

ISO 9241-171:2025-12 (E)

Ergonomics of human-system interaction - Part 171: Software accessibility

Contents

Page

| | |
|--|-----------|
| Foreword..... | viii |
| Introduction..... | ix |
| 1 Scope..... | 1 |
| 2 Normative references..... | 1 |
| 3 Terms and definitions..... | 1 |
| 3.1 Major accessibility related concepts..... | 1 |
| 3.2 Concepts relating to interaction..... | 3 |
| 3.3 Concepts relating to the user interface..... | 3 |
| 3.4 Concepts relating to individualization..... | 6 |
| 3.5 Concepts relating to accessibility features..... | 6 |
| 3.5.1 Major concepts relating to accessibility features..... | 6 |
| 3.5.2 Concepts relating to visual accessibility features..... | 7 |
| 3.5.3 Concepts relating to audio accessibility features..... | 8 |
| 3.5.4 Concepts relating to audiovisual accessibility features..... | 9 |
| 3.5.5 Concepts relating to input features..... | 9 |
| 3.5.6 Concepts relating to keyboard-based input features..... | 10 |
| 4 Conventions..... | 12 |
| 5 Conformance..... | 13 |
| 6 Structure and application of this document..... | 13 |
| 6.1 External principles and guidance..... | 13 |
| 6.1.1 Accessibility principles of the W3C Web Content Accessibility Guidelines (WCAG) 2.2..... | 13 |
| 6.1.2 Accessibility principles of the W3C User Agent Accessibility Guidelines (UAAG) 2.0..... | 14 |
| 6.2 Accessibility goals of ISO/IEC Guide 71..... | 14 |
| 6.3 Organization of guidance in this document..... | 15 |
| 6.4 Achieving accessibility..... | 16 |
| 7 Goal 1: Achieving suitability for the widest range of users' needs..... | 16 |
| 7.1 To recognize that users are included as system users within diverse contexts..... | 16 |
| 7.2 To have accessible support for using the system..... | 16 |
| 7.2.1 Describe accessibility features..... | 16 |
| 7.2.2 Provide accessible support services..... | 16 |
| 7.2.3 Provide accessible training material..... | 17 |
| 7.2.4 Provide user documentation in accessible electronic form..... | 17 |
| 7.2.5 Provide accessible feedback mechanisms..... | 17 |
| 7.3 To have the system accessible to an individual with combinations of needs..... | 17 |
| 8 Goal 2: Achieving conformity with user expectations needs..... | 18 |
| 8.1 To not be surprised by the results of interactions with the system..... | 18 |
| 8.1.1 Maintain naming consistency..... | 18 |
| 8.1.2 Maintain location and ordering consistency..... | 18 |
| 8.1.3 Present user notification using consistent techniques..... | 18 |
| 8.1.4 Update equivalent alternatives for media when the media changes..... | 18 |
| 8.1.5 Use familiar tactile patterns..... | 19 |
| 8.1.6 Manage consistent focus..... | 19 |
| 8.1.7 Restore state when regaining focus..... | 19 |
| 8.1.8 Follow platform keyboard conventions..... | 19 |
| 8.1.9 Managing changes of context..... | 19 |

| | | |
|-----------|--|-----------|
| 8.2 | To apply personal knowledge and experience to interact successfully with the system | 20 |
| 8.3 | To provide user assistance for knowledge needed to interact with the system..... | 20 |
| 8.4 | To provide immediate and easily accessible help or further instructions, where such help can be provided by the system..... | 20 |
| 9 | Goal 3: Achieving support for individualization needs | 20 |
| 9.1 | To be provided with the way of interacting with a system that best works for them..... | 20 |
| 9.2 | To choose between the available input and output modalities and their configuration without requiring restart of the system..... | 21 |
| 9.2.1 | Enable switching of input and output alternatives..... | 21 |
| 9.2.2 | Enable revising or reassigning controls..... | 21 |
| 9.3 | To have simultaneous use of alternate interaction modalities..... | 21 |
| 9.3.1 | Choosing modalities to be simultaneously available..... | 21 |
| 9.3.2 | Switching between simultaneously available modalities..... | 21 |
| 9.3.3 | Allow user to select media streams to be presented..... | 21 |
| 9.4 | To be provided with information on available options for interacting with a system on which to base a choice of interaction methods..... | 21 |
| 9.5 | To be provided with an accessible means to choose individualization features..... | 22 |
| 9.5.1 | Enable individualization of user-preference settings..... | 22 |
| 9.5.2 | Enable adjustment of attributes of common user-interface elements | 24 |
| 9.5.3 | Enable individualization of the user interface..... | 24 |
| 9.6 | To have individualization features maintained for future uses of the system, until changed by the user | 24 |
| 9.6.1 | Utilize user-preference profiles..... | 24 |
| 9.6.2 | Provide a means of restoring system defaults | 25 |
| 9.6.3 | Minimize the need to restart for changes..... | 25 |
| 9.7 | To provide pre-defined preference profiles | 25 |
| 9.8 | To take or give up control of functions that can be performed by either the user or the system | 25 |
| 9.9 | To have the option to use the system with a minimum of setup or configuration..... | 25 |
| 9.10 | To customize important functionality: a new user accessibility need (UAN)..... | 25 |
| 9.10.1 | Manage key input functionalities..... | 25 |
| 9.10.2 | Manage pointer functionalities..... | 27 |
| 9.10.3 | Manage visual attributes..... | 28 |
| 9.10.4 | Manage auditory attributes..... | 30 |
| 9.10.5 | Manage language selection..... | 30 |
| 9.10.6 | Manage windowing functionalities..... | 31 |
| 9.10.7 | Manage functionalities providing content alternatives..... | 32 |
| 9.10.8 | Manage animation functionalities..... | 32 |
| 9.10.9 | Adjust the scale and layout of user-interface elements as font-size changes..... | 32 |
| 10 | Goal 4: Achieving approachability needs | 33 |
| 10.1 | To have the system free from any physical barriers | 33 |
| 10.2 | To have the system free from any psychological barriers..... | 33 |
| 10.3 | To have the system maintain the user's attention..... | 33 |
| 10.3.1 | Engage the user's attention | 33 |
| 10.3.2 | Enable user rest breaks..... | 33 |
| 10.4 | To have interaction options clearly presented..... | 33 |
| 10.5 | To have appropriate levels of privacy and security..... | 34 |
| 10.6 | To avoid patterns that cause psychological or physical discomfort or disturbance..... | 34 |
| 10.6.1 | Avoid seizure-inducing flash rates..... | 34 |
| 10.7 | To use the system remotely as well as directly | 34 |
| 10.8 | To have the system free from environmental barriers..... | 34 |
| 11 | Goal 5: Achieving perceivability needs..... | 34 |
| 11.1 | To use a specific sensory modality (or a set of specific modalities) to perceive information..... | 34 |
| 11.1.1 | To have information presented visually..... | 34 |
| 11.1.2 | To have visual information available in other modalities | 35 |
| 11.1.3 | To have information presented in auditory form..... | 35 |
| 11.1.4 | To have audio information available in other modalities | 35 |
| 11.1.5 | To have information in tactile form..... | 36 |
| 11.1.6 | To have tactile information also available in other modalities..... | 36 |
| 11.1.7 | To experience information via multiple simultaneous modalities..... | 36 |
| 11.2 | To have presentation attributes of a modality that match an individual's needs | 36 |

| | | |
|-----------|--|-----------|
| 11.2.1 | To have presentation attributes specific to the visual modality that match an individual's needs..... | 36 |
| 11.2.2 | To have material printed..... | 38 |
| 11.2.3 | To have sign language perceivable..... | 38 |
| 11.2.4 | To have 3-dimensional visual information presented using only two dimensions..... | 38 |
| 11.2.5 | To have presentation attributes specific to the auditory modality that match an individual's needs..... | 38 |
| 11.2.6 | To select or deselect different audio streams..... | 39 |
| 11.2.7 | To have presentation attributes specific to the tactile modality that match an individual's needs..... | 39 |
| 11.2.8 | To have visual or tactile feedback occur at the same location as the control..... | 39 |
| 11.3 | To distinguish among the different components of information that are being presented..... | 39 |
| 11.3.1 | To distinguish between different components without them interfering with one another..... | 39 |
| 11.3.2 | To prevent actions which would unintentionally decrease information perceivability..... | 39 |
| 11.3.3 | To locate and identify all actionable components without activating them..... | 39 |
| 11.3.4 | To have actionable components look, sound or feel distinctive from non-actionable components..... | 40 |
| 11.3.5 | To have sufficient landmarks and cues to navigate to the necessary locations, functionalities or controls to carry out a task..... | 40 |
| 11.3.6 | To have distinct recognizable signals for different alerts or other messages that use signals..... | 40 |
| 11.4 | To perceive information regardless of environmental or other conditions that might interfere..... | 40 |
| 11.4.1 | To perceive foreground information in the presence of background information..... | 40 |
| 11.4.2 | To avoid distractions that prevent focusing on a task..... | 41 |
| 11.4.3 | To have accessibility features not interfere with perception of standard information..... | 41 |
| 11.4.4 | To have only the content necessary for the current task presented..... | 41 |
| 11.4.5 | To have haptic input and output from devices not interfere with the perception of information..... | 41 |
| 11.5 | To not have one's senses overloaded..... | 41 |
| 11.6 | To have attention drawn to critically important information in the appropriate modality, form, and language..... | 42 |
| 12 | Goal 6: Achieving understandability needs..... | 42 |
| 12.1 | To obtain information on the system and its components and functionalities..... | 42 |
| 12.1.1 | To get an overview and to orient the users to the system and its functions and components..... | 42 |
| 12.1.2 | To obtain and use unique names for every user interface component..... | 43 |
| 12.1.3 | To receive training that supports an individual's cognitive needs..... | 46 |
| 12.1.4 | To receive help that supports an individual's cognitive needs..... | 46 |
| 12.1.5 | To receive recommendations that aid a user's understanding..... | 47 |
| 12.2 | To understand information presented by the system..... | 47 |
| 12.2.1 | To have presented information as easy to understand as possible..... | 47 |
| 12.2.2 | To have individual linguistic requirements supported by the system..... | 48 |
| 12.2.3 | To have individual cultural requirements supported by the system..... | 48 |
| 12.2.4 | To have text alternatives be provided for all non-textual information..... | 48 |
| 12.2.5 | To have information provided pictorially as well as via text..... | 50 |
| 12.2.6 | To customize abstract symbols with alternative representations..... | 50 |
| 12.2.7 | To have language presented in a particular modality and format..... | 50 |
| 12.3 | To have information that supports an individual's cognitive needs..... | 51 |
| 12.3.1 | To have information presented in a manner that supports an individual's styles of reasoning..... | 51 |
| 12.3.2 | To avoid unnecessary high cognitive demands..... | 51 |
| 12.3.3 | To have navigation that supports an individual's thinking style..... | 51 |
| 12.3.4 | To have assistance with remembering and recalling information..... | 53 |

| | | |
|-----------|--|-----------|
| 12.4 | To have the steps for completing tasks optimized to match an individual's needs and clearly explained..... | 53 |
| 12.4.1 | Optimize the number of steps required for any task..... | 53 |
| 12.5 | To have cues to support the individual in completing tasks..... | 53 |
| 12.5.1 | Provide notification about toggle-key status..... | 53 |
| 12.5.2 | Provide implicit or explicit designators..... | 54 |
| 12.5.3 | Provide notification of progress..... | 54 |
| 12.6 | To have feedback showing the results of actions..... | 54 |
| 12.7 | To have sufficient time to interact with the system..... | 54 |
| 12.7.1 | To have sufficient time to understand displayed or presented information..... | 54 |
| 12.7.2 | To have information necessary to plan actions available in advance..... | 55 |
| 12.7.3 | To plan a series of actions in advance..... | 55 |
| 12.8 | To access support when needed..... | 55 |
| 13 | Goal 7: Achieving controllability needs..... | 55 |
| 13.1 | To use a specific sensory modality (or a set of specific sensory modalities) for inputs to the system..... | 55 |
| 13.1.1 | To have alternate modalities of input to the system..... | 55 |
| 13.1.2 | To use the tactile modality as a source of inputs to the system..... | 56 |
| 13.1.3 | To use sound as a source of inputs..... | 56 |
| 13.1.4 | To use visual recognition as a source of inputs..... | 57 |
| 13.2 | To control attributes of an input or interaction modality to match an individual's needs..... | 57 |
| 13.2.1 | To have acceptable input or interaction attributes specific to the tactile modality..... | 57 |
| 13.2.2 | To have acceptable input or interaction attributes specific to the auditory modality..... | 57 |
| 13.2.3 | To have acceptable input or interaction attributes specific to the visual modality..... | 57 |
| 13.2.4 | To position system components and devices in suitable locations for their use..... | 57 |
| 13.3 | To use a specific interaction method to provide inputs to the system..... | 57 |
| 13.3.1 | Keyboard-based interactions..... | 57 |
| 13.3.2 | Pointer-based interactions..... | 59 |
| 13.3.3 | Speech-based interactions..... | 59 |
| 13.3.4 | Gesture-based interactions..... | 60 |
| 13.4 | To perform the task using specific types of action..... | 60 |
| 13.4.1 | To have a means of shifting the focus from one interface component to another interface component..... | 60 |
| 13.4.2 | To perform the task using various parts of the body..... | 61 |
| 13.4.3 | To have a method to fully operate the system that does not require simultaneous actions..... | 61 |
| 13.4.4 | To interact with the system at one's own pace..... | 62 |
| 13.4.5 | To have a method to fully operate the system that does not require direct body contact..... | 64 |
| 13.4.6 | To have specific interaction features: a new user accessibility need (UAN)..... | 64 |
| 13.5 | To perform supporting and maintenance tasks related to the use of the system that other users are expected to undertake..... | 67 |
| 13.6 | To control the environment (to the extent possible) to prevent interference with performing the task..... | 67 |
| 13.6.1 | General..... | 67 |
| 13.6.2 | Avoid interference with accessibility features..... | 67 |
| 13.7 | To access the controls that allow them to turn on and adjust the built-in accessibility features..... | 68 |
| 13.7.1 | Make controls for accessibility features discoverable and operable..... | 68 |
| 13.7.2 | Inform user of accessibility feature "On" or "Off" status..... | 68 |
| 13.7.3 | Inform user of accessibility feature activation..... | 68 |
| 13.7.4 | Provide capability to use preference settings across locations..... | 68 |
| 13.8 | To have a suitable level of autonomy..... | 69 |
| 14 | Goal 8: Usability..... | 69 |
| 14.1 | To be provided a means to successfully accomplish tasks..... | 69 |
| 14.2 | To avoid making mistakes in completing tasks..... | 69 |
| 14.3 | To complete tasks in an efficient manner relative to one's own abilities..... | 69 |

| | | |
|--|--|-----------|
| 14.4 | To perform tasks with a minimum of physical exertion | 69 |
| 14.5 | To perform tasks with a minimum of cognitive exertion..... | 69 |
| 14.6 | To operate the system without becoming fatigued..... | 70 |
| 14.7 | To complete tasks within the available time..... | 70 |
| 14.8 | To be satisfied with the outcome of interacting with the system..... | 70 |
| 14.9 | To have comparable satisfaction that the system is worth using to that of other users..... | 70 |
| 15 | Goal 9: Error tolerance..... | 70 |
| 15.1 | To have confidence that using the system will be free from negative consequences or unacceptable risks..... | 70 |
| 15.1.1 | Avoiding negative consequences..... | 70 |
| 15.1.2 | Avoiding motion sickness..... | 70 |
| 15.1.3 | Avoiding unexpected major changes..... | 70 |
| 15.2 | To explore a system without unintentionally activating components or their functionalities..... | 71 |
| 15.2.1 | Support exploration without unintentionally activating functions..... | 71 |
| 15.2.2 | Safeguard against inadvertent activation or deactivation of accessibility features..... | 71 |
| 15.3 | To accomplish tasks in spite of the occurrence of errors..... | 71 |
| 15.3.1 | Allow warning or error information to persist..... | 71 |
| 15.4 | To detect when errors have been made..... | 71 |
| 15.4.1 | Notify the user when errors are detected..... | 71 |
| 15.4.2 | Provide information about the error that has occurred..... | 71 |
| 15.5 | To recover from errors made from interacting with the system..... | 71 |
| 15.5.1 | Facilitate navigation to the location of errors..... | 71 |
| 15.5.2 | Assist with error correction..... | 71 |
| 15.6 | To reset a system to an earlier or original condition as a means of responding to errors..... | 72 |
| 15.7 | To avoid errors by making negative consequences be obvious, easy to avoid, and difficult to trigger..... | 72 |
| 16 | Goal 10: Equitable use..... | 72 |
| 16.1 | To use a system in a manner that is as similar as possible to other users..... | 72 |
| 16.2 | To use a system in a manner that is equivalent to that of other users, even if the manner of use is different..... | 72 |
| 16.3 | To have available alternate ways of interacting with a system that match a user's needs..... | 72 |
| 16.3.1 | Provide alternative means of interaction that match users' needs..... | 72 |
| 16.3.2 | Provide alternatives when assistive technology (AT) is not operable..... | 73 |
| 17 | Goal 11: Compatibility with other systems..... | 73 |
| 17.1 | To use their own assistive products or assistive technology (AT) to interact with all the functionalities of the system..... | 73 |
| 17.1.1 | Make interactions available to assistive technology (AT)..... | 73 |
| 17.1.2 | Make user-interface element information available to assistive technologies..... | 73 |
| 17.1.3 | Make feedback and messages available to assistive technology (AT)..... | 74 |
| 17.1.4 | Make event notification available to assistive technologies..... | 74 |
| 17.1.5 | Enable communication between software and assistive technology (AT)..... | 75 |
| 17.1.6 | Use standard accessibility services..... | 75 |
| 17.1.7 | Allow assistive technology (AT) to change focus and selection..... | 76 |
| 17.1.8 | Allow assistive technology (AT) to access resources..... | 76 |
| 17.1.9 | Use system-standard input and output..... | 76 |
| 17.1.10 | Enable appropriate presentation of tables..... | 76 |
| 17.1.11 | Accept the installation of keyboard and pointing device emulators..... | 77 |
| 17.1.12 | Allow assistive technology (AT) to monitor output operations..... | 77 |
| 17.2 | To have the interaction between the system and assistive technology be without interference..... | 77 |
| 17.2.1 | Support combinations of assistive technologies..... | 77 |
| 17.2.2 | Avoid interference between assistive technologies..... | 77 |
| 17.3 | To have specific accessibility functions available at all times, without disruption..... | 77 |
| 17.3.1 | Pass through of system functions..... | 77 |
| 17.3.2 | Restore hidden accessibility functions..... | 78 |
| Annex A (informative) W3C web content accessibility guidelines (WCAG) 2.2 success criteria..... | | 79 |