
**Information technology — Individualized
adaptability and accessibility in
e-learning, education and training —**

Part 2:

**“Access for all” personal needs and
preferences for digital delivery**

iTeh STANDARD PREVIEW

*Technologies de l'information — Adaptabilité et accessibilité
individualisées en e-apprentissage, en éducation et en formation —*

*Partie 2: Besoins personnels en matière d'«accès pour tous» et
préférences de prestation numérique*

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Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
Web www.iso.org

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Foreword

ISO (the International Organization for Standardization) and IEC (the International Electrotechnical Commission) form the specialized system for worldwide standardization. National bodies that are members of ISO or IEC participate in the development of International Standards through technical committees established by the respective organization to deal with particular fields of technical activity. ISO and IEC technical committees collaborate in fields of mutual interest. Other international organizations, governmental and non-governmental, in liaison with ISO and IEC, also take part in the work. In the field of information technology, ISO and IEC have established a joint technical committee, ISO/IEC JTC 1.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

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

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

ISO/IEC 24751-2 was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 36, *Information technology for learning, education, and training*.

ISO/IEC 24751 consists of the following parts, under the general title *Information technology — Individualized adaptability and accessibility in e-learning, education and training*:

- *Part 1: Framework and reference model* ISO/IEC 24751-2:2008
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- *Part 2: “Access for all” personal needs and preferences for digital delivery*
- *Part 3: “Access for all” digital resource description*

Future parts will address non-digital resource description, personal needs and preferences for non-digital resources, personal needs and preferences for description of events and places, digital description of events and places, and language accessibility and human interface equivalencies (HIEs) in e-learning applications.

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Information technology — Individualized adaptability and accessibility in e-learning, education and training —

Part 2: “Access for all” personal needs and preferences for digital delivery

1 Scope

This part of ISO/IEC 24751 provides a common information model for describing the learner or user needs and preferences when accessing digitally delivered resources or services. This description is one side of a pair of descriptions used in matching user needs and preferences with digital delivery (as described in ISO/IEC 24751-1). This model divides the personal needs and preferences of the learner or user into three categories:

- a. Display: how resources are to be presented and structured;
- b. Control: how resources are to be controlled and operated; and,
- c. Content: what supplementary or alternative resources are to be supplied.

This part of ISO/IEC 24751 is intended to meet the needs of learners with disabilities (as defined in ISO/IEC 24751-1) and of anyone in a disabling context.

The purpose of this part of ISO/IEC 24751 is to provide a machine-readable method of stating user needs and preferences with respect to digitally based education or learning. This part of ISO/IEC 24751 can be used independently, for example to deliver the required or desired user interface to the learner/user, or in combination with ISO/IEC 24751-3 to deliver digital resources that meet a user's needs and preferences.

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.

2.1 ISO/IEC

ISO 639-2:1998 (E/F), *Codes for the representation of names of languages — Part 2: Alpha-3 code/Codes pour la représentation des noms de langue — Partie 2: Code alpha-3*

2.2 Referenced specifications

IETF RFC 3986 Uniform Resource Identifier (URI): Generic Syntax [RFC 3986],
{<http://www.ietf.org/rfc/rfc3986.txt>}

3 Terms and definitions

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

3.01 access for all AfA

approach to providing **accessibility** in a computer-mediated environment in which the **digital resources** and their method of delivery are matched to the needs and preferences of the user

[IMS *AccessForAll Meta-data Specification Version 1*] ¹⁾

3.02 accessibility

usability of a product, service, environment or facility by **individuals** with the widest range of capabilities

NOTE 1 Although “accessibility” typically addresses users who have a disability, the concept is not limited to disability issues.

NOTE 2 Adapted from ISO/TS 16071:2003 (3.2).²⁾

3.03 access mode

human sense perceptual system or cognitive faculty through which a user may process or perceive the content of a **digital resource**

[ISO/IEC 24751-1:2008 (2.3)]

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3.04 adaptation

(e-learning) **digital resource** that presents the **intellectual content** of all or part of another **digital resource**

NOTE Adaptations can also include the adjustment of the presentation, control methods, access mode, structure and user supports.

[ISO/IEC 24751-1:2008 (2.5)]

3.05 AfA context

particular situation or environment in which a set of **AfA accessibility** needs and preferences might be used

3.06 AfA contextual description

name or description of a context in which a set of **AfA accessibility** needs and preferences might be used

EXAMPLE A label for a particular location such as home, work or school, or a particular time of day such as evening.

NOTE See 5.4 for more information.

3.07 AfA hazard

characteristic of a **digital resource** that can be specified as being dangerous to a user

EXAMPLE Flashing animations can trigger seizures in people with photosensitive epilepsy.

NOTE See the coded domain in B.17.

1) The source for this adapted IMS definition is now ISO/IEC 24751-1:2008 (2.1).

2) The source for this adapted ISO/TS 16071:2003 definition is now ISO/IEC 24751-1:2008 (2.2).

3.08**AfA preference**

specific preference of an **individual** who requires **AfA accessibility**

NOTE See 5.5.

3.09**AfA preference set**

defined combination of two or more **AfA preferences**

3.10**application parameter**

set of **application specific** values for a particular **assistive technology**

3.11**application specific**

configuration of an **assistive technology** that involves **application parameters** unique to a particular **assistive technology** product

NOTE See 5.6 for more information.

3.12**assistive technology**

alternative access system

specialized software and/or hardware used in place of or in addition to commonly used software or hardware for control, **display** or processing

EXAMPLES Screen reader, alternative keyboard, refreshable Braille device, screen magnifier.

[ISO/IEC 24751-1:2008 (2.8)]

[ISO/IEC 24751-2:2008](https://standards.iteh.ai/catalog/standards/sist/051e47f8-0abf-4512-a9b0-2918cd506eb5/iso-iec-24751-2-2008)

3.13**digital resource****DR**

any type of resource that can be transmitted over and/or accessed via an **information technology system**

NOTE A digital resource can be referenced via an unambiguous and stable identifier in a recognized identification system (e.g. ISBN, ISAN, UPC/EAN, URI).

[ISO/IEC 24751-1:2008 (2.11)]

3.14**disability**

⟨digital resource delivery⟩ any obstacle to the use of a **digital resource** experienced because of a mismatch between the needs of a user and the **digital resource** delivered

NOTE 1 Disability in an AfA context is not a personal trait but a consequence of the relationship between the user and their resource system.

NOTE 2 In an e-learning context, disability refers to a mismatch between the needs of a learner and both the educational resource and/or the method of delivery.

[ISO/IEC 24751-1:2008 (2.13)]

3.15**disability**

⟨medical perspective⟩ any restriction or lack (resulting from an **impairment**) of ability to perform an activity in the manner or within the range considered normal for a human being

ISO/IEC 24751-2:2008(E)

NOTE 1 This definition of “disability” is included to ensure that users who may have “legal rights” to assistive technologies are served.

NOTE 2 Adapted from World Health Organization Document A29/INFDOCI/1, Geneva, Switzerland, 1976. ³⁾

3.16 display

rendering or presentation of a user interface and/or **digital resource** in a range of **access modes**

NOTE Access modes include, but are not limited to, visual, auditory, olfactory, textual and tactile.

[ISO/IEC 24751-1:2008 (2.15)]

3.17 display transformability

characteristic of a **digital resource** that supports changes to specific aspects of its **display**

NOTE See the coded domain in ISO/IEC 24751-3:2008, B.3.

[ISO/IEC 24751-1:2008 (2.16)]

3.18 display transformation DT

restyling or reconfiguration of the rendering or presentation of a user interface and/or **digital resource**

[ISO/IEC 24751-1:2008 (2.17)]

3.19 generic assistive technology configuration

configuration of an **assistive technology** that involves application parameters common among similar technologies, and not exclusive to a particular product

NOTE See 5.6.

3.20 impairment

⟨medical perspective⟩ any loss or abnormality of psychological, physiological or anatomical structure or function

NOTE Adapted from World Health Organization. Document A29/INFDOCI/1, Geneva, Switzerland, 1976. ⁴⁾

3.21 individual

human being, i.e. a natural person, who acts as a distinct indivisible entity or is considered as such

NOTE Adapted from ISO/IEC 15944-1:2002 (3.28).

3.22 individualized accessibility

⟨e-learning⟩ facility of an **IT system** based learning environment to address the needs of an **individual** as learner (through **adaptation**, re-aggregation and substitution)

3) The source of this definition adapted from World Health Organization Document A29/INFDOCI/1, Geneva, Switzerland, 1976 is now ISO/IEC 24751-1:2008 (2.14).

4) The source of this definition adapted from World Health Organization Document A29/INFDOCI/1, Geneva, Switzerland, 1976 is now ISO/IEC 24751-1:2008 (2.19).

NOTE Accessibility is determined by the flexibility of the education environment (with respect to presentation, control methods, structure, access mode, and learner supports) and the availability of equivalent content deemed to be adequate alternatives.

[ISO/IEC 24751-1:2008 (2.21)]

3.23

information technology system

IT system

set of one or more computers, associated software, peripherals, terminals, human operations, physical processes, information transfer means, that form an autonomous whole, capable of performing information processing and/or information transfer

[ISO/IEC 14662:2004 (3.1.8)]

3.24

language

system of signs for communication, usually consisting of a vocabulary and rules

NOTE In this part of ISO/IEC 24751, language refers to “natural languages” or “special languages” but not “programming languages” or “artificial languages”.

[ISO 5127:2001 (1.1.2.01)]

4 Symbols and abbreviations

AfA	access for all
DR	digital resource
DRD	access for all digital resource description
DT	display transformation
IEEE	Institute of Electronic & Electrical Engineering
IMS	IMS Global Learning Consortium
IT system	information technology system
MIME	multipurpose internet mail extensions
PNP	access for all personal needs and preferences
W3C	World Wide Web Consortium
W3C/WAI WCAG	World Wide Web Consortium/Web Accessibility Initiative Web Content Accessibility Guidelines

5 Basic Principles

A number of concepts are encapsulated in the information model for this part of ISO/IEC 24751. These concepts are explained below.

5.1 Functional Approach

The information collected as an Access For All Personal Needs and Preferences (PNP) description is associated with the user's functional abilities and the assistive technology or other non-standard technology in use as well as other user needs and preferences (a functional approach), rather than with the name and other details of a human impairment (a medical approach). If the structure were based on information about users' impairments, it would still need to address their functional abilities at some stage, as it is this information that is needed by learning systems to adapt content and navigation. A medical approach would exclude many of the details that the system would require. One example would be a user with a learning disability: because learning disabilities are so varied that classification does not capture the range of options that can be offered in a functional description. Another example would be the needs and preferences of a blind user: knowing that a user is blind (the medical terminology of the impairment) does not indicate whether or not they can read Braille or whether they need output to a Braille display or to a screen reader with speech; only a functional approach can do this. Many users with disabilities and users with alternate needs and preferences will require the user interface to be compatible with the assistive or non-standard technology that they use, so for them Access For All Needs and Preferences (PNP) are specific to the hardware and software used.

5.2 Creating a Personal Needs and Preferences Statement

The Access For All Personal Needs and Preferences (PNP) description can be created in a variety of ways. The most likely way is through an interactive form ('wizard') that presents a number of questions to the user and, given responses to the questions, generates the description. This application may be integrated into a content management system or offered as a stand-alone application. Once a person has a PNP, they should be able to change, expand, replace, or completely remove their user needs and preferences statement as needed. They should also be able to create multiple PNPs in order to have a convenient way to switch between several sets of needs and preferences for different situations - e.g., at home, school, or in a quiet or noisy place. They should also be able to move their PNPs to new systems or new situations for reuse.

5.3 Display, Control and Content

Needs and preferences are grouped into display, control, and content elements. Display needs and preferences describe how the user prefers to have information displayed or presented. Control needs and preferences describe how a user prefers to control the device. Finally, content needs and preferences describe what supplementary, enhanced, adapted, or alternative content the learner requires.

5.4 Multiple Contexts

A learner may have one or more defined sets of needs and preferences. Multiple sets are necessary because a learner's needs and preferences may vary according to the learning context. Changing requirements may be caused by changes to their environment (for example, a home system may have different technologies installed from one at school) and/or other factors (for example, needs may vary later in the day as fatigue increases, or with specific disciplines such as science versus literature).

5.5 Needs and Preferences

This standard includes both needs and preferences because it is crucial to provide for and distinguish between them. As described in the Framework document, the interoperability requirements of learners with disabilities necessitate strong adherence, whenever possible, to the stated needs of each learner. However, to avoid having users over-specify by marking their preferred settings as needs, the standard incorporates a priority rating for each configuration or technology setting requested. This allows users to state, for example, that they prefer to use a keyboard (perhaps due to repetitive strain injury from "mouse" use) but that they can use a "mouse"-driven application when no adaptation is available. The ratings are:

- *required*: The learner cannot use content or tools that do not provide this feature or allow this transformation.
- *preferred*: The learner prefers content or tools that provide this feature or allow this transformation.

- *optionally use*: The learner would use this setting if the content or tool they have selected for other reasons provides or allows it.
- *prohibited*: The learner cannot use content or tools that include this feature or require this transformation; this feature should be turned off if possible, and content that includes this feature should not be offered.

5.6 Generic versus Application Specific

In general, any application within a particular class of alternative access systems will share some subset of functionality. For example, screen readers, in general, allow the users to set the rate at which text is read. In addition to this subset of common or generic functionality, many vendors add features that are unique to their application.

Access For All Personal Needs and Preferences (PNP) statements identify and separate these generic settings for different classes of alternative access systems, and provide a vendor-neutral way for users to state their needs and preferences for these settings. These generic settings are applicable to any application within the class. As well, the PNP provides a mechanism for vendors to define their own application-specific settings, (which may not be applicable to other vendors' applications) and for the user to request them.

6 Information Model

The attributes in this information model are described in Clause 7.

6.1 General

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6.1.1 Access For All User

Attribute	Allowed Occurrences	Datatype
<i>language</i>	Zero or one per Access For All User	ISO 639-2/T
<i>display</i>	Zero or one per Access For All User	Display
<i>control</i>	Zero or one per Access For All User	Control
<i>content</i>	Zero or one per Access For All User	Content

6.1.2 Application

Attribute	Allowed Occurrences	Datatype
<i>name</i>	One per Application	characterstring
<i>application version</i>	Zero or one per Application	characterstring
<i>application priority</i>	One per Application	integer range (0 .. *)
<i>application parameter</i>	Zero or more per Application	Application_Parameter

6.1.3 Application Parameter

Attribute	Allowed Occurrences	Datatype
<i>name</i>	One per Application Parameter	characterstring
<i>parameter value</i>	Zero or one per Application Parameter	characterstring

6.2 Display

Attribute	Allowed Occurrences	Datatype
<i>screen reader</i>	Zero or one per <i>Display</i>	Screen_Reader
<i>screen enhancement</i>	Zero or one per <i>Display</i>	Screen_Enhancement
<i>text reading highlight</i>	Zero or one per <i>Display</i>	Text_Reading_Highlight
<i>braille</i>	Zero or one per <i>Display</i>	Braille
<i>tactile</i>	Zero or one per <i>Display</i>	Tactile
<i>visual alert</i>	Zero or one per <i>Display</i>	Visual_Alert
<i>structural presentation</i>	Zero or one per <i>Display</i>	Structural_Presentation

6.2.1 Screen Reader

Attribute	Allowed Occurrences	Datatype
<i>usage</i>	Zero or one per <i>Screen Reader</i>	usage_vocabulary)
<i>link indication</i>	Zero or more per <i>Screen Reader</i>	link_indication_vocabulary
<i>speech rate</i>	Zero or one per <i>Screen Reader</i>	integer range (1 .. *)
<i>pitch</i>	Zero or one per <i>Screen Reader</i>	real(10,4) range (0.0 ..1.0)
<i>volume</i>	Zero or one per <i>Screen Reader</i>	real(10,4) range (0.0 ..1.0)
<i>application</i>	Zero or more per <i>Screen Reader</i>	Application

6.2.2 Screen Enhancement

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Attribute	Allowed Occurrences	Datatype
<i>usage</i>	Zero or one per <i>Screen Enhancement</i>	usage_vocabulary
<i>font face</i>	Zero or one per <i>Screen Enhancement</i>	Font_Face
<i>font size</i>	Zero or one per <i>Screen Enhancement</i>	real(10,4) range (0.0 .. *) excluding (0.0)
<i>foreground colour</i>	Zero or one per <i>Screen Enhancement</i>	Colour
<i>background colour</i>	Zero or one per <i>Screen Enhancement</i>	Colour
<i>highlight colour</i>	Zero or one per <i>Screen Enhancement</i>	Colour
<i>link colour</i>	Zero or one per <i>Screen Enhancement</i>	Colour
<i>cursor size</i>	Zero or one per <i>Screen Enhancement</i>	real(10,4) range (0.0 ..1.0)
<i>cursor colour</i>	Zero or one per <i>Screen Enhancement</i>	Colour
<i>cursor trails</i>	Zero or one per <i>Screen Enhancement</i>	real(10,4) range (0.0 ..1.0)
<i>invert colour choice</i>	Zero or one per <i>Screen Enhancement</i>	Boolean
<i>invert images</i>	Zero or one per <i>Screen Enhancement</i>	Boolean
<i>tracking</i>	Zero or more per <i>Screen Enhancement</i>	tracking_vocabulary
<i>magnification</i>	Zero or one per <i>Screen Enhancement</i>	real(10,4) range (1.0 .. *)
<i>personal stylesheet</i>	Zero or one per <i>Screen Enhancement</i>	URI
<i>application</i>	Zero or more per <i>Screen Enhancement</i>	Application

6.2.3 Text Reading Highlight

Attribute	Allowed Occurrences	Datatype
<i>usage</i>	Zero or one per <i>Text Reading Highlight</i>	usage_vocabulary
<i>speech rate</i>	Zero or one per <i>Text Reading Highlight</i>	integer range (1 .. *)
<i>pitch</i>	Zero or more per <i>Text Reading Highlight</i>	real(10,4) range (0.0 ..1.0)
<i>volume</i>	Zero or more per <i>Text Reading Highlight</i>	real(10,4) range (0.0 ..1.0)
<i>highlight</i>	Zero or one per <i>Text Reading Highlight</i>	reading_unit_vocabulary
<i>speech component</i>	Zero or one per <i>Text Reading Highlight</i>	speech_component_vocabulary
<i>reading unit</i>	Zero or one per <i>Text Reading Highlight</i>	reading_unit_vocabulary
<i>application</i>	Zero or more per <i>Text Reading Highlight</i>	Application

6.2.4 Braille

Attribute	Allowed Occurrences	Datatype
<i>usage</i>	Zero or one per <i>Braille</i>	usage_vocabulary
<i>braille grade</i>	Zero or one per <i>Braille</i>	braille_grade_vocabulary
<i>number of braille dots</i>	Zero or one per <i>Braille</i>	braille_dot_number_vocabulary
<i>number of braille cells</i>	Zero or one per <i>Braille</i>	integer range (1 .. *)
<i>braille mark</i>	Zero or one per <i>Braille</i>	braille_mark_vocabulary
<i>braille dot pressure</i>	Zero or one per <i>Braille</i>	real(10,4) range (0.0 ..1.0)
<i>braille status cell</i>	One per <i>Braille</i>	braille_status_cell_vocabulary
<i>application</i>	Zero or more per <i>Braille</i>	Application

6.2.5 Tactile

Attribute	Allowed Occurrences	Datatype
<i>usage</i>	Zero or one per <i>Tactile</i>	usage_vocabulary
<i>application</i>	Zero or more per <i>Tactile</i>	Application

6.2.6 Visual Alert

Attribute	Allowed Occurrences	Datatype
<i>usage</i>	Zero or one per <i>Visual Alert</i>	usage_vocabulary
<i>system sounds</i>	Zero or one per <i>Visual Alert</i>	system_sounds_vocabulary
<i>system sounds caption</i>	Zero or one per <i>Visual Alert</i>	boolean
<i>application</i>	Zero or more per <i>Visual Alert</i>	Application