IMS Access For All Digital Resource Description Information Model

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1 Scope

The Access For All Specification is intended to meet the needs of learners with disabilities and anyone who is disabled by their context.

This part of the Access For All Specification 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 the Access For All Specification addresses the latter purpose. Metadata to assert compliance to an accessibility specification or standard is not within the scope of this part of the Access For All Specification.

This part of the Access For All Specification is intended to be applied in combination with 'Access For All Personal Needs and Preferences for Digital Delivery', which provides a means to describe how a user desires to access online learning content and related applications. This part of the Access For All Specification 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 the Access For All Specification 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 the Access For All Specification provides an information model for describing learning resources so that individual learner preferences and needs (described according to the Access For All Personal Needs and Preferences for Digital Delivery) can be matched with the appropriate user interfaces, tools and learning resources within a computer-mediated learning environment.

This document is based upon the original ISO/IEC 24751-3:2008 *Information technology — Individualized adaptability and accessibility in e-learning, education and training — Part 3: "Access For All Digital Resource Description"*. The ISO/IEC 24751-3:2008 document was a further development of the original IMS GLC Access For All Meta-data Specification, August 2004. The key changes from the ISO/IEC equivalent document are (note that these changes are documentation in nature and the technical solution is faithfully reproduced):

- The ISO/IEC Annex A as been removed and the subsequent appendices renumbered. This annex consisted of the French equivalents;
- The ISO/IEC Section 6 and 7 have been combined into a new Section 6 to contain all of the formal description of the information model. Also, this model uses the Unified Modelling Language representation as defined in the IMS GLC Specification Note 07: UML Profile for Platform Independent Model Descriptions of Specifications for Data Models.

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*.

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 reference*.

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)]

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.

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

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.

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 A.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)].

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
DCMI MT	Dublin Core Metadata Initiative Metadata Terms
DR	Digital Resource
DRD	access for all Digital Resource Description
DT	Display Transformation
IEEE	Institute of Electronic & Electrical Engineering
IMS	IMS Global Learning Consortium
ISAN	International Standard Audiovisual Number
ISBN	International Standard Book Number
ISO/IEC	International Standards Organisation/International Electrotechnical Commission
IT system	Information Technology system
LIP	Learner Information Package
MIME	Multipurpose Internet Mail Extensions
PIM	Platform Independent Model
PNP	access for all Personal Needs and Preferences
TILE	The Inclusive Learning Exchange
UML	Unified Modelling Language
UPC/EAN	Universal Product Code / European Article Number
URI	Uniform Resource Identifier
W3C	World Wide Web Consortium
W3C/WAI WCAG	W3C/Web Accessibility Initiative Web Content Accessibility Guidelines
XML	Extensible Mark-up Language
XSLT	XML Style Sheet Transform

5 Basic Principles

5.1 Assumptions

For the purposes of the Access For All Digital Resource Description (DRD) 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.

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 for which it provides an adaptation.

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 Digital Resource Descriptions closely match the Access For All Personal Needs and Preferences (PNP)[2].

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,

[2] Defined in ISO/IEC 24751-2.

- 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 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).

[3] Defined in ISO/IEC 24751-2.

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 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.

Adaptations are not always complete alternatives (replacements or supplements) to an original resource. For example, an alternative for a video that contains audio and visual modes may be an alternative for the audio (e.g. a caption) or for the visual (e.g. a video description). Each adaptation statement must indicate to which access mode the adaptation is assigned. This detail is required to enable precise matching of resources to a PNP.

Original resources may have any number of adaptations. An adaptation can serve as an alternative to more than one original resource, but a separate DRD is required to describe each such relationship. That is, by definition, and adaptation's DRD must refer to only one original resource. For example, a transcript of Martin Luther King's "I Have a Dream" speech could serve as a text equivalent to both a video of that speech and an audio file of the same speech, as long as two separate DRDs are available.

In a case where an adaptation is derived from another adaptation, such as when there is a French version of an English transcript, both transcripts are defined as Access for All adaptations of the original resource. (The resources may have other metadata that describes the derivation of the French transcript from the English one.)

5.6 The Importance of Interoperability and Consistent Implementation

While interoperability is important for e-learning, the importance is heightened for learners who use assistive technologies or specialized devices such as refreshable Braille displays, enlarged keyboards or voice recognition systems. Many people with a physical, sensory or intellectual impairment are dependent on assistive technologies to use a computer. Because of the diversity of alternative access systems, from an information technology developer's perspective every person using an alternative access system potentially represents a unique external system that needs to interoperate. Additionally, in order to function, each assistive technology needs to interoperate with a large

[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.

array of interfaces and applications. Although very varied, the user base and development base of assistive technologies is very small and under-resourced. For this reason, it is critical that there is consistency in the implementation and interpretation of these standards to increase the likelihood of interoperability for assistive technologies.

Whether involving an assistive technology or not, user needs and preferences of people with a disability (in the traditional sense) are frequently very particular with little or no room for variance. A slight variation in font size, button size, or background colour, for example, can be the difference between an accessible resource and an unusable one for a specific user. Ensuring access for users whose choice of access modes is restricted by an impairment often requires exact matching of a resource with a user's requirement: in such a case it is not a matter of convenience or optional refinement but one of utmost importance. As a result, it is necessary for systems to agree upon well-defined interfaces and for the standard to deter free, non-conformant extension in its usage. A strictly defined approach is taken in this multi-part standard to support maximum interoperability.

6 Access For All Digital Resource Description (DRD) Information Model

6.1 Key Terms and Concepts

Classes in this information model are classified into one of three types. These abstractions are bound to specific data structures for machine processing in the associated bindings. The abstract class types are:

- **container:** A container class may be a parent of one or more child classes;
- **value:** A value class shall not be a parent. That is, it shall not be a composite of characteristic, container, value, or unspecified class types. A value class shall always be a child of a container class and shall have semantic value within the scope of its parent class's semantic value;
- **unspecified: An unspecified class may be a parent.** An unspecified class serves as an extension point for this Information Model.

Table 6.1 lists the class descriptors used to describe the abstract classes and definitions of the descriptors.

Table 6.1 Class descriptors

Descriptor	Definition
Class name	The name given to the class being described.
Class type	The abstract class type of this class.
Data type	For value classes, the allowed structure for valid values for the class. Valid data types are: **Boolean:** The primitive, two-valued data type that uses the keywords "Yes" and "No" to indicate the logical state of an object. **Integer:** An integer. **NormalizedString:** A sequence of printable characters that does not contain carriage returns or tabs. **Unspecified:** An unspecified attribute serves as an extension point for this Information Model. The form of the extension is binding dependent. **URI**: Any syntactically valid instance of a URI as defined in RFC3986. Note: Many of the foundational Specifications, Standards, and Recommendations referred to by this Information Model use RFC2396 and RFC2732 as the definitions of URI. These are made obsolete by RFC3986, but many of the foundational documents have not been updated to reference RFC3986.
Value space	The range of valid values for this class. If the value space is unspecified, it is not known or is not important.
Multiplicity	A property of a class indicating the number of times it may be used or appear in a given parent context. The values of this property are expressed as a range or shorthand for a range using this notation: • **'0..1'** [optional; restricted] • **'0..unbounded'** [optional; unrestricted] • **'1..1'** [mandatory; restricted] • **'1..unbounded'** [mandatory; unrestricted] Multiplicities may also appear in short-hand notation in the UML models. The short-hand equivalents shall be (exclusive of bracketed comments): • **'*'** [optional; unrestricted]

Descriptor	Definition
	• **'1'** [mandatory; restricted] • **'1..*'** [mandatory; unrestricted] Where multiplicity is greater than one, the importance of the ordering of siblings is also indicated by appending either **","ordered** or **"," unordered.** **ordered** specifies a sequence of siblings as listed, **unordered** specifies a collection or bag of siblings for which the order is not important.
Parents	Lists classes that may be parents of this class.
Children	Lists the possible child classes of this class in the form **"[" child *"," child "]".** One or more child classes may be expressed within square brackets. Each child class shall be separated by a comma. Where more than one child is listed, the importance of the ordering of siblings is also indicated by appending either **","ordered** or **"," unordered.** **ordered** specifies a sequence of siblings as listed. **unordered** specifies a collection or bag of sibling for which the order is not important.
Description	Contains descriptions relating to the class and its values space.

In general, this specification does not define the ways in which an end system must be realized. However, the required interoperability behavior requires that an end system have certain characteristics. The static properties of these characteristics are defined in this Section, including:

- When an attribute has a multiplicity of '1..1' then an end system must be capable of supporting one instance;
- When an attribute has a multiplicity of '1..*' then an end system must be capable of supporting at least one instance. The specification will also define the smallest permitted maximum number of instances that must also be supported by the end system;
- When an attribute has a multiplicity of '0..1' then an end system should support a single instance;
- When an attribute has a multiplicity of '0..*' then the specification will define the smallest permitted maximum number of instances that must also be supported by the end system.

6.2 Access_For_All_Resource Class Description

The PIM for the Access_For_All_Resource data model is shown in Figure 6.1.

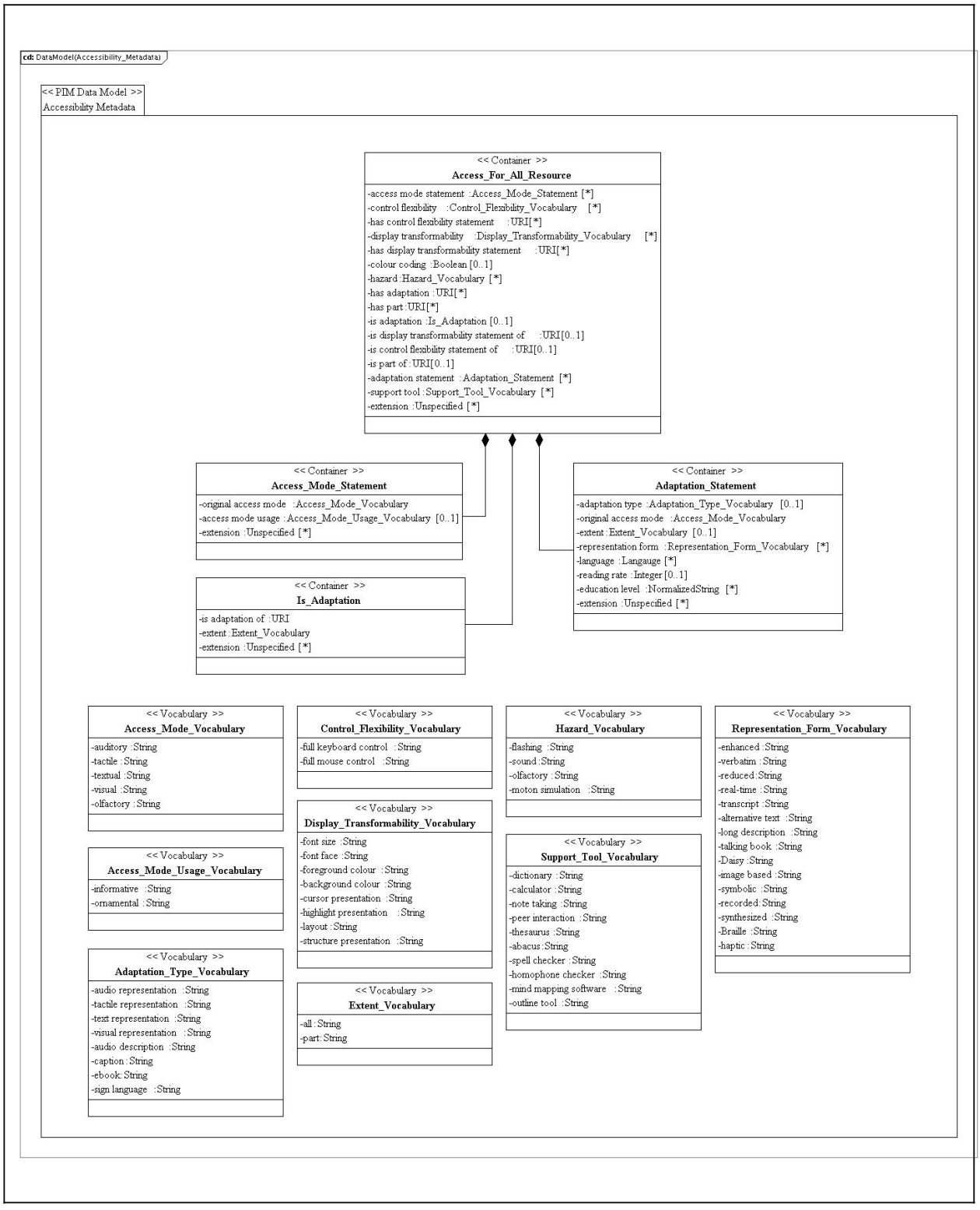

Figure 6.1 — Access_For_All_Resource class diagram.

Table 6.2: Description of the 'Access_For_All_Resource' class.

Descriptor	Definition
Class name	Access_For_All_Resource
Class type	Container
Parents	Root
Children	[access mode statement, control flexibility, has control flexibility statement, display transformability, has display transformability statement, colour coding, hazard, has adaptation, has part, is adaptation, is display transformability statement of, is part of, adaptation statement, support tool, extension]
Description	A collection of information that states how a digital learning resource can be perceived, understood or interacted with by users.

6.2.1 'Access Mode Statement' Attribute Description

Table 6.3 Description of the 'access mode statement' attribute for the Access_For_All_Resource class.

Descriptor	Definition
Attribute name	access mode statement
Data type	Access_Mode_Statement
Value space	Container
Multiplicity	[0..unbounded], unordered
Description	A collection of information that states a primary **access mode** of a resource and its usage in the resource.

6.2.2 'Control Flexibility' Attribute Description

Table 6.4 Description of the 'control flexibility' attribute for the Access_For_All_Resource class.

Descriptor	Definition
Attribute name	control flexibility
Data type	Enumerated vocabulary: Control_Flexibility_Vocabulary.
Value space	The enumerated vocabulary is: { full keyboard control | full mouse control }.
Multiplicity	[0..unbounded], unordered
Description	A single input method which is sufficient to control a resource. NOTE: More than one item from the vocabulary may be chosen. For example, a resource might support full keyboard control and full mouse control. The value space for this vocabulary is approved by IMS GLC. The syntax and semantics of the approved list of terms shall be supported by all software components implementing this Information Model. The value space for the vocabulary may be extended. Such extensions may be created and used only when no approved IMS GLC value satisfies the expressive need of an implementing community to define the shape of a collection.

6.2.3 'Has Control Flexibility Statement' Attribute Description

Table 6.5 Description of the 'has control flexibility statement' attribute for the Access_For_All_Resource class.

Descriptor	Definition
Attribute name	has control flexibility statement
Data type	URI
Value space	See Table 6.1.
Multiplicity	[0..unbounded], unordered
Description	The referenced resource states the **control flexibility** characteristics of the described resource. NOTE: This does not refer to the control flexibility element of the referenced resource's DRD, but rather to the fact that the referenced resource itself describes the control flexibility characteristics of the described resource. This might take the form of a report generated by an automated tool, for example.

6.2.4 'Display Transformability' Attribute Description

Table 6.6 Description of the 'display transformability' attribute for the Access_For_All_Resource class.

Descriptor	Definition
Attribute name	display transformability
Data type	Enumerated vocabulary: Display_Transformability_Vocabulary.
Value space	The enumerated vocabulary is: { font size | font face | foreground colour | background colour | cursor presentation | highlight presentation | layout, structure presentation }.
Multiplicity	[0..unbounded], unordered
Description	A characteristic of a resource display that can be modified. NOTE: This is used to state what display properties are amenable to transformation. The value space for this vocabulary is approved by IMS GLC. The syntax and semantics of the approved list of terms shall be supported by all software components implementing this Information Model. The value space for the vocabulary may be extended. Such extensions may be created and used only when no approved IMS GLC value satisfies the expressive need of an implementing community to define the shape of a collection.

6.2.5 'Has Display Transformability Statement' Attribute Description

Table 6.7 Description of the 'has display transformability statement' attribute for the Access_For_All_Resource class.

Descriptor	Definition
Attribute name	has display transformability statement
Data type	URI
Value space	See Table 6.1.
Multiplicity	[0..unbounded], unordered
Description	The referenced resource states the **display transformability** characteristics of the described resource. NOTE: This does not refer to the display transformability element of the referenced resource's DRD, but rather to the fact that the referenced resource itself describes the display transformability characteristics of the described resource. This might take the form of a report generated by an automated tool, for example.

6.2.6 'Colour Coding' Attribute Description

Table 6.8 Description of the 'colour coding' attribute for the Access_For_All_Resource class.

Descriptor	Definition
Attribute name	colour coding
Data type	Boolean
Value space	Enumerated as: { Yes | No }
Multiplicity	[0..1]
Description	The described resource communicates some information by use of colour alone.

6.2.7 'Hazard' Attribute Description

Table 6.9 Description of the 'hazard' attribute for the Access_For_All_Resource class.

Descriptor	Definition
Attribute name	hazard
Data type	Enumerated vocabulary: Hazard_Vocabulary.
Value space	The enumerated vocabulary is: { flashing | sound | olfactory | motion simulation }.
Multiplicity	[0..unbounded], unordered
Description	A characteristic of the described resource that must not be delivered to some users. NOTE: For example, flashing animations can trigger seizures in people with photosensitive epilepsy. The value space for this vocabulary is approved by IMS GLC. The syntax and semantics of the approved list of terms shall be supported by all software components implementing this Information Model. The value space for the vocabulary may be extended. Such extensions may be created and used only when no approved IMS GLC value satisfies the expressive need of an implementing community to define the shape of a collection.

6.2.8 'Has Adaptation' Attribute Description

Table 6.10 Description of the 'has adaptation' attribute for the Access_For_All_Resource class.

Descriptor	Definition
Attribute name	has adaptation
Data type	URI
Value space	See Table 6.1.
Multiplicity	[0..unbounded], unordered
Description	The referenced resource presents the intellectual content of all or part of the described resource, often in another access mode.

6.2.9 'Has Part' Attribute Description

Table 6.11 Description of the 'has part' attribute for the Access_For_All_Resource class.

Descriptor	Definition
Attribute name	has part
Data type	URI
Value space	See Table 6.1.
Multiplicity	[0..unbounded], unordered
Description	A referenced resource is a **resource component** of the described resource. Adapted from [DCMI MT].

6.2.10 'Is Adaptation' Attribute Description

Table 6.12 Description of the 'is adaptation' attribute for the Access_For_All_Resource class.

Descriptor	Definition
Attribute name	is adaptation
Data type	Is_Adaptation
Value space	Container
Multiplicity	[0..1]
Description	A collection of information that states what resource the described resource provides an adaptation of, and the extent to which it does so.

6.2.11 'Is Display Transformability Statement Of' Attribute Description

Table 6.13 Description of the 'is display transformability statement of' attribute for the Access_For_All_Resource class.

Descriptor	Definition
Attribute name	is display transformability statement of
Data type	URI
Value space	See Table 6.1.
Multiplicity	[0..1]
Description	The described resource states the **display transformability** characteristics of the referenced resource. NOTE: This does not refer to the display transformability element of the described resource, but rather to the fact that the described resource itself in some way describes the display transformability characteristics of the referenced resource. This might take the form of a report generated by an automated tool, for example.

6.2.12 'Is Control Flexibility Statement Of' Attribute Description

Table 6.14 Description of the 'is control flexibility statement of' attribute for the Access_For_All_Resource class.

Descriptor	Definition
Attribute name	is control flexibility statement of
Data type	URI
Value space	See Table 6.1.
Multiplicity	[0..1]
Description	The described resource states the **control flexibility** characteristics of the referenced resource. NOTE: This does not refer to the control flexibility element of the described resource, but rather to the fact that the described resource itself in some way describes the control flexibility characteristics of the referenced resource. This might take the form of a report generated by an automated tool, for example.

6.2.13 'is Part Of' Attribute Description

Table 6.15 Description of the 'is part of' attribute for the Access_For_All_Resource class.

Descriptor	Definition
Attribute name	is part of
Data type	URI
Value space	See Table 6.1.
Multiplicity	[0..1]
Description	The described resource is a **resource component** of the referenced resource Adapted from [DCMI MT].

6.2.14 'Adaptation Statement' Attribute Description

Table 6.16 Description of the 'adaptation statement' attribute for the Access_For_All_Resource class.

Descriptor	Definition
Attribute name	adaptation statement
Data type	Adaptation_Statement
Value space	Container
Multiplicity	[0..unbounded], unordered
Description	A collection of information that gives detailed information about an **adaptation**.

6.2.15 'Support Tool' Attribute Description

Table 6.17 Description of the 'support tool' attribute for the Access_For_All_Resource class.

Descriptor	Definition
Attribute name	support tool
Data type	Enumerated vocabulary: Support_Tool_Vocabulary.
Value space	The enumerated vocabulary is: { dictionary | calculator | note taking | peer interaction | thesaurus | abacus | spell checker | homophone checker | mind mapping software | outline tool }.
Multiplicity	[0..unbounded], unordered
Description	An electronic tool associated with a resource. The value space for this vocabulary is approved by IMS GLC. The syntax and semantics of the approved list of terms shall be supported by all software components implementing this Information Model. The value space for the vocabulary may be extended. Such extensions may be created and used only when no approved IMS GLC value satisfies the expressive need of an implementing community to define the shape of a collection.

6.2.16 'Extension' Attribute Description

Table 6.18 Description of the 'extension' attribute for the Access_For_All_Resource class.

Descriptor	Definition
Attribute name	extension
Data type	Unspecified
Value space	Defined in terms of how the Information Model is realised by a binding.
Multiplicity	[0..unbounded], unordered
Description	This is a placeholder. It informs bindings of this Information Model as to the valid locations for the inclusion that extend the parent class.

6.3 Access_Mode_Statement Class Description

Table 6.19 Description of the 'Access_Mode_Statement' class.

Descriptor	Definition
Class name	Access_mode_Statement
Class type	Container
Parents	Access_For_All_Resource
Children	[original access mode, access mode usage, extension]
Description	A collection of information that states a primary **access mode** of a resource and its usage in the resource.

6.3.1 'Original Access Mode' Attribute Description

Table 6.20 Description of the 'original access mode' attribute for the Access_Mode_Statement class.

Descriptor	Definition
Attribute name	original access mode
Data type	Enumerated vocabulary: Access_Mode_Vocabulary.
Value space	The enumerated vocabulary is: { auditory | tactile | textual | visual | olfactory }.
Multiplicity	[1]
Description	This is an **access mode** through which the **intellectual content** of the resource is communicated, not including any adaptations NOTE This does not include the **access mode** of any **adaptations** embedded in the resource. The value space for this vocabulary is approved by IMS GLC. The syntax and semantics of the approved list of terms shall be supported by all software components implementing this Information Model. The value space for the vocabulary may be extended. Such extensions may be created and used only when no approved IMS GLC value satisfies the expressive need of an implementing community to define the shape of a collection.

6.3.2 'Access Mode Usage' Attribute Description

Table 6.21 Description of the 'access mode usage' attribute for the Access_Mode_Statement class.

Descriptor	Definition
Attribute name	access mode usage
Data type	Enumerated vocabulary: Access_Mode_Usage_Vocabulary.
Value space	The enumerated vocabulary is: { informative | ornamental }. Default=informative.
Multiplicity	[0..1]
Description	The role of a primary **access mode** with respect to the intellectual content of a resource. The value space for this vocabulary is approved by IMS GLC. The syntax and semantics of the approved list of terms shall be supported by all software components implementing this Information Model. The value space for the vocabulary may be extended. Such extensions may be created and used only when no approved IMS GLC value satisfies the expressive need of an implementing community to define the shape of a collection.

6.3.3 'Extension' Attribute Description

Table 6.22 Description of the 'extension' attribute for the Access_Mode_Statement class.

Descriptor	Definition
Attribute name	extension
Data type	Unspecified
Value space	Defined in terms of how the Information Model is realized by a binding.
Multiplicity	[0..unbounded], unordered
Description	This is a placeholder. It informs bindings of this Information Model as to the valid locations for the inclusion that extend the parent class.

6.4 Is_Adaptation Class Description

Table 6.23 Description of the 'Is_Adaptation' class.

Descriptor	Definition
Class name	Is_Adaptation
Class type	Container
Parents	Access_For_All_Resource
Children	[is adaptation, extent, extension]
Description	A collection of information that states what resource the described resource provides an adaptation of, and the extent to which it does so.

6.4.1 'Is Adaptation Of' Attribute Description

Table 6.24 Description of the 'is adaptation of' attribute for the Is_Adaptation class.

Descriptor	Definition
Attribute name	is adaptation of
Data type	URI
Value space	See Table 6.1.
Multiplicity	[1]
Description	The described resource presents the **intellectual content** of all or part of the referenced resource, often in another access mode.

6.4.2 'Extent' Attribute Description

Table 6.25 Description of the 'extent' attribute for the Is_Adaptation class.

Descriptor	Definition
Attribute name	extent
Data type	Enumerated vocabulary: Extent_Vocabulary.
Value space	The enumerated vocabulary is: { part | all }. Default=all.
Multiplicity	[0..1].
Description	The scope of the content of the resource. The value space for this vocabulary is approved by IMS GLC. The syntax and semantics of the approved list of terms shall be supported by all software components implementing this Information Model. The value space for the vocabulary may be extended. Such extensions may be created and used only when no approved IMS GLC value satisfies the expressive need of an implementing community to define the shape of a collection.

6.4.3 'Extension' Attribute Description

Table 6.26 Description of the 'extension' attribute for the Is_Adaptation class.

Descriptor	Definition
Attribute name	extension
Data type	Unspecified
Value space	Defined in terms of how the Information Model is realized by a binding.
Multiplicity	[0..unbounded], unordered
Description	This is a placeholder. It informs bindings of this Information Model as to the valid locations for the inclusion that extend the parent class.

6.5 Adaptation_Statement Class Description

Table 6.27 Description of the 'Adaptation_Statement' class.

Descriptor	Definition
Class name	Adaptation_Statement
Class type	Container
Parents	Access_for_All_Resource
Children	[adaptation type, original access mode, extent, representation form, language, reading rate, education level, extension]
Description	A collection of information that gives detailed information about an **adaptation**.

6.5.1 'Adaptation Type' Attribute Description

Table 6.28 Description of the 'adaptation type' attribute for the Adaptation_Statement class.

Descriptor	Definition
Attribute name	adaptation type
Data type	Enumerated vocabulary: Adaptation_Type_Vocabulary.
Value space	The enumerated vocabulary is: { audio representation | tactile representation | text representation | visual representation | audio description | caption | ebook | sign language }.
Multiplicity	[0..1]
Description	Nature or genre of the adaptation NOTE: Adapted from ISO 15836:2003. The value space for this vocabulary is approved by IMS GLC. The syntax and semantics of the approved list of terms shall be supported by all software components implementing this Information Model. The value space for the vocabulary may be extended. Such extensions may be created and used only when no approved IMS GLC value satisfies the expressive need of an implementing community to define the shape of a collection.

6.5.2 'Original Access Mode' Attribute Description

Table 6.29 Description of the 'original access mode' attribute for the Adaptation_Statement class.

Descriptor	Definition
Attribute name	original access mode
Data type	Enumerated vocabulary: Access_Mode_Vocabulary.
Value space	The enumerated vocabulary is: { auditory | tactile | textual | visual | olfactory }.
Multiplicity	[1]
Description	An **access mode** through which the **intellectual content** of the resource is communicated, not including any **adaptations.** NOTE: When used inside an adaptation statement, this term describes the original access mode of the resource that is being adapted. The value space for this vocabulary is approved by IMS GLC. The syntax and semantics of the approved list of terms shall be supported by all software components implementing this Information Model. The value space for the vocabulary may be extended. Such extensions may be created and used only when no approved IMS GLC value satisfies the expressive need of an implementing community to define the shape of a collection.

6.5.3 'Extent' Attribute Description

Table 6.30 Description of the 'extent' attribute for the Adaptation_Statement class.

Descriptor	Definition
Attribute name	extent
Data type	Enumerated vocabulary: Extent_Vocabulary.
Value space	The enumerated vocabulary is: { part | all }. Default=all.
Multiplicity	[0..1].
Description	The scope of the content of the resource. This term means how much of the **intellectual** content in the original **access mode** is presented in this **adaptation type**. EXAMPLE: An **adaptation** might use both auditory and tactile content to replace an image. If the auditory and tactile information must be used together to fully replace the image, each adaptation statement would indicate that the extent is "part." On the other hand if either the auditory or the tactile information can be used separately to fully replace the image, each would indicate that the extent is "all". The value space for this vocabulary is approved by IMS GLC. The syntax and semantics of the approved list of terms shall be supported by all software components implementing this Information Model. The value space for the vocabulary may be extended. Such extensions may be created and used only when no approved IMS GLC value satisfies the expressive need of an implementing community to define the shape of a collection.

6.5.4 'Representation Form' Attribute Description

Table 6.31 Description of the 'representation form' attribute for the Adaptation_Statement class.

Descriptor	Definition
Attribute name	representation form
Data type	Enumerated vocabulary: Representation_Form_Vocabulary.
Value space	The enumerated vocabulary is: { enhanced | verbatim | reduced | real-time | transcript | alternative text | long description | talking book | Daisy | image-based | symbolic | recorded | synthesized | Braille | haptic }.
Multiplicity	[0..unbounded], unordered
Description	Additional details about the **adaptation type.** The value space for this vocabulary is approved by IMS GLC. The syntax and semantics of the approved list of terms shall be supported by all software components implementing this Information Model. The value space for the vocabulary may be extended. Such extensions may be created and used only when no approved IMS GLC value satisfies the expressive need of an

Descriptor	Definition
	implementing community to define the shape of a collection.

6.5.5 'Language' Attribute Description

Table 6.32 Description of the 'language' attribute for the Adaptation_Statement class.

Descriptor	Definition
Attribute name	language
Data type	Normalized String.
Value space	A value from: ISO 639-2:1998
Multiplicity	[0..unbounded], unordered
Description	A **language** of the **intellectual content** of the resource [ISO 639-2:1998].

6.5.6 'Reading Rate' Attribute Description

Table 6.33 Description of the 'reading rate' attribute for the Adaptation_Statement class.

Descriptor	Definition
Attribute name	reading rate
Data type	Integer
Value space	Range: [1..300] (words per minute)
Multiplicity	[0..1]
Description	The rate of presentation of text that is automatically scrolled, as in captions for a film, in words per minute.

6.5.7 'Education Level' Attribute Description

Table 6.34 Description of the 'education level' attribute for the Adaptation_Statement class.

Descriptor	Definition
Attribute name	education level
Data type	Normalized String
Value space	Character string.
Multiplicity	[0..unbounded], unordered

Descriptor	Definition
Description	Audience education level [DCMI MT].

6.5.8 'Extension' Attribute Description

Table 6.35 Description of the 'extension' attribute for the Adaptation_Statement class.

Descriptor	Definition
Attribute name	extension
Data type	Unspecified
Value space	Defined in terms of how the Information Model is realized by a binding.
Multiplicity	[0..unbounded], unordered
Description	This is a placeholder. It informs bindings of this Information Model as to the valid locations for the inclusion that extend the parent class.

6.6 Set of Defined Vocabularies

The set of vocabularies used in this information model are listed in Table 6.36.

Table 6.36 Set of vocabularies.

Vocabulary	Description
Access_Mode_Vocabulary	{ auditory | tactile | textual | visual | olfactory }
Access_Mode_Usage_Vocabulary	{ informative | ornamental }. Default=informative.
Adaptation_Type_Vocabulary	{ audio representation | tactile representation | text representation | visual representation | audio description | caption | ebook | sign language }
Control_Flexibility_Vocabulary	{ full keyboard control | full mouse control }
Display_Transformability_Vocabulary	{ font size | font face | foreground colour | background colour | cursor presentation | highlight presentation | layout, structure presentation }
Extent_Vocabulary	{ part | all }. Default=all.
Hazard_Vocabulary	{ flashing | sound | olfactory | motion simulation }
Representation_Form_Vocabulary	{ enhanced | verbatim | reduced | real-time | transcript | alternative text | long description | talking book | Daisy | image-based | symbolic | recorded | synthesized | Braille | haptic }
Support_Tool_Vocabulary	{ dictionary | calculator | note taking | peer interaction | thesaurus | abacus | spell checker | homophone checker | mind mapping software | outline tool }

7 Extending the Specification

Each class in the specification contains extension points. New parts include additional elements, element qualifiers and vocabularies. The form of the extension is dependent on the binding being used.

The value space for each of the vocabularies is approved by IMS GLC. The value space for a vocabulary may be extended. Such extensions may be created and used only when no approved IMS GLC value satisfies the expressive need of an implementing community to define the shape of a collection.

8 Conformance

The requirements for conformance to this part of specification are dependent on the function or role played by the conformant technology or application.

Resources are conformant when the metadata record of the resource includes elements in this part of the Access For All specification, as specified.

Education delivery applications, agents or systems are conformant when they gather and/or process Personal Needs and Preference descriptions as specified in the 'Access For All Personal Needs and Preferences for Digital Delivery' specification, and identify and process resources having metadata elements specified in this part of the Access For All specification.

Metadata authoring tools are conformant if they assist in authoring metadata that includes all the elements in this part of the Access For All specification, as specified.

Annex A Vocabulary Codes

NOTE Refer to IMS GLC Access For All Personal Needs and Preferences v2.0 for additional vocabulary codes as vocabulary codes are not duplicated in this document.

A.1 Access Mode Usage Vocabulary Codes

The 2 basic "access mode usage" values are:

- informative
- ornamental

The coding convention for the "access mode usage" vocabulary is presented in Table A.1.

Table A.1 Codes representing "access mode usage" values.

IT Interface		Human Interface / Equivalent Linguistic Expressions			
		ISO English (eng)		ISO French (fra)	
Table ID (1)	Code (2)	Mnemonic (3)	Expression (4)	Mnemonic (5)	Expression (6)
AfA-DRD:01	1	I	Informative		
AfA-DRD:01	2	O	Ornamental		

Rule A.1-01: Code = 1 (Informative) implies that a resource uses the access mode in an informative way.

Rule A.1-02: Code = 2 (Ornamental) implies that a resource uses the access mode in an ornamental way.

A.2 Display Transformability Vocabulary Codes

The 8 basic "display transformability" values are:

- font size
- font face
- foreground colour
- background colour
- cursor presentation
- highlight presentation
- layout
- structure presentation

The coding convention for the "display transformability" vocabulary is presented in Table A.2.

Table A.2 Codes representing "display transformability" values.

IT Interface		Human Interface / Equivalent Linguistic Expressions			
		ISO English (eng)		ISO French (fra)	
Table ID (1)	Code (2)	Mnemonic (3)	Expression (4)	Mnemonic (5)	Expression (6)
AfA-DRD:03	1	Z	Font size		
AfA-DRD:03	2	A	Font face		
AfA-DRD:03	3	F	Foreground colour		
AfA-DRD:03	4	B	Background colour		
AfA-DRD:03	5	C	Cursor presentation		
AfA-DRD:03	6	H	Highlight presentation		
AfA-DRD:03	7	L	Layout		
AfA-DRD:03	8	S	Structure presentation		

Rule A.2-01: Code = 1 (Font size) implies that the font size within the described resource can be transformed.

Rule A.2-02: Code = 2 (Font face) implies that the font face within the described resource can be transformed.

Rule A.2-03: Code = 3 (Foreground colour) implies that the foreground colour (i.e. the colour of the text) within the described resource can be transformed.

Rule A.2-04: Code = 4 (Background colour) implies that the background colour within the described resource can be transformed.

Rule A.2-05: Code = 5 (Cursor presentation) implies that the cursor presentation within the described resource can be transformed.

Rule A.2-06: Code = 6 (Highlight presentation) implies that the highlight presentation within the described resource can be transformed.

Rule A.2-07: Code = 7 (Layout) implies that the layout of the described resource can be transformed.

Rule A.2-08: Code = 8 (Structure presentation) implies that the structure of the described resource can be transformed.

A.3 Extent Vocabulary Codes

The 2 basic "extent" values are:

- part
- all

The coding convention for the "extent" vocabulary is presented in Table A.3.

Table A.3: Codes representing "extent" values.

IT Interface		Human Interface / Equivalent Linguistic Expressions			
		ISO English (eng)		ISO French (fra)	
Table ID (1)	Code (2)	Mnemonic (3)	Expression (4)	Mnemonic (5)	Expression (6)
AfA-DRD:02	1	P	Part		
AfA-DRD:02	2	A	All		

Rule A.3-01: Code = 1 (Part) denotes that the described resource provides an adaptation of a part of the intellectual content in a resource.

Rule A.3-02: Code = 2 (All) denotes that the described resource provides an adaptation of all of the intellectual content in a resource.

Annex B Recommended Default Values

The following is a list of recommended default values for the digital resource description settings.

Attribute	Suggested default value
access mode usage	informative [AfA-DRD:01-1]
adaptation extent	all [AfA-DRD:02-2]

Annex C Bindings and Implementations

The following bindings are available or in development for the IMS Access For All Digital Resource Description Specification that serves as the reference specification for this standard.

1) IMS Access For All Digital Resource Description XML Binding (available), http://imsglobal.org/accessibility

2) Dublin Core Accessibility Working Group application profile (in development), http://dublincore.org/groups/access/

3) IEEE LOM (in development), http://www.cenorm.be/isss/Workshop/lt/

Implementations:

1) The Inclusive Learning Exchange (TILE): http://inclusivelearning.ca/

The following project is developing a Java binding for this standard.

2) CulturAll (TransformAble sub-project): http://culturall.atrc.utoronto.ca/

Annex D Scenarios

These scenarios are informal and introductory only, but are provided to help explain the context and use of the standard.

D.1 Scenario 1: Discovery and Retrieval of Alternate Training Content

Sophia is a participant in a distance training program. She is blind and uses a computer equipped with a screen reader that converts on-screen text into both Braille and synthetic speech. At the start of the program, Sophia uses a "preference wizard" which asks her questions regarding her preferred content settings. She records that she would prefer alternatives to visual content, when available. When finished editing her preferences, the preference wizard produces a Personal Needs and Preferences (PNP) file that is saved in the content management system's user database.

For today's assignment, Sophia is required to complete 3 of 5 provided exercises. When she logs in and requests the exercises the system compares her PNP file and the Access For All Digital Resource Description (DRD) on the exercises to determine if the exercises are suitable for her needs. The metadata associated with each exercise indicates that all 5 contain visual content. The system then determines that there are text descriptions available for 4 out of 5 of the resources. Two of the exercises have text descriptions embedded in the primary file, while there are separate text descriptions for the other two exercises. The system informs Sophia that 4 of the 5 exercises should be appropriate for her needs, and she selects the three she wishes to complete, giving a sigh of relief that she is able to skip the least interesting one. As she calls up her chosen exercises, the system automatically transforms each resource by displaying the text description rather than the image, drawing the text either from within the original file or from the associated separate text descriptions, as indicated by the metadata.

D.2 Scenario 2: Customization of Information about a Prescription

A patient at a hospital has been diagnosed with diabetes. The clinical nurse prepares a prescription package for the patient containing information necessary for the patient to manage her condition. To create the package, the nurse prepares the patient's profile, which includes the native language, Tamil, and the print requirements (large text) of the patient. When the patient uses the hospital's information system, the system processes the user's profile along with the diagnosis to retrieve information in Tamil about measuring blood glucose levels and exercising. Before being printed, the documents are automatically enlarged.

D.3 Scenario 3: Extreme Instructional Environments

Airline maintenance staff receive regular training sessions, but there is always the possibility of the need for "ad hoc" instruction. Available airplane resource materials include video instructions on aircraft engine maintenance that detail the methods for repairing various engine problems. Usually the use of such material is in a noisy hangar in which workers are required to wear hearing protection. There may also be multiple information systems connected to their ear-phones for safety reasons. In this environment, workers use portable computers to view the reference materials as they carry out the repair exercises.

When workers log in, they indicate the hangar as the context and PNP file is selected by the system. This profile requires text transcripts or animated diagrams to replace audio content. When viewing the training videos, the system automatically retrieves the available text captions or alternative visual content and supplements the video with them while synchronizing it to the original audio. As a result, the workers are able to reference videos as they work in the hangar.

D.4 Scenario 4: Creating a Repository for Federated Searching

A lecturer for a course in social history produces an online module that is based around recordings of songs from the American Civil Rights movement. The diction on the recordings is not very clear. One student has a minor cognitive disability and a partial hearing loss and the hearing loss prevents him from hearing the words of some of the songs. He does not wish anyone to know about his disabilities, particularly not the course lecturer. The student is normally provided with services to help him with his studies by the disabled student services office. When he informs his assistant from that office that he cannot hear the words of some of the songs, she writes text transcripts of the songs

he cannot hear. She produces a DRD for each transcript she writes, then deposits the transcript and its DRD in the office's repository.

The learning environment the university uses is configured to search the disability office's repository for alternatives for content. When the student accesses the songs online, the learning environment picks up the requirement for alternatives to auditory from the PNP and searches the repository. Where a transcript is available, it is found in the repository and delivered to the student.

This repository is available to all learners using that environment in the university and is also marketed to and used by other universities. For any future use of these online music resources, the transcripts will be automatically provided to any student with an appropriate PNP.

Annex E Implementation Example

The following examples illustrate the use of this standard by means of generic pseudo-code and are not meant to represent any particular binding. The examples use XML, but implementations are not required to do to.

E.1 TILE Low Vision Example

The following example[5] is from The Inclusive Learning Exchange system (TILE) developed by the Adaptive Technology Resource Centre, University of Toronto.

A learner is studying a course on Globalization and International Migration containing an illustration of the concepts of restricted migration. A user without a PNP file or with a PNP file, but without expressed needs or preferences concerning visual content, would receive the original image as displayed in Figure E.1.

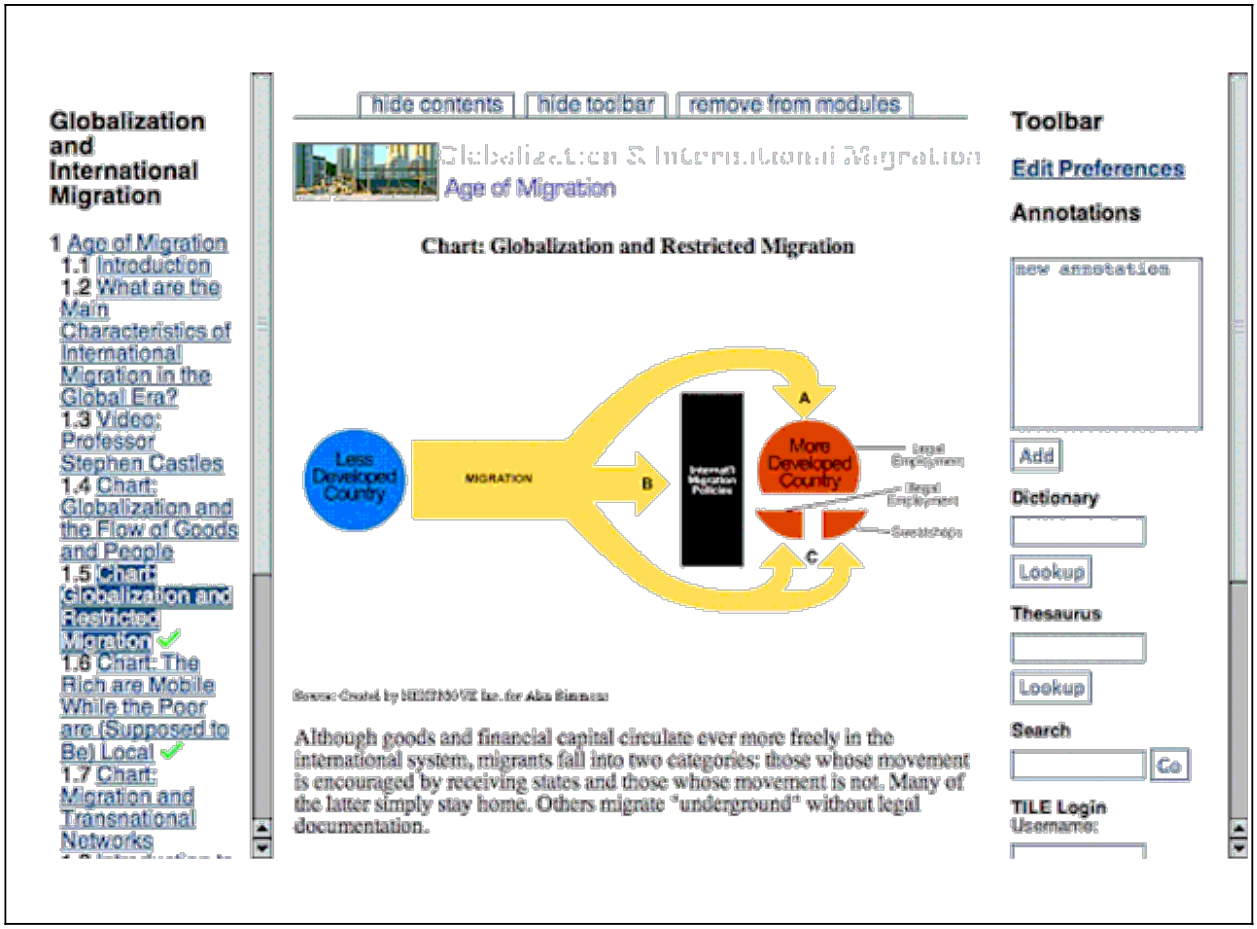

Figure E.1 — TILE screenshot of resource with text and Flash animation.

Another user who has a visual impairment and uses a screen reader may require text instead of images. To accommodate this user, it is necessary for the original image to be replaced by an adaptation.

[5] http://inclusivelearning.ca/tile/servlet/view?view=item&cp=urn:uuid:1ec15aa6-40a1-11d8-b01b 0002b3af6db8&item=CHART2

To achieve this, first, the original image would need the following accessibility metadata to communicate its access modes and point to an adaptation:

```
<AccessForAllResource>
   <accessModeStatement>
      <originalAccessMode=”textual”/>
      <accessModeUsage=”informative”/>
   </accessModeStatement>
   <accessModeStatement>
      <originalAccessMode=”visual”/>
      <accessModeUsage=”informative”/>
   </accessModeStatement>
   <hasAdaptation=”URIofAdaptation”/>
</AccessForAllResource>
```

Additionally, the adaptation would need to have the following accessibility metadata to communicate its adaptation type and point to the original resource:

```
<AccessForAllResource>
   <isAdaptation>
      <isAdaptationOf=”URIofOriginal”/>
       <extent=”full”/>
   </isAdaptation>
   <adaptationStatement>
      <adaptationType=”textRepresentation”/>
      <originalAccessMode=”visual”/>
      <representationForm=”longDescription”/>
      <language=”eng”/>
   </adaptationStatement>
</AccessForAllResource>
```

The metadata above describes a resource that contains an English language long text description of the original image. The ‘extent’ indicates that this text file is meant to be used as a complete alternative to the original image.

The final requirement is for the user to have a PNP file stating his/her needs or preferences relating to his/her vision requirements. The user edits a PNP file using a preference wizard as shown below in Figure E.2:

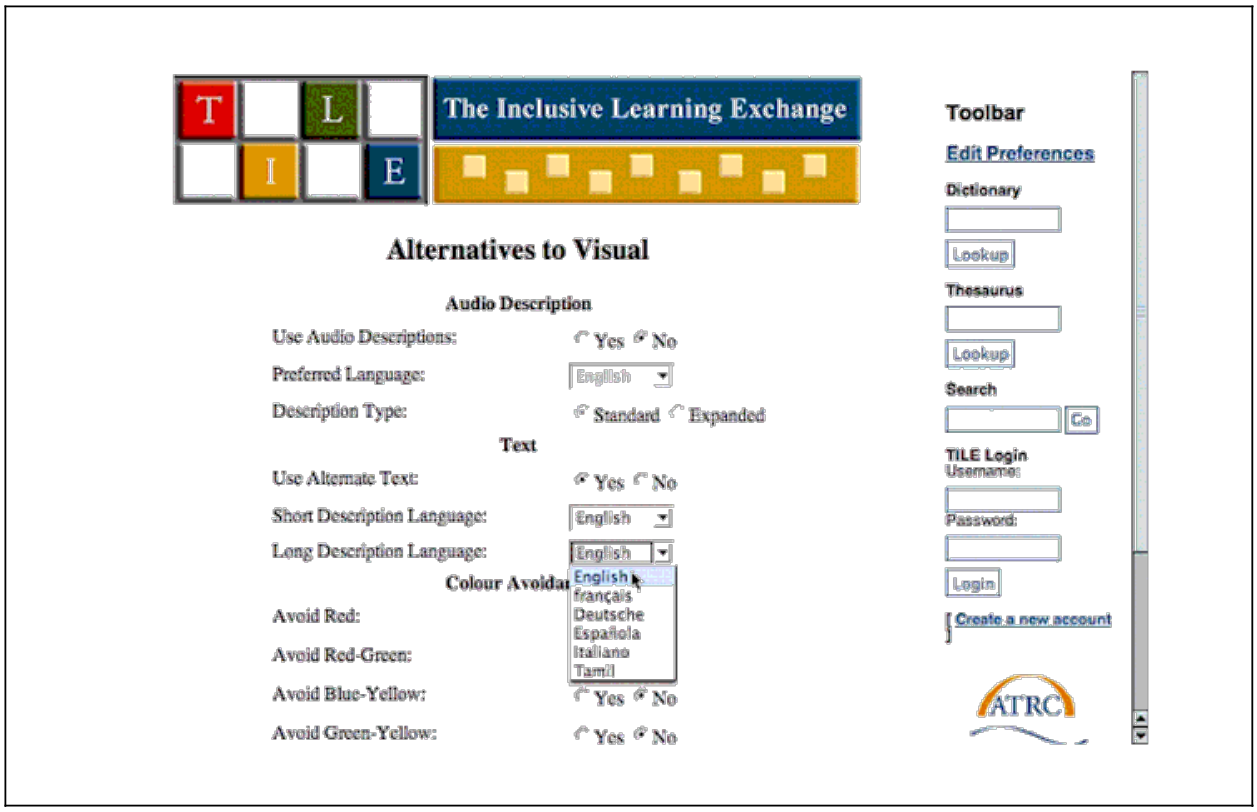

Figure E.2 — TILE screenshot of Alternatives to Visual preference editing.

The user specifies a requirement for text alternatives to visual elements. The user's PNP could be the following document:

```
<AccessForAllUser>
   <language=”eng”/>
   <content>
      <adaptationPreference>
         <adaptationType=”audioDescription”/>
         <originalAccessMode=”visual”/>
         <representationForm=”standard”/>
         <language=”eng”/>
      </adapationPreference>
      <adaptationPreference>
         <adaptationType=”textRepresentation”/>
         <originalAccessMode=”visual”/>
         <representationForm=”alternativeText”/>
         <language=”eng”/>
      </adapationPreference>
      <adaptationPreference>
         <adaptationType=”textRepresentation”/>
         <originalAccessMode=”visual”/>
         <representationForm=”longDescription”/>
         <language=”eng”/>
      </adapationPreference>
   </content>
</AccessForAllUser>
```

This document indicates that the user requests English-language standard audio descriptions and English-language "alt-text" and long descriptions.

When the user requests to view the course on Globalization and International Migration containing the image, the system recognizes that the user requires alternatives to any visual content. It checks for adaptations and discovers that one exists with characteristics that match the requirements of the user in the PNP. The system then displays the page with the long description substituted for the image, as shown below in Figure E.3:

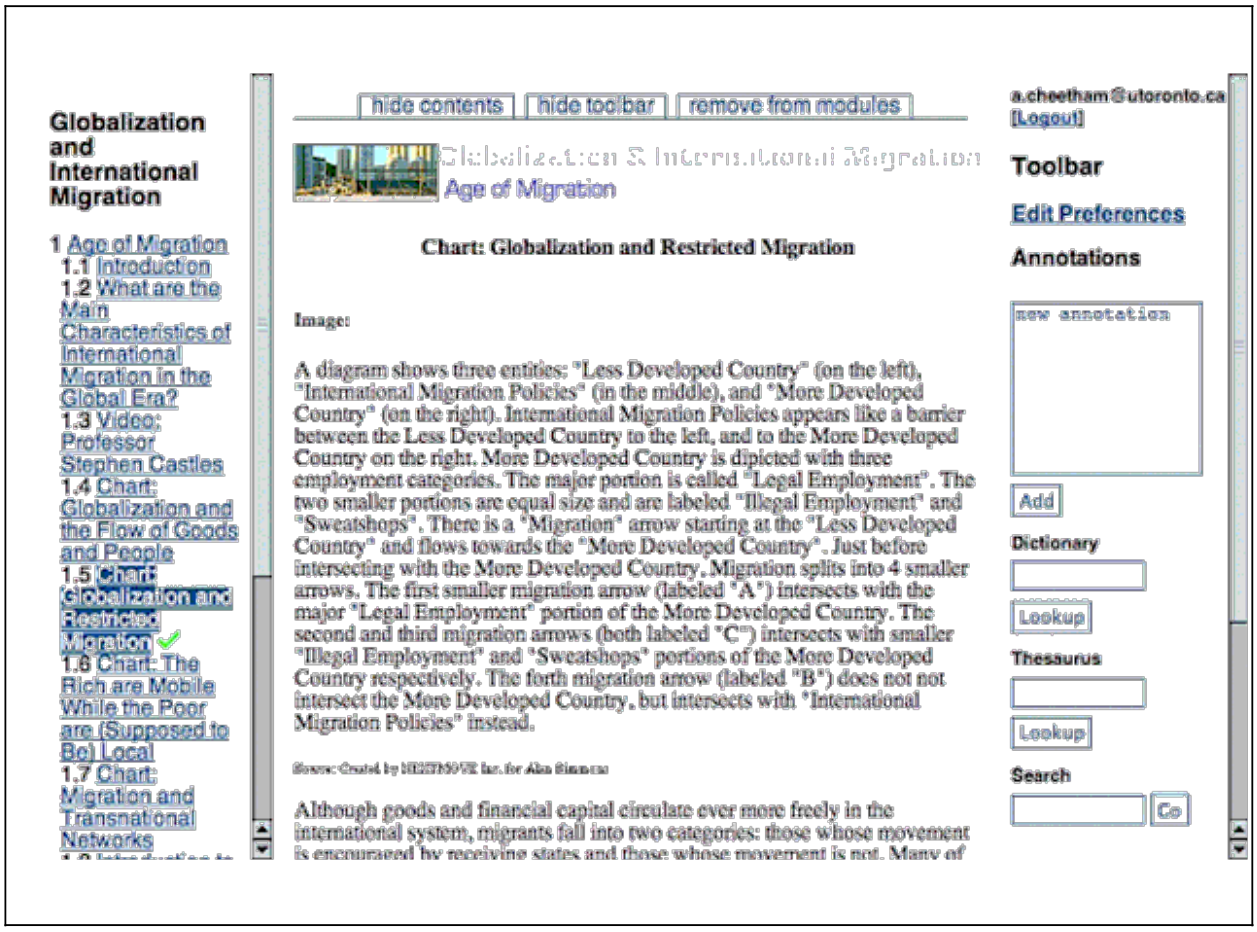

Figure E.3 — TILE screenshot of resource with Flash animation substituted with text alternative.

E.2 TILE Caption Example

The following example[6] is from The Inclusive Learning Exchange system (TILE) developed by the Adaptive Technology Resource Centre, University of Toronto.

A learner is studying a course on Globalization and International Migration containing a video of a lecture by Professor Stephen Castles. Like most videos, it contains visual and audio information. The media type of the video could be Quicktime, Real Media, or one of many other formats. A user without a PNP file or with a PNP file, but without expressed needs or preferences concerning audio or visual content, would receive the original video as shown below in Figure E.4:

[6] http://inclusivelearning.ca/tile/servlet/view?view=item&cp=urn:uuid:1ec15aa6-40a1-11d8-b01b 0002b3af6db8&item=CHART2

Figure E.4 — TILE screenshot of video with no captions.

Another user who has a hearing impairment and difficulty understanding English may require captions. In this case it would be necessary for the original video to be supplemented by an *alternative* resource.

To achieve this, first, the video would need to have the following accessibility metadata which communicates its access mode attributes and expresses a relationship with an alternative resource:

```
<AccessForAllResource>
   <accessModeStatement>
      <originalAccessMode=”auditory”/>
      <accessModeUsage=”informative”/>
   </accessModeStatement>
   <accessModeStatement>
      <originalAccessMode=visual/>
      <accessModeUsage=”informative”/>
   </accessModeStatement>
   <hasAdaptation=”URIofAdaptation”/>
</AccessForAllResource>
```

Additionally, the alternative resource needs to have the following accessibility metadata to communicates its adaptation type and a relationship with the original resource:

```
<AccessForAllResource>
   <isAdaptation>
      <isAdaptationOf=”URIofOriginal”/>
      <extent=partial/>
   </isAdaptation>
   <adaptationStatement>
      <adaptationType=”caption”/>
      <originalAccessMode=”auditory”/>
      <language=eng/>
   </adaptationStatement>
</AccessForAllResource>
```

The metadata above describes a caption file in English. The extent is partial, indicating that this caption file is meant to be used in conjunction with the original video.

The final requirement is for the user to have a PNP file stating his/her needs or preferences relating to his/her hearing problems and difficulty in understanding English. The user edits a PNP file using a preference wizard as shown below in Figure E.5:

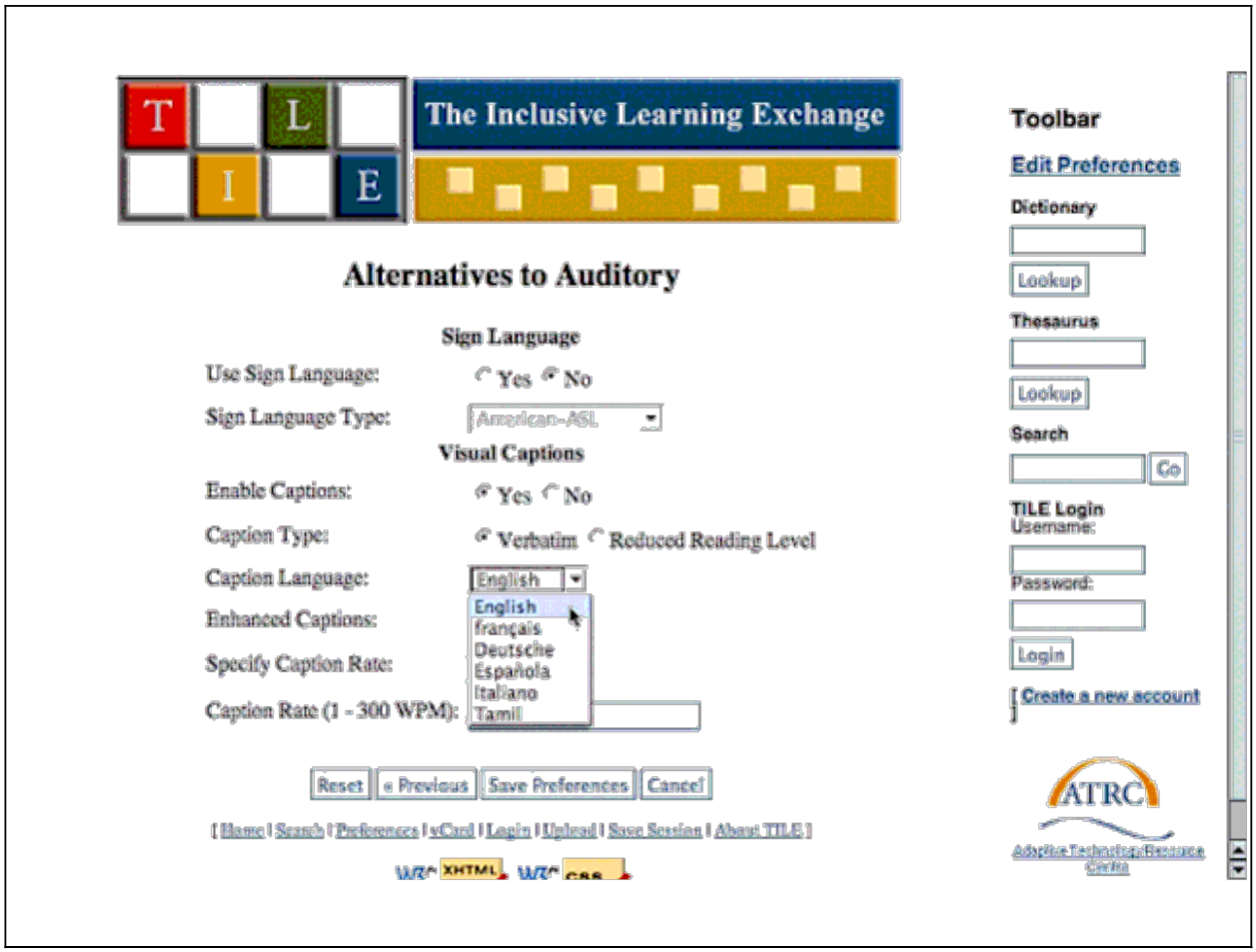

Figure E.5 — TILE screenshot of Alternatives to Auditory preference editing.

The user specifies a requirement for verbatim captions. The user’s PNP profile could be the following document:

```
<AccessForAllUser>
   <content>
      <adaptationPreference>
         <adaptationType=”caption”/>
         <originalAccessMode=”auditory/”>
         <usage=”required”/>
         <language=”eng”/>
      </adaptationPreference>
   </content>
</AccessForAllUser>
```

When the user requests to view the course on Globalization and International Migration containing the video of a lecture by Professor Stephen Castles, the system recognizes that the user requires an alternative to the auditory components. It checks the video’s equivalent resources and discovers that an equivalent exists with a caption that matches the requirements of the user. The metadata for the caption file indicates that it is a partial alternative and should be displayed with the video. The system displays the video with its supplementary captions as shown below in Figure E.6:

Figure E.6 — TILE screenshot of video with captions.

Annex F List of Contributors

Contributors to this version of the specification from ISO/IEC include:

- The Project Editors:
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  - Liddy Nevile, La Trobe University;
  - Andy Heath, Axelrod Access for All.
- Members of ISO/IEC JTC 1/SC36, Working Group 7.
- Staff of the Adaptive Technology Resource Centre (ATRC), University of Toronto including Anastasia Cheetham, David Weinkauf, Joseph Scheuhammer and others.
- Madeleine Rothberg, WGBH.
- Martyn Cooper, Open University.

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About This Document

Title:	Access For All Digital Resource Description
Co-chairs:	Richard Schwerdtfeger (IBM, USA) and Madeleine Rothberg (WGBH National Center for Accessible Media, USA)
Editor:	Colin Smythe (IMS GLC, UK)
Summary:	The Access For All Specification is intended to meet the needs of learners with disabilities and anyone who is disabled by their context. This part of the Access For All Specification provides a common language to describe digital learning resources to facilitate matching of those resources to learners' accessibility needs and preferences. This part of the Access For All Specification addresses the use of meta-data to enable the delivery of resources that meet a user's needs and preferences.
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Status:	**Final Release**
Revision Information:	Supersedes IMS Access For All Metadata V1.0 specification which was published in July 2004. This document is based upon the original ISO/IEC 24751-3:2008 *Information technology — Individualized adaptability and accessibility in e-learning, education and training — Part 3: "Access For All Digital Resource Description"*. The ISO/IEC 24751-3:2008 document was a further development of the original IMS GLC Access For All Meta-data Specification, August 2004. Several documentation changes have been made to the ISO/IEC but the technical solution is faithfully reproduced.
Purpose:	This document is for public release. Please provide feedback to the Project Group via IMS GLC Accessibility Forum at http://www.imsglobal.org/community/forum/categories.cfm?catid=54.
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Revision History

Version No.	Release Date	Comments
Final Release v1.0	12 July 2004	This is the formal Final Specification of the IMS Access For All Meta-data Information Model.
Final Release v2.0	31 October 2009	This is the formal Final Specification of the IMS Access For All Digital Resource Description Information Model.

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