International Standard

ISO/IEC 19788-1

Second edition
2024-11

Information technology for learning, education and training — Metadata for learning resources —

Part 1: Framework

Technologies de l'information pour l'apprentissage, l'éducation et la formation — Métadonnées pour ressources d'apprentissage —

Partie 1: Cadre de référence

Reference number
ISO/IEC 19788-1:2024(en)

COPYRIGHT PROTECTED DOCUMENT

ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Email: copyright@iso.org
Website: www.iso.org

Published in Switzerland

Contents

Page

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.

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

ISO and IEC draw attention to the possibility that the implementation of this document may involve the use of (a) patent(s). ISO and IEC take no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, ISO and IEC had not received notice of (a) patent(s) which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at www.iso.org/patents and https://patents.iec.ch. ISO and IEC shall not be held responsible for identifying any or all such patent rights.

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see www.iso.org/iso/foreword.html. In the IEC, see www.iec.ch/understanding-standards.

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

This second edition cancels and replaces the first edition (ISO/IEC 19788-1:2011), which has been technically revised. It also incorporates amendment 1 (ISO/IEC 19788-1:2011/AMD 1:2014).

The main changes are as follows:

— Generic terms and definitions, previously in ISO/IEC 19788-8:2015 (Annex E) have been added to Clause 3;

— An attribute "label" has been added to MLR specification templates for resource classes, properties (DESs in ISO/IEC 19788-1:2011), application profiles, generic content rule sets, vocabularies, and vocabulary terms;

— "Data element specification" has been renamed to "property specification";

— Redefining what an application profile is and deleting data element groups (DEGs);

— Clause 8 about MLR Vocabularies has been added. This clause solves a long-standing problem with the MLR Standard: The non-existence of a normalized way to specify/describe MLR vocabulary in a technology independent way;

— the entire content of the document has been reviewed and modified where necessary.

A list of all parts in the ISO/IEC 19788 series can be found on the ISO and IEC websites.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html and www.iec.ch/national-committees.

Introduction

0.1 Purpose and overview

This document was originally designed as a framework for the specification of metadata describing learning resources (hence it's title MLR: Metadata for Learning Resources). Its use in SC36 to specify metadata about competences or accessibility has shown that its scope is broader than originally intended.

This document is about providing a metadata framework relevant to several committees and sectors and is of crucial importance to ensure coherence across standardization deliverables. The framework provides specification of generic entities and rules governing their use. This would then be used to define the semantic (meaning) of any type of information in a predictable way. This framework is information-technology-neutral and defines a set of common approaches, i.e. methodologies and constructs. The key principles are informed by a user requirements-driven context with the aim of supporting multilingual and cultural adaptability requirements from a global perspective, providing a way to link semantics to content.

This document includes rules for the assignment and management of identifiers and the development of subsequent documents fulfilling specific user needs.

Additionally, this document specifies how to define application profiles.

Some generic resource classes and properties are included in this document but there are few of them. Excluded from this document are the specification of bindings for properties (e.g. XML or RDF/OWL bindings) and the description of particular application profiles. These will be considered in subsequent documents. Nevertheless, code may be used in an informal way in examples.

The primary purpose of the ISO/IEC 19788 series is to facilitate: (1) the description of a learning resource by providing a standards-based approach to the identification and specification of the properties required to describe a learning resource, for example, as a metadata learning resource (MLR) record; and, (2) the search, discovery, acquisition, evaluation, and use of learning resources, for instance by learners, instructors or automated software processes. The interoperability of these functions can be achieved through harvesting or federated search processes, among other technologies and solutions. ISO/IEC 19788 (all parts) is based on identified user requirements.

At the same time, ISO/IEC 19788 (all parts) takes into account the diversity of cultural and linguistic contexts in which learning resources and their metadata are likely to be created and exploited. ISO/IEC 19788 (all parts) also facilitates the sharing and reuse of learning resource descriptions.

ISO/IEC 19788 (all parts) aims to specify properties relating to learning resources to be expressed in a range of established formats, providing some compatibility with IEEE 1484.12.1-2002,[2] ISO 15836-1:2017[4] and ISO 15836-2:2019[5] (as exemplified by ISO/IEC 19788-2 and amendment), while also addressing user-driven requirements and uses not explicitly addressed in those two standards. These properties are used to form the description of a learning resource.

In addition to having this document, ISO/IEC 19788 (all parts) is modularly structured with all subsequent parts having a distinct scope. Some of these parts represent a specified set of user requirements for the identification and specification of properties having a particular focus and intended use in the description of a learning resource. This includes collections of properties focused on technical perspectives, educational (pedagogical) aspects, etc.

0.2 About the description of resources

Properties are the basis of the resource description. However, not all properties are relevant to describe all resources. Indeed, a person is not described like a book. So, when specifying a property, a type of resources containing all the entities the property may be applied to, a domain for the property is provided.

An important aspect of MLR is the notion of classes of resources, i.e., sets of resources sharing common characteristics (e.g. books, people). Classes can be linked together by an inheritance relationship. This notion is to be understood as close to the notion of subset. If class A inherits from class B then all instances of A are also instances of B and instances of all classes from which B inherits.

MLR supports multiple inheritance. In addition, a resource can belong to two classes that are not in a hierarchy. Moreover, it is not necessary before describing a resource to declare a class it is an instance of. If a property applies to a resource, then the resource in question is an instance of the class that is declared as the domain of the property.

The description of a resource is done by making explicit the characteristics of the resource in consideration. Each characteristic is made explicit by specifying the property involved, the resource described and the value of the property for that resource. This is the purpose of MLR data elements.

The values of properties can be either data like a specific date (a date of birth for example) or references to other resources (the author of a book being itself a resource with its own characteristics that can itself linked to other resources and so on).

0.3 About neutral identifiers

A base principle of the approach of this document is that it is linguistically and culturally neutral, even if its text is in English. This is achieved by using language and culture-neutral identifiers. Thus, a designation in the desired language can be associated with a given identifier (e.g. of a property, of a vocabulary term), meaning the same identifier can have as many different names as languages.

Identifiers for MLR entities (properties, resource classes, generic content value rule sets, application profiles, vocabularies and vocabulary terms) are unique reference and permanent tags.

Those identifiers are:

— language-neutral,

— unambiguous in the identification of a particular MLR entity in ISO/IEC 19788 (all parts), related standards or any other type of document based on this document,

— be used to reference and cross-reference MLR entities,

— be information technology independent,

— be as self-explanatory as possible.

The design of MLR identifiers is explained in Annex B.

Canonical identifiers for MLR entities provide a way to denote the common "essence" of entities that are essentially the same. Usually, the description associated with such an identifier is the latest version of the specification/description of the entity. Canonical identifiers are preferentially used if they exist. The design of MLR canonical identifiers is explained in Annex C.

Non-canonical identifiers are only used by persons writing normative documents based on this document. Using non-canonical identifiers allows to keep the history of modifications to the definitions.

In ISO/IEC 19788 (all parts), URI/IRI are used as identifiers for resources (they denote resources). A URI/IRI denoting a resource based on HTTP uses the ‘http’ scheme, not the ‘https’ scheme. Any URI/IRI identifier using the ‘https’ scheme will be deemed to be the identifier obtained by replacing ‘https’ by ‘http’.

Information technology for learning, education and training — Metadata for learning resources —

Part 1: Framework

1 Scope

This document provides a framework that applies to all resources and specifies how to describe resources. It includes rules governing the way in which descriptions are made.

This document provides principles, rules and structures for specifying the description of any type of resource; it identifies and establishes attributes for specifying properties, resources classes, vocabularies and application profiles and the rules governing their use. The key principles set out in this document are framed in a user-centric context and aim to meet the requirements of multilingual and cultural adaptability from a global perspective.

This document can be used for the specification of metadata describing any type of resource (not only learning resources). This document is information-technology-neutral and defines a set of common approaches.

This document specifies generic properties, generic resource classes and predefined rule sets for content value rules. These generic elements are proposed in such a way that they can be widely reused, thereby promoting interoperability.

This document is applicable to the development of:

— application profiles based on the ISO/IEC 19788 series but not part of it or any other document based on it,
— standards consisting of the description of resources (in a broad sense), whether they belong to the domain of education or to any other domain.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 639-3[1)], *Codes for the representation of names of languages — Part 3: Alpha-3 code for comprehensive coverage of languages*

ISO 8601-1:2019, *Date and time — Representations for information interchange — Part 1: Basic rules*

ISO/IEC 10646, *Information technology — Universal coded character set (UCS)*

IETF RFC 3987[2)], *Internationalized Resource Identifiers (IRIs)*

IETF RFC 5646[3)], *Tags for Identifying Languages*

1) Cancelled and replaced by ISO 639. ISO 639-3 is available at: https://iso639-3.sil.org/code_tables/639/data

2) Available at: https://tools.ietf.org/html/rfc3987

3) Available at: https://tools.ietf.org/html/rfc5646

IETF RFC 6838[4], *Media Type Specifications and Registration Procedures*

IETF RFC 8259[5], *The JavaScript Object Notation (JSON) Data Interchange Format*

W3C Recommendation,[6] *Extensible Markup Language (XML) 1.1*

3 Terms and definitions

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

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

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

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

3.1
application profile
defined structured collection of *properties* (3.49) chosen to satisfy the particular needs of a community, or communities

Note 1 to entry: The properties are from the various parts of ISO/IEC 19788 and from other sources.

Note 2 to entry: This collection of properties is accompanied by constraints about their presence and repeatability.

3.2
attribute
field that represents information in a template

3.3
attribute value
information recorded as the content of an *attribute* (3.2) in an *MLR specification* (3.40)

Note 1 to entry: It is good practice to indicate by the string "N/A" that no value should be provided for this attribute.

Note 2 to entry: It is good practice to indicate by the string "-" that no values are provided but could have been.

3.4
characteristic
abstraction of a feature of an *object* (3.46)

Note 1 to entry: Characteristics are used for describing *concepts* (3.6)

3.5
codomain
<property> set containing the possible values for the *property* (3.49) under consideration, this set is either a *resource class* (3.54) or a set of *literals* (3.22)

Note 1 to entry: The information concerning the codomain of a *property* (3.49) is provided as the values of the *attribute* (3.2) "Codomain" of its specification.

3.6
concept
unit of knowledge created by a unique combination of *characteristics* (3.4)

Note 1 to entry: Concepts are not necessarily bound to particular natural languages. They are, however, influenced by the social or cultural background which often leads to different categorizations.

4) Available at: https://tools.ietf.org/html/rfc6838

5) Available at: https://www.rfc-editor.org/rfc/rfc8259

6) Available at: https://www.w3.org/TR/xml11/

[SOURCE: ISO 1087:2019, 3.2.7, modified — Note 2 to entry removed.]

3.7
conditional
required under certain specified conditions

Note 1 to entry: One of the three *obligation statuses* (3.47) applied to the *attributes* (3.2) of an *MLR specification* (3.40) indicating the circumstances under which an *attribute value* (3.3) is required. See also *mandatory* (3.24) and *optional* (3.48).

Note 2 to entry: One of the three possible values for the presence type indicator of a property in the specification of constraints on properties in an application profile.

3.8
content value
information recorded as the content of the *attribute* (3.2) "Content value" of an *MLR data element* (3.31), in compliance with the specification of its underlying *property* (3.49)

3.9
content negotiation
<web architecture> practice of providing multiple representations available via the same *IRI* (3.19)

Note 1 to entry: Which representation is served depends on negotiation between the requesting agent and the agent serving the representations.

3.10
data
reinterpretable representation of information in a formalized manner suitable for communication, interpretation or processing

[SOURCE: ISO/IEC 2382:2015, modified — Notes to entry deleted.]

3.11
data element
unit of *data* (3.10) expressing a *characteristic* (3.4) of a resource

3.12
definition
representation of a *concept* (3.6) by an expression that describes it and differentiates it from related concepts

[SOURCE: ISO 1087:2019 , 3.3.1]

3.13
designation
representation of a *concept* (3.6) by a sign which denotes it

3.14
domain
<property> *resource class* (3.54) any *entity* (3.15) *subject* (3.59) of the property under consideration belongs to (is an instance of)

Note 1 to entry: The information concerning the domain of a *property* (3.49) is provided as the values of the attribute "Domain" of its specification.

Note 2 to entry: Some resources in the stated domain may very well not be a *subject* (3.59) of the property.

Note 3 to entry: If x P y (see 3.49, note 1) then x belongs to the domain of P.

3.15
entity
any concrete or abstract thing that exists, did exist, or might exist, including associations among these things

EXAMPLE Person, object, event, idea, process, etc.

Note 1 to entry: An entity exists whether data about it are available or not.

[SOURCE: ISO/IEC 2382:2015, 3.9.5]

3.16
identifier
sequence of characters, capable of uniquely identifying an *entity* (3.15)

Note 1 to entry: An identifier is linguistically neutral, with no translation provided.

Note 2 to entry: An identifier may be of the nature of a composite identifier, i.e. a unique identifier consisting of two or more identifiers and/or other elements, whose inter-workings are rule-based and which together serve as a "single" identifier.

3.17
information resource
resource (3.53) which is such that all of its essential *characteristics* (3.4) can be conveyed in a message

EXAMPLE The book "Turtle, Termites, and Traffic Jams" (considered from the point of view of the information it contains) by Mitchel Resnick (MIT Press, 1994, ISBN 0-262-18162-2) is an information resource. However, the physical object "Turtle, Termites, and Traffic Jams" book owned by Jon Doe is not an information resource.

3.18
instance
individual *object* (3.46) of a certain *entity* (3.15) or class

[SOURCE: ISO/TS 21308-4:2007, 3.5]

3.19
Internationalized Resource Identifier
IRI
sequence of characters from the Universal Character Set (ISO/IEC 10646) that conforms to the syntax and semantics defined in IETF RFC 3987

Note 1 to entry: IRIs are a generalization of URIs. While URIs are a sequence of characters chosen from a limited subset of US-ASCII, IRIs may contain characters from the Universal Character Set, such as Chinese, Japanese, Korean or Cyrillic characters.

Note 2 to entry: A mapping from IRIs to URIs is defined in IETF RFC 3987, making it possible to use IRIs instead of URIs, where appropriate, to identify resources.

Note 3 to entry: An IRI can be written by hand, spoken, or represented by a sequence of octets.

Note 4 to entry: An HTTP IRI is an IRI whose scheme is HTTP.

Note 5 to entry: IRIs are distinct entity from their underlying character string, in the same way an integer is distinct from the character string representing it. For example, http://example.org/ as a string literal is not equal to http://example.org as an IRI

3.20
label
descriptive text for human consumption

3.21
learning resource
resource (3.53) used for learning, education or training

3.22
literal
datatype value

Note 1 to entry: Primitive datatypes from W3C XML Schema Definition Language (XSD) 1.1 Part 2: Datatypes (section 3.3)[7] and other datatypes are used in this document.

EXAMPLE strings, integers, IRIs, language-tagged strings.

3.23
literal data element
MLR data element (3.31) whose *content value* (3.8) is a *literal* (3.22)

3.24
mandatory
always required

Note 1 to entry: One of the three *obligation statuses* (3.47) applied to the *attributes* (3.2) of an *MLR specification* (3.40) indicating the circumstances under which an *attribute value* (3.3) is required. See also *conditional* (3.7) and *optional* (3.48).

Note 2 to entry: One of the three possible values for the presence type indicator of a property in the specification of constraints on properties in an application profile.

3.25
media type
metadata for a *representation* (3.52), using IETF RFC 6838, that provides format specification and preferred interpretation for the representation

EXAMPLE image/jpeg, image/svg+xml, text/plain, text/html, text/turtle, video/H264, application/xhtml+xml.

Note 1 to entry: Media types, also called Internet media types, were previously called MIME types when used essentially for email sent through the SMTP protocol.

Note 2 to entry: Registry of Internet media types is available at: https://www.iana.org/assignments/media-types.

3.26
metadata
data (3.10) that defines and describes other data

[SOURCE: ISO/IEC 11179-1:2023, 3.2.16]

3.27
metadata record
record (3.50) containing a description of a resource or of a set of resources

Note 1 to entry: A metadata record for a set of resources may be a combination of the content of MLR records of the resources.

3.28
MLR application profile
application profile (3.1) described by an *MLR application profile specification* (3.29)

3.29
MLR application profile specification
description of an *application profile* (3.1) by informing the *attributes* (3.2) of 11.2

3.30
MLR canonical identifier
identifier (3.16) obtained from an *MLR identifier* (3.34) by replacing its `Standard_ID` part by the related `Standard_Canonical_ID` part.

Note 1 to entry: See Annex B for the syntax of `Standard_ID` and `Standard_Canonical_ID`.

Note 2 to entry: An MLR canonical identifier is not an *MLR identifier* (3.34).

3.31
MLR data element
data element (3.11) described by an *MLR data element specification* (3.32)

Note 1 to entry: MLR data elements are *data elements* (3.11).

Note 2 to entry: MLR data elements are described independently of any implementation language.

3.32
MLR data element specification
description of a *data element* (3.11) by informing the *attributes* (3.2) of 9.2

3.33
MLR entity
entity (3.15) that is defined using MLR standard specification mechanisms

Note 1 to entry: MLR entities include among others *MLR resource classes* (3.38), *MLR properties* (3.35), *MLR vocabularies* (3.41).

3.34
MLR identifier
identifier (3.16) of an *MLR entity* (3.33) that conforms to the following syntax:

```
MLR_Identifier ::= Standard_ID "::" MLR_ID
```

Note 1 to entry: See Annex B for the syntax of `Standard_ID` and `MLR_ID`.

3.35
MLR property
property (3.49) described by an *MLR property specification* (3.36)

3.36
MLR property specification
description of an *MLR property* (3.35) by informing the essential *attributes* (3.2) of 7.2

3.37
MLR record
ordered set of *MLR data elements* (3.31) describing a *resource* (3.53) and resources directly related to that resource

Note 1 to entry: If the MLR data elements are stored as XML elements in a file (XML document), for example, the MLR record consists of the whole XML document.

Note 2 to entry: An MLR record is inherently non-mutable. Addition or deletion of *MLR data elements* (3.31) to the MLR data element set, or modification of any MLR data element belonging to the MLR data element set make it a different MLR record.

Note 3 to entry: An MLR record is a *metadata record* (3.27).

3.38
MLR resource class
resource class (3.54) described by an *MLR resource class specification* (3.39)

3.39
MLR resource class specification
description of an *MLR resource class* (3.38) by informing the *attributes* (3.2) of 6.2

3.40
MLR specification
generic term for an *MLR resource class specification* (3.39), an *MLR property specification* (3.36), an *MLR vocabulary specification* (3.42), an *MLR data element specification* (3.32), or an *MLR application profile specification* (3.29)

Note 1 to entry: In this document MLR specifications are provided using templates.

3.41
MLR vocabulary
vocabulary (3.61) described by an *MLR vocabulary specification* (3.42)