1.4.6 Input method selection settings

The device should provide the capability for a user to access input method settings, so that users can choose an appropriate input method between sequential input method, material keyboard, virtual keyboard, vocal command.

4.2.2 Output

4.2.2.1 Visual output

4.2.2.1.1 SoundSentry™

If the device implements the SoundSentry™ feature, the following requirements and recommendations apply.

Turning SoundSentry™ on and off:

a) The SoundSentry™ feature should be off by default.

b) The device shall allow a user to turn SoundSentry™ on and off from the user settings.

Operation of SoundSentry™:

c) When SoundSentry™ is on, visual or tactile feedback should be provided when the device generates a sound.

    NOTE   ISO 9241-171:2008, Annex E lists the following common types of visual feedback: flash of on-screen icon, flash of full screen, flash of foreground window frame, and flash of desktop.

d) The device shall allow a user to set the type of visual or tactile feedback.

4.2.2.1.2 ShowSounds™

If the device implements the ShowSounds™ feature, the following requirements and recommendations apply.

Turning ShowSounds™ on and off:

a) The ShowSounds™ feature should be off by default.

b) The device shall allow a user to turn ShowSounds™ on and off from the user settings.

c) The device shall allow applications to read the state of the ShowSounds™ setting.

4.2.2.1.3 Visual modes

These requirements apply only where the device is physically able to support these visual modes.

a) The device shall provide the capability for a user to invert the colour tone of screen.

b) The device shall provide the capability for a user to choose:

    — grayscale;

    — high-contrast;

— colour combination;

— foreground colour (e.g. text colour) and background colour.

c) The device shall provide the capability for a user to set the contrast of the screen.

d) The device should provide the capability for a user to access the same settings as a) to c) by voice command.

e) The device should provide the capability for a user to access the same settings as a) to c) by gesture command.

f) Pressing the specific modifier keys combination should enable and disable colour tone inverse.

g) Pressing the specific modifier keys combination should change contrast up or down, respectively.

h) Pressing the specific modifier keys combination should enable and disable high-contrast mode.

i) The device should provide the capability for a user to enable and disable accepting the specific modifier keys combination described in f), g) and h) for controlling contrast.

4.2.2.1.4   Screen magnifier

If the device has the feature of screen magnification:

NOTE 1   Examples of shortcut keys and voice commands, described as "the specific modifier key" or "the specific word/phrase" in the text body, are shown in A.4.1.1.

NOTE 2   The screen magnification can be built into the operating system or an added assistive technology.

a) The device shall provide the capability for a user to enable and disable screen magnification.

b) The device shall provide the capability for a user to set the magnification factor for screen magnification.

c) The device shall provide the capability for a user to select the variety of movements of the magnification window with respect to the movement of pointing device.

   NOTE 3   In c), the variety of movements of the screen with respect to the movement of pointing device includes, e.g "scroll with pointer", "scroll only when the pointer is at end of screen," .

d) The device should provide the capability for a user to access the same settings as a) to c) by voice command.

e) The device should provide the capability for a user to access the same settings as a) to c) by gesture command.

f) Pressing the specific modifier keys combination should enable and disable screen magnification mode.

g) Pressing the specific modifier keys combination should cause screen magnification or reduction, respectively.

h) The device should provide the capability for a user to enable and disable accepting the specific modifier keys combination described in f) and g) for controlling screen magnification.

4.2.2.2   Audio output — Text to speech screen reader

If the device has the feature of a text-to-speech screen reader:

NOTE 1   Examples of shortcut keys and voice commands, described as "the specific modifier key" or "the specific word/phrase" in the text body, are shown in A.4.2.1.

a) The device shall provide the capability for a user to enable and disable the screen reader.

b) The device shall provide the capability for a user to select the voice from a variety of voices.

NOTE 2   In b), the variety of voices includes, e.g. male or female, high pitch or low pitch, dialect.

c) The device shall provide the capability for a user to set the speech rate.

d) Pressing the specific modifier keys combination should enable and disable the screen reader.

e) The device should provide the capability for a user to enable and disable accepting the specific modifier keys combination described in d).

f) Saying the specific phrase should enable and disable the screen reader.

4.2.2.3   Tactile and movement output — Tactile display

The device shall provide the capability for a user to set the output characteristics of any tactile display.

a) The device shall provide the capability for a user to enable and disable the screen reader for text-to braille.

b) Pressing the specific modifier keys combination should enable and disable the screen reader for text-to-braille.

c) The device should provide the capability for a user to enable and disable accepting the specific modifier keys combination described in b).

d) Saying the specific phrase should enable and disable the screen reader for text-to-braille.

NOTE   Requirements and recommendations on the accessible design of tactile/haptic devices including braille output can be found in ISO 9241-971.

4.2.2.4   Other output modalities

4.2.2.4.1   Visual, auditory or tactile feedback

If the device has the feature of visual, auditory or tactile feedback:

The device shall provide the capability for a user to enable and disable visual, auditory or tactile feedback. It should be enabled by default.

4.2.2.4.2   Language

The device shall provide the capability for a user to select the output language.

4.3   Shortcuts to access the accessibility features

4.3.1   General

The requirements for shortcuts to access the accessibility features are:

a) If the accessibility feature is enabled or disabled by the shortcut, the device shall notify the user in accessible manners that the accessibility feature is enabled or disabled.

b) Shortcut commands shall be multimodal in perception. As such they shall be available through visual display, through audio display and through tactile display.

c) Shortcut commands shall be multimodal in execution. As such they shall be actionable through pointing, and also without pointing, through key pressing, vocal commands and gesture commands.