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

Part 3: "Access for all" digital resource description

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

Partie 3: Description des ressources numériques relatives à «accès pour tous»

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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 24751-3 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*

— *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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Introduction

In this part of ISO/IEC 24751, the term disability is defined as a mismatch between the needs of the user and the resource offered. It is not a personal trait therefore but an artifact of the relationship between the user and the resource environment or delivery. Accessible systems adjust the user interface of the learning environment, locate needed resources, evaluate the properties of the available resources to match the needs and preferences of the user, and deliver to the learner the most accessible content available.

This part of ISO/IEC 24751 defines accessibility metadata that is able to express a resource's ability to match the needs and preferences of a user, as described by their access for all personal needs and preferences (PNP), already defined in ISO/IEC 24751-2. This part of ISO/IEC 24751 is intended to benefit anyone experiencing a mismatch between needs and preferences and education delivered.

For people with disabilities, whose choice of access modalities is restricted, the process of matching a resource with a user requirement is not a matter of convenience or refinement, but one of utmost importance in ensuring access. As a result, it is necessary for systems to agree upon well-defined interfaces and usage. This closely defined approach is taken by this part of ISO/IEC 24751 to support optimum interoperability.

This part of ISO/IEC 24751 is not judgmental but informative. The purpose is to facilitate the discovery and use of the most appropriate content for each user. Users of alternative access systems need to know whether a resource is compatible with their required access method, e.g. a user who is blind may need audible access to a resource as opposed to visual access.

This part of ISO/IEC 24751 does not describe how to create accessible content; other work has been completed that describes how content and media objects can be made more accessible [see, for example, W3C/WAI Web Content Accessibility Guidelines (W3C/WAI WCAG) for details].

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

Part 3: "Access for all" digital resource description

1 Scope

ISO/IEC 24751 is intended to meet the needs of learners with disabilities and anyone who is disabled by their context.

This part of ISO/IEC 24751 provides a common language to describe digital learning resources to facilitate matching of those resources to learners' accessibility needs and preferences.

Metadata can be used for at least two accessibility-related purposes: to record compliance to an accessibility specification or standard (e.g. for adherence to legislated procurement policies) and to enable the delivery of resources that meet a user's needs and preferences. This part of ISO/IEC 24751 addresses the latter purpose. Metadata to assert compliance to an accessibility specification or standard is not within the scope of this part of ISO/IEC 24751.

This part of ISO/IEC 24751 is intended to be applied in combination with ISO/IEC 24751-2, which provides a means to describe how a user desires to access online learning content and related applications. This part of ISO/IEC 24751 is intended to describe aspects of a computer system (including networked systems) that can be adjusted to improve accessibility. They are not intended to address non-digital systems that can include physical location, other people, external processes, etc.

This part of ISO/IEC 24751 focuses on the description of the characteristics of the resource that affect how it can be perceived, understood or interacted with by users, including

a) what sensory modalities are used in the resource,
b) ways in which the resource is adaptable, i.e. whether text can be transformed automatically,
c) which methods of input the resource accepts, and
d) what adaptations are available.

This part of ISO/IEC 24751 provides an information model for describing learning resources so that individual learner preferences and needs (described according to ISO/IEC 24751-2) can be matched with the appropriate user interfaces, tools and learning resources within a computer-mediated learning environment.

2 Normative references

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

ISO 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*

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ISO/IEC 24751-1:2008 (E/F), *Information technology — Individualized adaptability and accessibility in e-learning, education and training — Part 1: Framework and reference model/Technologies de l'information — Adaptabilité et accessibilité individualisées en e-apprentissage, en éducation et en formation — Partie 1: Cadre et modèle de référence*

ISO/IEC 24751-2:2008 (E), *Information technology — Individualized adaptability and accessibility in e-learning, education and training — Part 2: "Access for all" personal needs and preferences for digital delivery*

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

[ISO/IEC 24751-1:2008 (2.1)]

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).[1)]

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)]

3.04
adaptability
⟨e-learning⟩ ability of a **digital resource** or delivery system to adjust the presentation, control methods, structure, **access mode**, and user supports when delivered

[ISO/IEC 24751-1:2008 (2.4)]

3.05
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 modes, structure and user supports.

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

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

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3.06
adaptation coverage
specification of the nature or genre of the **adaptation**

EXAMPLE Caption, tactile representation, visual representation, etc.

NOTE See the coded domain in ISO/IEC 24751-2:2008, B.2.

3.07
adaptation type
nature or genre of an **adaptation**

EXAMPLE Caption, tactile representation, visual representation, etc.

3.08
AfA control flexibility
characteristic of a **digital resource** that supports control of all functionality using an input device of the user's choosing, i.e. the user is not restricted to any particular input device

NOTE More than one single input type can be supported by a resource. For example, a resource might support use by keyboard only and by “mouse” only.

3.09
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 ISO/IEC 24751-2:2008, B.17.

[ISO/IEC 24751-2:2008 (3.07)

3.10
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)]

3.11
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)]

3.12
digital resource component
digital resource included in another resource either physically or logically

NOTE In using the access for all approach, one digital resource component might be replaced by an adaptation, while other resource components are unchanged.

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3.13
digital resource delivery
presentation of a **digital resource** by a **display**

[ISO/IEC 24751-1:2008 (2.12)]

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

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.

3.16
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 B.2.

[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
e-learning
learning facilitated by information and communications technology

[ISO/IEC 24751-1:2008 (2.18)]

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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.

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
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)]

3.23
intellectual content
recorded information of a **digital resource** independent of its representation and/or **access mode**

[ISO/IEC 24751-1:2008 (2.23)]

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)]

3.25
original access mode
access mode through which the **intellectual content** of the **digital resource** was originally designed to be communicated

4 Symbols and abbreviations

The following abbreviations and acronyms are used in this document.

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

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MIME	multipurpose internet mail extensions
PNP	access for all personal needs and preferences
W3C	World Wide Web Consortium
W3C/WAI WCAG	W3C/Web Accessibility Initiative Web Content Accessibility Guidelines

5 Basic Principles

5.1 Assumptions

For the purposes of the Access For All Digital Resource Description (DPD) it is assumed that content to be presented to a learner is compliant with basic accessibility specifications as defined in the World Wide Web Consortium Web Content Accessibility Guidelines [W3C WAI WCAG]. Compliance with W3C WAI priority 1 and 2 ensure that the presentation and control of text is transformable. This avoids the need to provide multiple static presentations of textual material to accommodate the different needs of individual learners.

This standard assumes that all users, not just individuals with specific impairments, have accessibility preferences and may need or want to optimize learning by configuring education delivery to meet their individual needs and preferences. With the increasing variety of interface choices and environments in which on-line learning occurs, users need to be able to control how they interact. Some of these choices may be considered personal preferences, while others will be essential to access to content in environments such as noisy locations, hands free operation, etc.

It is assumed that users have different preferences in different contexts, such as at different times or locations.

5.2 Original and Adapted Resources

The Access For All Digital Resource Description (DRD) assumes two categories of resources: original and adapted. An original resource is the initial or default resource. An adaptation contains the same intellectual content as an original resource but in a different form such as in a different sensory mode, or with more or less dense semantics. Some resources, especially those compliant with W3C WAI Web Content Accessibility Guidelines, contain several versions of content, such as a video file and text captions as an adaptation of the auditory content of the video. An original resource may be a part of another resource.

The Access For All Digital Resource Description (DRD) enables metadata authors to record the access modes used to communicate the intellectual content of their resources. These are called “original access modes” because generally they were created as the original content of the resource. When an adaptation is created, as a component of the same resource or in a separate resource, its DRD can refer back to the original access modes of the resource being adapted. Similarly, when another existing resource is chosen as an adaptation of the first resource, its DRD can also refer to the original access modes of the resource it provides an adaptation for.

Many authors of resources are unaware of accessibility considerations and are not motivated or skilled to provide extensive accessibility metadata. Such authors can supply useful information by identifying the access modes of the resource, whether the display and method of control of the resource can be transformed, and if there is a known adaptation. Metadata describing the display transformability and control flexibility of the resource can be generated using accessibility evaluation tools.

On the other hand, authors of specialized adaptations are likely to be both informed and motivated about accessibility considerations. Detailed Access For All Resource Descriptions closely match the Access For All Personal Needs and Preferences (PNP) [2].

2) Defined in ISO/IEC 24751-2.

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5.3 Access For All Resource Metadata

Access For All metadata for original resources includes:

- Access Mode: whether the user requires vision, hearing, touch and/or text literacy to access the resource
- Access Mode Usage: whether the content in each access mode is informative or ornamental
- Display: amenability of a resource to transformation of the display
- Control: flexibility of control of a resource
- Adaptations: any known adaptations

and, where appropriate,

- Components: any parts that make up this resource (a sound file, an image, etc.) or a composite resource of which this resource is a part
- Hazards: any dangerous characteristics
- Support tools: electronic tools associated with the resource (calculator, dictionary, etc.)

Access For All metadata for adapted resources (adaptations) includes the same metadata as for original resources but also includes the:

- Identity of the original resource: the resource for which it is an adaptation
- Type: kind of adaptation
- Extent: extent of original resource contained in the adaptation
- Detailed description of adaptation: description of characteristics necessary for matching resource characteristics to a PNP [3)].

The Access for All Digital Resource Description may be used in combination with other Metadata specifications and standards, or independently. Similarly, metadata bindings employed to describe resources may integrate the Access for All Digital Resource Description into the more generic binding or apply it independently.

5.4 Access Mode

The access mode of a resource is not the same as the format of a resource. The format of a resource can be represented as a MIME type but its access mode will depend upon a combination of its format and its genre: an image of a poem in a tapestry will have a visual format but a text genre. A user viewing the image on a screen can read the text of the poem but a screen reader (an assistive technology) cannot access the text as it is locked in the image.

The important information, from the viewpoint of a user with specific access needs and preferences, is which sensory modes are required to access the content of the resource. The possibilities are based on the human computer interface modes of sight, sound, and touch, with an additional special mode, 'textual' to include text literacy. Text literacy is not the same as literacy in everyday parlance. In this context, text literacy may mean accessing the content of text by listening to an aural rendition of the text or viewing a transformation of it into symbolic or sign language, or feeling it as Braille.

If an access mode is not suitable for a user (including after any possible transformations), the content in that access mode should be adapted by another resource.

As many resources contain multiple files (i.e., aggregate resources), adding the necessary metadata in order to deliver accessible resources may involve a dis-aggregation of the composite resource into a set of components. Once such components can be associated with their own access modes (as opposed to being represented in the aggregation of modes of the original resource), they can be individually matched to a PNP

3) As specified in ISO/IEC 24751-2.

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with access mode requirements. Matching individual components to a PNP ensures that a resource that is re-aggregated will also match that PNP.

5.5 Adaptability

5.5.1 Display Transformability

The presentation or display of most resources can be transformed if appropriate formats, mark-up or software development practices are used to create the resources. This requires that the content and content-structure are independent of the presentation of the content. The means to achieve this is to keep presentational and structural mark-up separate (see W3C guidelines [W3C WAI WCAG]). This enables the display or method of presentation to be transformed using styling mechanisms (e.g., Cascading Style Sheets, system based display settings, XSLT or others).

Display transformability specifies how the display or presentation of a resource (e.g., font colour, font size, background colour, layout, image size) is amenable to transformation. It can be determined using a number of available Web content evaluation and repair tools [4)].

5.5.2 Control Flexibility

Some resources can only be controlled using a mouse or mouse equivalent. This means users who do not have a mouse or cannot control a mouse cannot control such resources. If all of the functions controlled by the mouse can also be controlled using keyboard commands, users will have access to the same functionality using a keyboard or any number of other keyboard-emulating devices (e.g., scanning systems, coding systems, enlarged keyboards, etc.).

Some interfaces require many sequential actions to navigate to a desired control, such as a button. This can be difficult for some users. Interfaces that allow reconfiguration of the actions required to access specific controls, buttons, links or input fields enable the optimization of the control method.

Control flexibility describes how the resource supports a choice of methods of controlling the resource functions. It is anticipated that this will be determined using accessibility-checking tools.

5.5.3 Pointer to Adaptation from Original Resource

When the authors of metadata for original resources are aware of the existence of an adaptated resource, they can point in the metadata to a known adaptation for the original resource. A description of the adaptation is recorded in the metadata for the adaptation. Further detail on adaptation metadata is in the next section.

5.5.4 Adaptation Embedded in an Original Resource

When an original resource contains an adaptation (such as a video that contains a text caption), a metadata record for the original resource will have both an original resource description and an adaptation description. Thus, both components of the Access for All Digital Resource Description (DRD) record will be completed for the single resource.

5.5.5 Adaptation Metadata

Adaptations are used two ways: to replace or to augment an original resource. Although in most cases the original and adapted resources will be separate, an original resource may contain a supplementary adaptation. For example, a video could have text captions included. In this case the resource would be classified as original containing an adaptation.

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4) The range of possible display transformations is described in the Access For All Personal Needs and Preferences (PNP) specification in ISO/IEC 24751-2.

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