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Introduction

This draft standard is based on national and international discussions. Your comments on this draft are invited and will assist in the preparation of the consequent standard.

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Date: xx/xx/20xx	Document: ISO/DIS xxxx
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1	2	(3)	4	5	(6)	7
MB	Clause No./ Subclause No./Annex (e.g. 3.1)	Paragraph/ Figure/Table/Note	Type of comment	Comment (justification for change) by the MB	Proposed change by the MB	Secretariat observations on each comment submitted
	3.1	Definition 1	ed	Definition is ambiguous and needs clarifying.	Amend to read '...so that the mains connector to which no connection...'	
	6.4	Paragraph 2	te	The use of the UV photometer as an alternative cannot be supported as serious problems have been encountered in its use in the UK.	Delete reference to UV photometer.	

DRAFT INTERNATIONAL STANDARD

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ISO/IEC JTC 1/SC 36

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Part 1: Framework

ICS: 03.100.30; 35.240.90

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

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 ISO documents 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).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

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

For an explanation on 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 the following URL: www.iso.org/iso/foreword.html.

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) and its amendment (ISO/IEC 19788-1:2011/AMD 1:2014), which have been technically revised.

The main changes compared to the previous edition are as follows:

- 1) Generic terms and definitions, previously in ISO/IEC 19788-8:2015 (Annex E) have been added to [Clause 3](#).
- 2) An attribute "label" has been added to specification templates such as resource classes, properties (DESS in 1st edition), application profiles.
- 3) "Data element specification" has been renamed to "property specification"
- 4) Redefining what an application profile is and deleting data element groups (DEGs).
- 5) [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.
- 6) A normative annex (see [Annex A](#)) has been added to provide labels and names for generic resource classes (see [Clause 13](#)), generic properties (see [Clause 14](#)) and generic content value rule sets (see [Clause 15](#)) in the three ISO languages (English, French and Russian).
- 7) A normative annex (see [Annex C](#)) has been added to provide the specification of MLR canonical identifiers. (adapted from ISO/IEC 19788-7:2015, Annex B)
- 8) [Clause 13](#) about rules governing the management and addition of new parts of ISO/IEC 19788 has been moved to annex [Annex D](#) (normative).

- 9) A normative annex (see [Annex E](#)) containing UML class diagrams representing generic properties and generic resource classes has been added.
- 10) An informative annex (see [Annex F](#)) containing UML class diagrams representing the concepts introduced in 19788-1 has been updated.
- 11) Two annexes have been added ([Annex G](#) and [Annex H](#)) to provide tables of contents for documents based on this standard.
- 12) As ISO/IEC 19788-1 is now a horizontal standard, the entire content of the document has been reviewed, and modified where necessary, to reflect this fact.
- 13) ISO/IEC 19788-1 (1st edition) informative [Annex A](#) is not part of this second edition.

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

Introduction

0.1. Purpose and overview

ISO/IEC 19788-1 was originally designed as a framework for the specification of metadata describing learning resources (hence its 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.

ISO/IEC 19788-1 is a horizontal standard and may be used for the specification of metadata describing any type of resource (not only learning resources).

ISO/IEC 19788-1 is about providing a metadata framework relevant to several committees and sectors and 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.

ISO/IEC 19788-1 includes rules for the assignment and management of identifiers and the development of subsequent documents fulfilling specific user needs.

Additionally, ISO/IEC 19788-1 specifies how to define application profiles.

Some generic resource classes and properties are included in ISO/IEC 19788-1 but there are few of them. Excluded from ISO/IEC 19788-1 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 ISO/IEC 19788 (all parts) 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, e.g., 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 optimal compatibility with IEEE 1484.12.1-2002 and ISO 15836:2009 (see Bibliography), 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 ISO/IEC 19788-1, 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... A list of all parts in the ISO/IEC 19788 series can be found in the ISO website.

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, one does not describe a person like a book. So, when specifying a property, one indicates a type of resources containing all the entities, a domain for the property.

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 should 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 2 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. Any property that applies to a resource implies that 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 the ISO/IEC 19788-1 standard is that it shall be linguistically and culturally neutral, even if its text is in English. This is achieved by using language and culture neutral identifiers. Thus, to a given identifier (e.g. of a property, of a vocabulary term) one can associate a designation in the desired language which means that 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 tags. An identifier usually is a linguistically independent sequence of characters capable of unique and permanent identification.

Those identifiers should:

- be language neutral,
- avoid any ambiguity 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 standard,
- be used to reference and cross-reference MLR entities,
- be information technology platform-independent,
- be as self-explanatory as possible.

The design of MLR identifiers is explained in [annex B](#).

Canonical identifiers for MLR entities (properties, resource classes, generic content value rule sets, application profiles, vocabularies and vocabulary terms) 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. The design of MLR canonical identifiers is explained in [annex C](#).

End users of the documents based on this standard (that is users of MLR entities) shall use canonical identifiers if available. Non-canonical identifiers should only be used by persons writing normative documents based on this standard. Using non-canonical identifiers allows to keep the history of modifications to the definitions.

In the MLR standard, URI/IRI are used as identifiers for resources (they denote resources). A URI/IRI denoting a resource based on HTTP shall use the 'http' scheme and 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'.

0.4. Organization and description of this document

In this document concepts prefixed with MLR (e.g. MLR property) are concepts that use the specification mechanisms of this document (à la MLR).

[Clause 6](#) is about the specification of resource classes.

[Clause 7](#) is about the specification of properties.

[Clause 8](#) is about the specification of vocabularies.

[Clause 9](#) specifies what is a MLR data element.

[Clause 10](#) introduces the notion of MLR record and metadata records.

[Clause 11](#) makes explicit the specification of application profiles.

[Clause 12](#) is about the use of this document outside ISO/IEC 19788.

[Clause 13](#) provides some generic resource classes that may be reused.

[Clause 14](#) provides some generic properties that may be reused.

[Clause 15](#) provides some generic content value rule sets to be used in a property specification (for the attribute Content value rules).

Finally, some annexes are provided. [Annexes A, B, C, D, E](#) are normative, and the remaining annexes are informative.

[Annex A](#) (normative) is a list of the labels and names of properties, resource classes and generic content value rule sets in ISO English, ISO French and ISO Russian.

[Annex B](#) (normative) provides rules for the production of MLR identifiers.

[Annex C](#) (normative) explains the making of MLR canonical identifiers from MLR identifiers.

[Annex D](#) (normative) provides rules governing the management and addition of new parts to the ISO/IEC 19788 multipart Standard.

[Annex E](#) (normative) presents some UML class diagrams modelling the properties and the resource classes defined in this standard.

[Annex F](#) (informative) presents some UML class diagrams modelling the concepts of this standard.

[Annex G](#) (informative) provides a table of contents for documents specifying application profiles not part of ISO/IEC 19788.

[Annex H](#) (informative) provides a table of contents for documents beyond ISO/IEC 19788 specifying MLR entities.

[Annex I](#) (informative) provides some general principles that have guided the development of this standard.

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

Part 1: Framework

1 Scope

ISO/IEC 19788-1 provides a framework that applies to all resources and specifies how to describe resources. Subsequent parts of ISO/IEC 19788 are only relevant to learning resources and related resources. This includes the rules governing the way to make these descriptions.

ISO/IEC 19788-1 provides principles, rules and structures for the specification of the description of any kind of resource; it identifies and specifies the attributes for specifying properties, resource classes, vocabularies and application profiles as well as the rules governing their use. The key principles stated in ISO/IEC 19788-1 are informed by a user requirements-driven context with the aim of supporting multilingual and cultural adaptability requirements from a global perspective.

ISO/IEC 19788-1 is information-technology-neutral and defines a set of common approaches, i.e. methodologies and constructs, which apply to the development of the subsequent parts of ISO/IEC 19788 or other standards.

ISO/IEC 19788-1 provides also the specification of generic properties, generic resource classes and predefined rule sets for content value rules. These generic elements are proposed so that they can be widely reused and thus promote interoperability.

ISO/IEC 19788-1 is a horizontal standard.

It is recommended to use this document:

- as a basis for the development of other parts of ISO/IEC 19788,
- as a basis for the development of application profiles based on ISO/IEC 19788 but not a part of it or on any other standard/document based on this document,
- for the development of standards consisting of the description of resources (in a broad sense) whether they belong to the domain of education or 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, *Codes for the representation of names of languages — Part 3: Alpha-3 code for comprehensive coverage of languages* ⁽¹⁾

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

ISO/IEC 10646 (E), *Information technology — Universal Multiple-Octet Coded Character Set (UCS)*

1) www.sil.org/iso639-3/

INTERNET ENGINEERING TASK FORCE (IETF), RFC 2048 (1996), Multipurpose Internet Mail Extensions (MIME) – Part two: Media Types. Edited by N. Freed, N. Borenstein. November 1996. [viewed 2023-01-31]. Available at <https://tools.ietf.org/html/rfc2048>

INTERNET ENGINEERING TASK FORCE (IETF), RFC 3987 (2005), Internationalized Resource Identifiers (IRIs) [online]. Edited by M. Duerst, M. Suignard. January 2005. [viewed 2023-01-31]. Available at <https://tools.ietf.org/html/rfc3987>

INTERNET ENGINEERING TASK FORCE (IETF), RFC 5646: BCP 47, Tags for Identifying Languages [online]. Edited by A. Phillips, M. Davis. September 2009. [viewed 2023-01-31]. Available at <https://tools.ietf.org/html/rfc5646>

INTERNET ENGINEERING TASK FORCE (IETF), RFC 6838. (2013). Media Type Specifications and Registration Procedures [online]. Edited by N. Freed, J. Klensin, T. Hansen. January 2013. [viewed 2023-01-31]. Available at <https://tools.ietf.org/html/rfc6838>

INTERNET ENGINEERING TASK FORCE (IETF), RFC 8259: The JavaScript Object Notation (JSON) Data Interchange Format [online]. Edited by T. Bray. December 2017. [viewed 2023-01-31]. Available at <https://www.rfc-editor.org/rfc/rfc8259>

W3C Recommendation. Extensible Markup Language (XML) 1.1 (Second Edition) Format [online]. Edited by Tim Bray, Jean Paoli, C. M. Sperberg-McQueen, Eve Maler, François Yergeau, John Cowan. August 2006. [viewed 2023-01-31]. Available at <https://www.w3.org/TR/xml11/>

3 Terms and definitions

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

ISO and IEC maintain terminological 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/>

The terms and definitions provided in this document should not be copied in other parts of ISO/IEC 19788.

3.1 application profile

defined structured collection of *properties* (3.52) 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.

Note 3 to entry: A document defining an application profile is more than an application profile. It may also contain some specifications of *MLR entities* (3.35)

3.2 application profile record

MLR record obeying the rules of a specific *application profile* (3.1)

3.3 application profile specification

description of an *application profile* (3.1) by providing *attribute values* (3.5) for a set of predefined *attributes* (3.4) using a specific template

3.4**attribute**

data field that represents information in a template

[SOURCE: Adapted from ISO 13374-2:2007, 0000_116]

3.5**attribute value**

information recorded as the content of an *attribute* (3.4) in a *MLR specification* (3.43)

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.

3.6**characteristic**

abstraction of a feature of an *object* (3.49)

Note 1 to entry: Characteristics are used for describing *concepts* (3.8)

[SOURCE: Adapted from ISO 1087:2019, 3.1.3 & 3.2.1]

3.7**codomain**

<property> set containing the possible values for the *property* (3.52) under consideration, this set is either a *resource class* (3.57) or a set of *literals* (3.24)

Note 1 to entry: The information concerning the codomain of a *property* (3.52) is provided as the values of the *attribute* (3.4) "Codomain" of its specification.

3.8**concept**

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

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.

[SOURCE: Adapted from ISO 1087:2019, 3.2.7]

3.9**conditional**

required under certain specified conditions

Note 1 to entry: One of the three *obligation statuses* (3.50) applied to the *attributes* (3.4) of a *MLR specification* (3.43) indicating the circumstances under which an *attribute value* (3.5) is required. See also *mandatory* (3.26) and *optional* (3.51).

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.

[SOURCE: adapted from ISO/IEC 11179-3:2013, 3.2.22]

3.10**content value**

information recorded as the content of the *attribute* (3.4) "Content value" of a *MLR data element* (3.33), in compliance with the specification of its underlying *property* (3.52)

3.11

content negotiation

<web architecture> practice of providing multiple representations available via the same *IRI* (3.21)

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

[SOURCE: Architecture of the World Wide Web, Volume One. W3C Recommendation [viewed 2013-05-10]. Available from: <https://www.w3.org/TR/2004/REC-webarch-20041215/>]

3.12

data

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

[SOURCE: ISO 2382-1:2015, 2121272 – Notes to entry deleted.]

3.13

data element

unit of *data* (3.12) expressing a *characteristic* (3.6) of a resource

3.14

definition

representation of a *concept* (3.8) by an expression that describes it and differentiates it from related concepts

[SOURCE: ISO 1087:2019, 3.3.1]

3.15

designation

representation of a *concept* (3.8) by a sign which denotes it

3.16

domain

<property> *resource class* (3.57) any *entity* (3.17) *subject* (3.62) of the property under consideration belongs to (is an instance of)

Note 1 to entry: The information concerning the domain of a *property* (3.52) is provided as the values of the attribute "Domain" of its specification

Note 2 to entry: For some resources in the stated domain the property may very well not apply.

Note 3 to entry: If $x \text{ P } y$ (see 3.52, note 1) then x belongs to the domain of P .

3.17

entity

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

EXAMPLE A person, an object, an event, an idea, a process, etc.

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

[SOURCE: Adapted from ISO/IEC 2382:2015, 2121433]

3.18

identifier

sequence of characters, capable of uniquely identifying an *entity* (3.17)

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.

3.19

information resource

<web architecture> resource which has the property that all of its essential *characteristics* (3.6) can be conveyed in a message

EXAMPLE The information content of the book "Turtle, Termites, and Traffic Jams" by Mitchel Resnick (ISBN 0-262-18162-2) is an information resource.

[SOURCE: Architecture of the World Wide Web, Volume One. W3C Recommendation [viewed 2013-05-10]. Available from: <https://www.w3.org/TR/2004/REC-webarch-20041215/>]

3.20

instance

individual *object* (3.49) of a certain *entity* (3.17) or class

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

3.21

Internationalized Resource Identifier

IRI

sequence of characters from the Universal Character Set (Unicode/ISO 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

[SOURCE: Adapted from Internationalized Resource Identifiers (IRIs). IETF RFC 3987.]

3.22

label

descriptive text for human consumption

3.23

learning resource

resource (3.56) used for learning, education or training

3.24

literal

datatype value

Note 1 to entry: Primitive datatypes from W3C XML Schema Definition Language (XSD) 1.1 Part 2: Datatypes (section 3.3)^[4] and other datatypes are used in this Standard.

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

3.25

literal data element

MLR data element (3.33) whose *content value* (3.10) is a *literal* (3.24)

3.26

mandatory

always required

Note 1 to entry: One of the three *obligation statuses* (3.50) applied to the *attributes* (3.4) of a *MLR specification* (3.43) indicating the circumstances under which an *attribute value* (3.5) is required. See also *conditional* (3.9) and *optional* (3.51).

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.

[SOURCE: ISO/IEC 11179-3:2013, 3.2.71]

3.27

media type

metadata for a *representation* (3.55), as per 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 online at <http://www.iana.org/assignments/media-types>.

3.28

metadata

data (3.12) that defines and describes other data

[SOURCE: ISO/IEC 11179-1:2015, 3.2.16]

3.29

metadata record

record (3.53) 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.

3.30

MLR application profile

application profile (3.1) described by a *MLR application profile specification* (3.31)

3.31

MLR application profile specification

description of an *application profile* (3.1) by informing the *attributes* (3.4) of [clause 11.2](#)

3.32

MLR canonical identifier

identifier (3.18) obtained from a *MLR identifier* (3.36) 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: A MLR canonical identifier is not a *MLR identifier* (3.36)

3.33**MLR data element**

data element (3.13) described by a *MLR data element specification* (3.34)

Note 1 to entry: MLR data elements are *data elements* (3.13).

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

3.34**MLR data element specification**

description of a *data element* (3.13) by informing the *attributes* (3.4) of [clause 9.2](#)

3.35**MLR entity**

entity (3.17) that is defined using MLR standard specification mechanisms

Note 1 to entry: MLR entities include among others *MLR resource classes* (3.41), *MLR properties* (3.37), *MLR vocabularies* (3.44).

3.36**MLR identifier**

identifier (3.18) of a *MLR entity* (3.35) 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.

3.37**MLR property**

property (3.52) described by a *MLR property specification* (3.38)

3.38**MLR property specification**

description of a *MLR property* (3.37) by informing the essential *attributes* (3.4) of [clause 7.2](#)

3.39**MLR record**

set of *MLR data elements* (3.33) describing a *resource* (3.56) 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: A MLR record is inherently non-mutable. Addition or deletion of *MLR data elements* (3.33) 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: A MLR record is a metadata record

3.40**MLR record relative to an application profile**

MLR record (3.39) for which the additional conditions specified in the *application profile specification* (3.3) are satisfied by all the *MLR data elements* (3.33) in the MLR record

3.41**MLR resource class**

resource class (3.57) described by a *MLR resource class specification* (3.42)

3.42**MLR resource class specification**

description of a *MLR resource class* (3.41) by informing the attributes of [clause 6.2](#)

3.43

MLR specification

generic term for a *MLR resource class specification* ([3.42](#)), a *MLR property specification* ([3.38](#)), a *MLR vocabulary specification* ([3.45](#)), a *MLR data element specification* ([3.34](#)), or *MLR application profile specification* ([3.31](#))

Note 1 to entry: in this standard MLR specifications are provided using templates.

3.44

MLR vocabulary

vocabulary ([3.65](#)) described by a *MLR vocabulary specification* ([3.45](#))

3.45

MLR vocabulary specification

description of a *MLR vocabulary* ([3.44](#)) by informing the *attributes* ([3.4](#)) of [clause 8.2](#)

3.46

mutable MLR record

container for a *MLR record* ([3.39](#))

Note 1 to entry: unlike the situation for a MLR record, the state (content) of a mutable MLR record can change over time, while still describing a given learning resource and resources related to it.

3.47

name

string ([3.60](#)) that is a valid name as per the production rule for Name in the XML W3C Recommendation

Note 1 to entry: a name for a MLR entity (e.g. property, resource class...) is usually constructed from the label of this *entity* ([3.17](#)).

Note 2 to entry: names are tokens used in constructing unique identifiers for MLR entities (e.g., properties, resource classes) used in machine processing (See ISO/IEC 19788-7 for more information).

3.48

non-literal data element

data element ([3.13](#)) whose content value is an *IRI* ([3.21](#)) denoting a *resource* ([3.56](#))

Note 1 to entry: the value of a non-literal data element is what is denoted by the IRI, not the IRI itself.

3.49

object

anything perceivable or conceivable

3.50

obligation status

⟨attribute⟩ indication of whether a value for the *attribute* ([3.4](#)) is to be provided

Note 1 to entry: the obligation status is *mandatory* ([3.26](#)), *conditional* ([3.9](#)) or *optional* ([3.51](#)).

3.51

optional

permitted but not required

Note 1 to entry: one of the three *obligation statuses* ([3.50](#)) applied to the *attributes* ([3.4](#)) of a *MLR specification* ([3.43](#)) indicating the circumstances under which an *attribute value* ([3.5](#)) is required. See also *mandatory* ([3.26](#)) and *conditional* ([3.9](#)).

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.

[SOURCE: Adapted from ISO/IEC 11179-3:2013, 3.2.89]

3.52**property**

relation between *resources* (3.56) or between resources and *literals* (3.24)

Note 1 to entry: the fact that P is a property that relates entities x and y is noted $x P y$.

Note 2 to entry: the concept of property is a primitive notion in this standard. It is not defined in terms of set theory concepts, but is motivated informally.

Note 3 to entry: if a property P is described by a *MLR property specification* (3.38), then the set of pairs of entities (x, y) such that $x P y$ is contained in the Cartesian product of the domain of P with the codomain of P.

3.53**record**

structured information that can be read by software services

[SOURCE: ISO24622-1:2015]

3.54**refine**

$\langle \text{property} \rangle$ *property* (3.52) P1 refines property P2 if (and only if) $x P_1 y$ implies $x P_2 y$

EXAMPLE 1 Property "is son of" refines property "is child of".

EXAMPLE 2 Property "has mother" refines property "has parent".

Note 1 to entry: "P1 refines P2" means "P1 is a *sub-property* (3.61) of P2".

3.55**representation**

$\langle \text{web architecture} \rangle$ *data* (3.12) that encodes information about resource state

Note 1 to entry: a resource may have more than one representation: The intellectual content of the book (an *information resource* (3.19)) "Turtle, Termites, and Traffic Jams" by Mitchel Resnick (ISBN 0-262-18162-2) could have textual representations (e.g. plain text, html, epub, portable document format (pdf), Microsoft Word, Braille), representations in various languages (e.g. English, French), audio representations...

Note 2 to entry: metadata such as character encoding (e.g. UTF-8, UTF-16, US-ASCII, ISO-8859-1) or content encoding (e.g. XML, HTML, JPEG video, JSON file) may be provided.

[SOURCE: Adapted from Architecture of the World Wide Web, Volume One. W3C Recommendation, 2004 [viewed 2013-05-10]. Available from: <https://www.w3.org/TR/2004/REC-webarch-20041215/>]

3.56**resource**

thing in the world, other than a literal, under consideration

EXAMPLE Physical entities (such as books and human beings), digital entities (such as images, videos, services) or conceptual entities (such as unicorns, collection of resources) constitute examples of resources.

Note 1 to entry: in this Standard, resources are denoted (named, identified, referenced) by *IRIs* (3.21).

3.57**resource class**

set of *resources* (3.56) that can be identified with explicit boundaries and meaning and whose *characteristics* (3.6) and behaviour follow the same *rules* (3.58)

EXAMPLE *Learning Resource* (set of all learning resources), *Person* (set of all persons), *Right* (set of all rights objects), and *Document* (set of all documents).

Note 1 to entry: adapted from the definition of "object class" in ISO/IEC 11179-1:2004, 3.3.20.

[SOURCE: Adapted from the definition of "object class" in ISO/IEC 11179-1:2004, 3.3.20.]

3.58

rule

statement that specifies a constraint

Note 1 to entry: rules specify conditions that shall be complied with. These may include relations among objects and their attributes.

Note 2 to entry: rules are of either a mandatory or a conditional nature.

Note 3 to entry: in MLR, rules formally specify and are applied to the conditions governing the content, i.e., in ensuring the precision of the semantics of the data.

Note 4 to entry: rules shall be explicit and clear enough to be understood by all.

3.59

rule set

defined and pre-established set of *rules* ([3.58](#)) that are used together

3.60

string

sequence of zero or more ISO 10646 / Unicode characters

3.61

sub-property

property ([3.52](#)) that is related to another property such that all resources related by the former property are also related by the latter property

3.62

subject

<property> entity x is a subject of P if x P y for some entity y

3.63

terminology

set of *designations* ([3.15](#)) belonging to one subject field

[SOURCE: adapted from ISO 1087:2019, 3.1.11]

3.64

value

<property> entity y is a value of a property P if x P y for some entity x

3.65

vocabulary

terminological dictionary which contains *designations* ([3.15](#)) and *definitions* ([3.14](#)) from one or more subject fields

Note 1 to entry: The vocabulary may be monolingual, bilingual or multilingual

[SOURCE: adapted from ISO 11616:2017(en) 3.1.40, note added]

3.66

Web resource

information resource ([3.19](#)) that "lives on the World Wide Web"

Note 1 to entry: A Web resource can be denoted by a HTTP IRI and under normal conditions (server not down...) one can retrieve using that IRI and the HTTP protocol a representation of the resource (the exact representation retrieved might depend on content negotiation).

4 Symbols and abbreviated terms

AP Application Profile

EBNF	Extended Backus-Naur Form
ID	Identifier
IEEE	Institute of Electrical and Electronics Engineers
IRI	Internationalized Resource Identifiers
JSON	JavaScript Object Notation
LOM	Learning Object Metadata
MLR	Metadata for Learning Resources
MLR-1	<i>ISO/IEC 19788-1:XXX (E) Information Technology – Learning, Education and Training – Metadata for Learning Resources – Part 1: Framework</i> (this document)
MLR record	Metadata for Learning Resource Record
XML	eXtensible Markup Language
W3C	World Wide Web Consortium

5 Digital access

In order to promote the dissemination of this multipart standard and not to overload it with content that is difficult for humans to read, the ontology (classes and properties) defined in this standard will be made available on the website standards.iso.org.

The files contain the ontology of 19788-1 as well as JSON files containing the linguistic equivalents of labels and names.

A README.md file (<https://standards.iso.org/iso-iec/19788/-1/ed-2/README.md>) containing the list of available files and the choices made is provided.

6 MLR Resource classes

6.1 Introduction

A resource class is a set of resources that can be identified with explicit boundaries and meaning and whose characteristics and behaviour follow the same rules.

Examples of resource classes are the set of all learning resources (*Learning Resource*), the set of all persons (*Person*), the set of all documents (*Document*).

There is one point to be aware of: this notion of class is close to the notion of set and is not to be confused with the notion of class in a programming language.

6.2 Resource class specification attributes

The specification of a resource class is done by making explicit the values of a set of attributes. Each resource class specification has the following attributes:

- **Identifier** (an identifier for the class)
- **Canonical identifier** (a canonical identifier for the class)
- **Label** (a label for the class)

- **Name** (a name for the class)
- **Definition** (a definition for the class)
- **Subclass of** [multiple inheritance] (a superclass or a list of superclasses for the class under specification.)
- **Note** (any additional information)

6.2.1 Attribute "Identifier"

6.2.1.1 Rules for the attribute "Identifier"

[R0001] The **obligation status** of this **attribute** is **mandatory**.

[R0002] The value for this **attribute** is a RC_Identifier, see [Annex B](#), [subclause B.2](#) for the EBNF production rules.

EXAMPLE Examples of such resource class specification identifiers include: ISO_IEC_19788-1:2011::RC0003,
ISO_IEC_19788-2:2011:AMD.:2014::DES2300

[R0003] The value for the **attribute** "Identifier" is unique (see [Annex B](#))^a within each ISO/IEC 19788 Part.

^a For bindings those identifiers will map to IRIs as defined by IETF RFC 5141 [2] (A Uniform Resource Name (URN) Namespace for the International Organization for Standardisation (ISO)). Namespace related to ISO/IEC 19788-1 will be based on IETF RFC 5141 [2] and its proposed process for identifier resolution (clause 2.8). For example, ISO/IEC 19788-1 (edition 2) document with identifier urn:iso:std:iso-iec:19788:-1:ed-2:en corresponds to the HTTP IRI <https://standards.iso.org/iso-iec/19788/-1/ed-2/en/> (using urn:iso:std:iso-iec:19788:-1:ed-2:en would also be possible)

6.2.2 Attribute "Canonical identifier"

6.2.2.1 Rules for the attribute "Canonical identifier"

[R0004] The **obligation status** of this **attribute** is **conditional**.

Condition: When (and only when) the value of the **attribute** "Identifier" is a **MLR identifier** a value shall be provided for this attribute.

[R0005] The value for this **attribute** is the **MLR canonical identifier** associated with the value of the **attribute** "Identifier".

6.2.3 Attribute "Label"

Resource class labels have the following properties:

- a resource class is a set of resources, but it is recommended to use a singular form for its label (e.g. Person, Learning Resource),
- a resource class label may have multiple linguistic equivalents in different languages, one label per language, preferably one of them should be in the language of the document,
- in the case of several linguistic equivalents for a resource class label, the language of each of them is indicated after the label in parenthesis using a language code from ISO 639-3,

- the label of a resource class begins with, generally and for languages making this distinction, an upper-case letter. If the label of a resource class consists of more than one word, then all the words start with an upper-case letter.

6.2.3.1 Rules for the attribute "Label"

[R0006] The **obligation status** of this **attribute** is **mandatory**.

[R0007] The value of this **attribute** is a **label**.

6.2.4 Attribute "Name"

A resource class name is a version of the resource class label of the resource class that is a valid name as per the production rule for Name in the XML W3C Recommendation, in the stated language.

Resource class names have the following properties:

- a resource class name may have multiple linguistic equivalents in different languages, one name per language, preferably one of them should be in the language of the document,
- in the case of several linguistic equivalents for a resource class name, the language of each of them is indicated in parenthesis after the name using a language code from ISO 639-3,
- the name of a resource class begins with, generally and for languages making this distinction, an upper-case letter and has no spaces. To show where a space would be, the letter following the space is capitalised (this is commonly known as camelCase),
- the name of a resource class is usually constructed from the label of the class.

6.2.4.1 Rules for the attribute "Name"

[R0008] The **obligation status** of this **attribute** is **mandatory**.

[R0009] The value of this **attribute** is a **name**.

6.2.5 Attribute "Definition"

Used to provide a definition of the resource class (in the language of the document).

6.2.5.1 Rules for the attribute "Definition"

[R0010] The **obligation status** of this **attribute** is **mandatory**.

[R0011] The value of this **attribute** is a **definition**.

[R0012] The **definition** shall begin with "Instances of this class are ...".

6.2.6 Attribute "Subclass of"

Classes are organized together by mean of the attribute "Subclass of". For a class, being a subclass of another class means that all instances of the former are also instances of the latter.

6.2.6.1 Rules for the attribute "Subclass of"

[R0013] The **obligation status** of this **attribute** is **optional**.

[R0014] The value of this **attribute** is a set of **identifiers** of **resource classes**. Use canonical identifiers if they exist.

[R0015] To improve readability, it is possible to add the **label** of each **resource class** between parentheses after the **identifier**.

6.2.7 Attribute "Note"

This attribute is used to provide additional information about a resource class: comments, explanatory information or remarks.

6.2.7.1 Rules for the attribute "Note"

[R0016] The **obligation status** of this **attribute** is **optional**.

[R0017] The value of this **attribute** is a **string**.

6.3 Resource class specification template

When developing a document, based on this standard, the way to fully describe a resource class (i.e. to provide resource class specifications) is by filling up the following template (one template per resource class).

Resource class specification	
Identifier (mandatory)	
Canonical Identifier (conditional)	
Label (mandatory)	
Name (mandatory)	
Definition (mandatory)	
Subclass of (optional)	
Note (optional)	

6.4 Example of a resource class specification

Resource class specification	
Identifier	ISO_IEC_19788-99:2099::RC0099
Canonical Identifier	ISO_IEC_19788-99::RC0099
Label	<i>Pedagogical Document</i>
Name	<i>PedagogicalDocument</i>
Definition	Instances of this class are the documents (in either physical or electronic format) used in an educational activity
Subclass of	ISO_IEC_19788-1::RC0002 (<i>Learning Resource</i>) ISO_IEC_19788-1::RC0098 (<i>Document</i>)
Note	-

7 MLR Properties

7.1 Introduction

A primary principle of ISO/IEC 19788-1 is that a common set of attributes specifies the essential characteristics of the property used to describe resources. This [clause 7](#), MLR properties, defines the attributes of property specifications and rules for the values of those attributes.

The linguistic content for the values of the attributes shall be given in English (to be more precise, in the language of the document in which they are given), but for the values of the attributes "Label" and "Name" which may have multiple linguistic equivalents other than English.

7.2 Property specification attributes

A property specification consists of a (defined) list of attributes with rules for the values of those attributes.

Each MLR property specification has the following attributes (essential attributes – see [clause 7.3](#) – are set in bold):

- **Identifier** (an identifier for the property)
- **Canonical identifier** (a canonical identifier for the property)
- **Label** (a label for the property)
- **Name** (a name for the property)
- **Definition** (a definition for the property)
- **Domain** (a domain for the property)
- **Codomain** (a codomain for the property)
- **Linguistic indicator** (property linguistic indicator)
- **Content value rules** (rules governing the possible values for the property)
- Refines (a super-property for the property)
- Example(s) (some examples of use of the property)
- Note(s) (any additional information)
- Best practice(s) (some good practices for using the property)
- Status (an information on the fact that the property is still in use)

7.2.1 Attribute "Identifier"

7.2.1.1 Rules for the attribute "Identifier"

[R0018] The **obligation status** of this **attribute** is **mandatory**

[R0019] The value for this **attribute** is a P_Identifier^a, or a DES_Identifier (deprecated). see [Annex B, subclause B.2](#) for the EBNF production rules.

EXAMPLE Examples of such identifiers include:

"ISO_IEC_19788-2:2011::DES0200", "ISO_IEC_19788-12:2027::P1300", "ISO_IEC_19788-5:2012::DES0300"

[R0020] The value for the **attribute** "Identifier" is unique (see [Annex B](#)) within each ISO/IEC 19788 Part.

^a In this version of 19788-1, "data element property" has been replaced by "property". As a logical consequence, the beginning of the property identifiers starts with P and no longer with DES. However, changing the identifiers of existing properties would not make sense. The use of DES remains possible but is deprecated.

7.2.2 Attribute "Canonical identifier"

7.2.2.1 Rules for the attribute "Canonical identifier"

[R0021] The **obligation status** of this **attribute** is **conditional**.

Condition: When (and only when) the value of the **attribute** "Identifier" is a **MLR identifier** a value shall be provided for this attribute.

[R0022] The value of this **attribute** is the **MLR canonical identifier** associated with the value of the **attribute** "Identifier".

7.2.3 Attribute "Label"

Property labels have the following properties:

- a property label may have multiple linguistic equivalents in different languages, one label per language, preferably one of them should be in the language of the document,
- in the case of several linguistic equivalents for a property label, the language of each of them is indicated, just after, in parenthesis using a language code from ISO 639-3,
- for a property label do not use a redundant prefix (for example if the domain is the class Annotation, use "date" for the label instead of "annotation date"), for a non-literal data element do not use the name of the codomain (for example if the codomain is the class Annotation, use "has annotation" for the property label instead of "annotation"),
- preferably, the label of a property begins with, for languages making this distinction, a lower-case letter. If there are spaces in the label of a property, the letter following a space is a lower-case letter.

7.2.3.1 Rules for the attribute "Label"

[R0023] The **obligation status** of this **attribute** is **mandatory**.

[R0024] The value of the **attribute** is a **label**.

[R0025] In any language, for all **properties** the values of the **attribute** "label" shall be unique across all **properties** (from all parts of ISO/IEC 19788, all editions) with the same values for the **attributes** "Domain" and "Codomain".

NOTE Said otherwise: In any given language, for any property the triple (label, domain, codomain) associated with the property constitutes a global (within ISO/IEC 19788 (all parts)) appellation of the property (the primary global identifier being provided by the property identifier).

7.2.4 Attribute "Name"

A property name is a version of the property label that is a valid name as per the production rule for Name in the XML W3C Recommendation , in the stated language.