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Part 32: Metamodel for concept system registration

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Foreword

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This document was prepared by Joint Technical Committee ISO/IEC/JTC 1, *Information technology*, Subcommittee SC 32, *Data management and interchange*.

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Introduction

ISO/IEC 11179-3 specifies the structure of a Metadata Registry (MDR) and provides a metamodel for registry common facilities. That metamodel is intended to be extended by other parts of ISO/IEC 11179 for specific purposes.

This first edition of ISO/IEC 11179-32, is part of a restructuring of ISO/IEC 11179-3:2013, which has now been broken into multiple parts. This document provides a metamodel for registering metadata about concept systems and binary relations in a Metadata Registry (MDR), as extensions to the registry metamodel specified in ISO/IEC 11179-3.

In Clauses 7 and 8, this document uses:

— **bold** font to highlight terms which represent metadata objects specified by the metamodel;

— normal text for terms which represent concepts defined in Clause 3.

EXAMPLE **Concept** (7.2.2.1) is a class each instance of which models a concept.

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Information technology — Metadata registries (MDR) —

Part 32:
Metamodel for concept system registration

1 Scope

This document provides a specification for an extension to a metadata registry (MDR), as specified in ISO/IEC 11179-3:2023, in which metadata that describes concept systems can be registered.

The specification in this document, together with the relevant clauses of the specification in ISO/IEC 11179-3, provides the ability to record the following metadata:

— concept systems and associated concepts;

— relations among concepts in a concept system;

— assertions about concepts in a concept system.

The metamodel in this document is intended to support the full description of a concept system, including ontologies.

Where there is a requirement to register an ontology where the details are defined elsewhere, consider using ISO/IEC 19763-3[8] instead.

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/IEC 11179-3:2023, *Information technology — Metadata registries (MDR) — Part 3: Metamodel for registry common facilities*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO/IEC 11179-3 and the following 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
concept
unit of knowledge created by a unique combination of characteristics

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.

Note 2 to entry: This is the concept “concept” as used and designated by the term “concept” in terminology work. It is a very different concept from that designated by other domains such as industrial automation or marketing.

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Note 3 to entry: A concept is independent of its representation.

[SOURCE: ISO 1087:2019, 3.2.7, modified — Reference to definition of *characteristics* removed. Note 3 to entry added.]

3.2
concept system
system of concepts
set of *concepts* (3.1) structured in one or more related domains according to the *concept relations* (3.3) among its concepts

[SOURCE: ISO 1087:2019, 3.2.28]

3.3
relation
concept relation
sense in which *concepts* (3.1) may be connected, via constituent *relation roles* (3.4)

EXAMPLE Causality is a relation with two constituent roles: cause and effect.

Note 1 to entry: The related concepts may be general or individual concepts.

3.4
relation role
role (3.5) that a *concept* (3.1) plays in a *relation* (3.3)

3.5
role
specified responsibilities

3.6
link
member of a *relation* (3.3)

3.7
link end
end of a *link* (3.6), identifying the *relation role* (3.4) played by a *concept* (3.1) in the link

3.8
binary relation
relation (3.3) with *arity* (3.9) equal to 2 (i.e. whose members all have two ends)

Note 1 to entry: Most common semantic relations are binary, e.g. “equals”, “less than”, “greater than”, “is part of”, etc. An example of a relation which is not binary is “betweenness” (e.g. A is between B and C.).

3.9
arity
number of arguments that a function takes

3.10
reflexivity
characterization of a *binary relation* (3.8) as reflexive, irreflexive or antireflexive

Note 1 to entry: A binary relation, R, is reflexive if for all x, R(x,x) is true. Equality is an example of a reflexive relation.

Note 2 to entry: A binary relation, R, is irreflexive if it is not reflexive. i.e., R(x,x) is not necessarily true for all x.

Note 3 to entry: A binary relation, R, is antireflexive if for all x, R(x,x) is false. Inequality is an example of an antireflexive relation. An antireflexive relation is also irreflexive, but antireflexive is a more specific characterization.

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3.11
symmetry
characterization of a *binary relation* (3.8) as symmetric, asymmetric or antisymmetric

Note 1 to entry: A binary relation, R, is symmetric if for all x, y: R(x,y) implies R(y,x).

EXAMPLE 1 Symmetric relations include: “equals”, “not equals”, “within-2-miles-of”, etc.

Note 2 to entry: Symmetry does not imply *reflexivity* (3.18).

EXAMPLE 2 the “inequality” relation is symmetric, but antireflexive.

Note 3 to entry: A binary relation, R, is asymmetric if for all x,y: R(x,y) does not imply R(y,x).

EXAMPLE 3 Asymmetric relations include: “less than”, “likes”, “father of”, etc.

Note 4 to entry: A binary relation, R, is anti-symmetric if for all x,y: R(x,y) implies not R(y,x). An antisymmetric relation is also asymmetric, but antisymmetric is a more specific characterization.

EXAMPLE 4 “less than” is an antisymmetric relation.

Note 5 to entry: An asymmetric relation is not necessarily antisymmetric.

EXAMPLE 5 Less than or equals.

3.12
transitivity
characterization of a *binary relation* (3.8) as: transitive, intransitive or antitransitive

Note 1 to entry: A binary relation, R, is transitive, if for all x,y,z: R(x,y) and R(y,z) implies R(x,z). Examples of transitive relations include equality, less than and less than or equals.

Note 2 to entry: A binary relation, R, is intransitive if it is not transitive i.e. R(x,y) and R(y,z) does not imply R(x,z).

Note 3 to entry: A binary relation, R, is antitransitive if for all x,y,z: R(x,y) and R(y,z) implies not R(x,z).

Note 4 to entry: An antitransitive relation is also intransitive, but antitransitive is a more specific characterization.

3.13
object
anything perceivable or conceivable

Note 1 to entry: Objects can be material (e.g. “engine”, “sheet of paper”, “diamond”), immaterial (e.g. “conversion ratio”, “project plan”) or imagined (e.g. “unicorn”, “scientific hypothesis”).

[SOURCE: ISO 1087:2019, 3.1.1]

3.14
property
feature of an *object* (3.13)

EXAMPLE 1 “Being made of wood” as a property of a given “table”.

EXAMPLE 2 “Belonging to person A” as a property of a given “pet”.

EXAMPLE 3 “Having been formulated by Einstein” as a property of the equation “$E = mc^2$”.

EXAMPLE 4 “Being compassionate” as a property of a given “person”.

EXAMPLE 5 “Having a given cable” as a property of a given “computer mouse”.

Note 1 to entry: One or more objects can have the same property.

[SOURCE: ISO 1087:2019, 3.1.3]

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3.15
characteristic
abstraction of a *property* (3.14)

EXAMPLE "Having a cable for connecting with a computer" as a characteristic of the concept "cord mouse".

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

[SOURCE: ISO 1087:2019, 3.2.1]

3.16
notation
formal syntax and associated semantics for the representation of information

EXAMPLE UML,[5],[6],[7] MOF, OCL, OWL[11]/RDF,[12] SKOS,[13] CGIF,[9] XCL,[9] XTM[17] or ISO/IEC 11404[4]

Note 1 to entry: A formal syntax consists of a set of symbols and the rules for their use.

Note 2 to entry: Formal syntax is often intended for machine processing.

[SOURCE: ISO/IEC 11179-3:2023, 3.2.36]

3.17
assertion
sentence or proposition in logic which is asserted (or assumed) to be true

3.18
cardinality
number of elements in a set

Note 1 to entry: cf. *multiplicity* (3.19)

Note 2 to entry: Adapted from ISO/IEC 19501:2005,[5] Glossary.

3.19
multiplicity
specification of the range of allowable *cardinalities* (3.18) that a set may assume

Note 1 to entry: Multiplicity specifications may be given for roles within *associations* (ISO/IEC 11179-3:2023, 3.1.5)

Note 2 to entry: A multiplicity is a (possibly infinite) subset of the nonnegative integers

Note 3 to entry: Adapted from ISO/IEC 19501:2005,[5] Glossary.

3.20
taxonomy
type of hierarchy which deals with generalization/specialization relationships

Note 1 to entry: cf. *meronomy* (3.21)

3.21
meronomy
type of hierarchy which deals with part-whole relationships

Note 1 to entry: cf. *taxonomy* (3.20)

4 Abbreviated terms

CD	Conceptual Domain
CL[9]	Common Logic

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