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Partie 31: Métamodèle pour l'enregistrement des spécifications de données

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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

In ISO/IEC 11179-3, the structure of a Metadata Registry is specified in the form of a conceptual data model. ISO/IEC 11179-3 specifies a metamodel for "registry common facilities", which is intended to be extended by other parts of ISO/IEC 11179 for specific purposes.

This document provides a specification of the extensions to the registry metamodel specified in ISO/IEC 11179-3 to enable the registration of metadata about data elements and associated concepts, such as "data element concepts", "conceptual domains" and "value domains". Generically, these are all referred to as "metadata items". Such metadata are necessary to clearly describe, record, analyse, classify and administer data.

This document is part of the 4th edition modularization of the ISO/IEC 11179 series. It extracts the Data Description package from ISO/IEC 11179-3:2013 to make it more accessible and renames it "Metamodel for data specification registration". At the same time, some enhancements have been made as follows:

— support for externally defined "reference enumerated conceptual domains" (7.4.2.6) and "reference enumerated value domains" (7.4.2.13);

— support for sub-setting of value domains (7.7) and conceptual domains (7.8) within a specified context;

— support for composite data elements and data types (7.9);

— finer-grained conformance options (see 5.3);

— relaxation of some constraints in the standard, while giving registration authorities the ability to enforce them if they wish (see 6.5).

From Clause 5 onwards, this document uses:

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

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

EXAMPLE **Conceptual_Domain** (7.2.2.2) is a class each instance of which models a conceptual domain.

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Information technology — Metadata registries (MDR) —

Part 31:
Metamodel for data specification registration

1 Scope

This document provides a specification for an extension to a Metadata Registry (MDR), as specified in ISO/IEC 11179-3, in which metadata that describes data elements and associated concepts, such as "data element concepts", "conceptual domains" and "value domains" 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 metadata about:

a) data elements, units of measure and derivation rules;

b) data element concepts and associated object classes and properties;

c) conceptual domains, conceptual domain subsets and value meanings;

d) value domains, value domain subsets, datatypes and permissible values.

This document is applicable to the formulation of data representations, concepts, meanings and relationships to be shared among people and machines, independent of the organization that produces the data. It is not applicable to the physical representation of data as bits and bytes at the machine level.

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
object class
set of ideas, abstractions or things in the real world that are identified with explicit boundaries and meaning and whose properties and behaviour follow the same rules

3.2
property
quality common to all members of an *object class* (3.1)

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3.3
characteristic
abstraction of a *property* (3.2)

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* (3.4).

[SOURCE: ISO 1087:2019, 3.2.1]

3.4
concept
unit of knowledge created by a unique combination of *characteristics* (3.3)

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: A concept is independent of its representation.

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

3.5
conceptual domain
CD
concept (3.4) whose meaning is expressed as an enumerated set, a description of subordinate concepts or both, which are *value meanings* (3.10)

3.6
described conceptual domain
conceptual domain (3.5) that is specified by a description or specification, such as a rule, a procedure or a range (i.e. interval)

3.7
enumerated conceptual domain
conceptual domain (3.5) that is specified by a list of all its *value meanings* (3.10)

Note 1 to entry: No ordering of the value meanings is implied.

3.8
local enumerated conceptual domain
enumerated conceptual domain (3.7) whose *value meanings* (3.10) are enumerated locally within the registry

Note 1 to entry: c.f. *reference enumerated conceptual domain* (3.11).

3.9
local enumerated conceptual domain subset
subset of the *value meanings* (3.10) in a *local enumerated conceptual domain* (3.8) used to restrict the value meanings a *data element concept* (3.25) can assume in a particular context

3.10
value meaning
semantic content of a value

Note 1 to entry: The representation of value meanings in a *registry* (3.36) shall be independent of (and shall not constrain) their representation in any corresponding *value domain* (3.13).

3.11
reference enumerated conceptual domain
enumerated conceptual domain (3.7) that is specified by a formal definition

Note 1 to entry: The definition may reference externally enumerated *value meanings* (3.10).

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3.12
enumerated conceptual domain definition
formal definition of an *enumerated conceptual domain* (3.7)

Note 1 to entry: The definition may reference externally enumerated *value meanings* (3.10).

3.13
value domain
VD
set of *permissible values* (3.19)

Note 1 to entry: The *value domain* provides representation but has no implication as to what *data element concept* (3.25) the values are associated with nor what the values mean.

Note 2 to entry: The *permissible values* can either be enumerated, expressed via a description, or a combination of the two.

3.14
described value domain
value domain (3.13) that is specified by a description or specification, such as a rule, a procedure or a range (i.e. interval)

3.15
enumerated value domain
value domain (3.13) that is specified by a list of all its *permissible values* (3.19)

Note 1 to entry: No ordering of the permissible values is implied.

3.16
local enumerated value domain
enumerated value domain (3.15) whose *permissible values* (3.19) are stored within the registry

Note 1 to entry: c.f. *reference enumerated value domain* (3.18).

3.17
local enumerated value domain subset
subset of the *permissible values* (3.19) in a *local enumerated value domain* (3.16) used to restrict the value meanings a *data element* (3.23) can assume in a particular context

3.18
reference enumerated value domain
enumerated value domain (3.15) that is specified by reference to an external specification, including externally enumerated *permissible values* (3.19)

3.19
permissible value
designation of a *value meaning* (3.10)

Note 1 to entry: Permissible values may be specified either as part of a *value domain* (3.13) or only associated with a *value meaning* (3.10).

Note 2 to entry: Within a value domain, permissible values can either be enumerated, expressed via a description, or a combination of the two.

Note 3 to entry: Explicit mapping of a single permissible value to a single value meaning is possible only when both the value meaning and permissible value are enumerated, e.g. for code sets. For described permissible values, it is possible for the described meaning to be associated with a range of values, e.g. weight in kilograms.

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3.20
data
re-interpretable representation of information in a formalized manner suitable for communication, interpretation or processing

Note 1 to entry: Data can be processed by humans or by automatic means.

[SOURCE: ISO/IEC 2382:2015, 2121272, modified — Notes to entry 2 and 3 deleted.]

3.21
datatype
set of distinct values, characterized by properties of those values and by operations on those values

[SOURCE: ISO/IEC 11404:2007, 3.12]

3.22
datatype scheme
source of the specification of one or more *datatypes* (3.21)

[SOURCE: ISO/IEC 11404:2007, 3.12]

3.23
data element
⟨organization of data⟩ unit of *data* (3.20) that is considered in context to be indivisible

Note 1 to entry: The definition states that a data element is "indivisible" in some context. This means that it is possible that a data element considered indivisible in one context (e.g. telephone number) may be divisible in another context, (e.g. country code, area code, local number).

EXAMPLE The data element "age of a person" with values consisting of all combinations of 3 decimal digits.

[SOURCE: ISO/IEC 2382:2015, 2121599, modified — Example moved to the end without the Note to entry prefix. Other Notes to entry have been replaced.]

3.24
data element collection
one or more *data elements* (3.23) that may be unordered or ordered

Note 1 to entry: Examples of unordered collections are a set or a bag (or multiset). An example of an ordered collection is a list.

3.25
data element concept
concept (3.4) that can be represented in the form of a *data element* (3.23), described independently of any particular representation

Note 1 to entry: A data element concept is implicitly associated with both the property and the object class whose combination it expresses.

Note 2 to entry: A data element concept may also be associated with zero, one or more *conceptual domains* (3.5) each of which expresses its *value meanings* (3.10).

Note 3 to entry: A data element concept may also be associated with zero, one or more *data elements* (3.23) each of which provide representation for the data element concept via its associated *value domain* (3.13).

3.26
data element derivation
application of a *data element derivation rule* (3.28) to one or more input *data elements* (3.23) to derive one or more output data elements

3.27
data element example
representative illustration of a *data element* (3.23)

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3.28
data element derivation rule
logical, mathematical, other operations or some combination specifying derivation

3.29
dimensionality
set of equivalent *units of measure* (3.33)

Note 1 to entry: Equivalence between two units of measure is determined by the existence of a quantity preserving one-to-one correspondence between values measured in one unit of measure and values measured in the other unit of measure, independent of context, and where characterizing operations are the same.

Note 2 to entry: The equivalence defined here forms an equivalence relation on the set of all units of measure. Each equivalence class corresponds to a dimensionality. The units of measure "temperature in degrees Fahrenheit" and "temperature in degrees Celsius" have the same dimensionality, because:

a) given a value measured in degrees Fahrenheit there is a value measured in degrees Celsius with the same quantity, and vice-versa, by the well-known correspondences ºC = (5/9)*(ºF - 32) and ºF = (9/5)*(ºC) + 32.

b) the same operations can be performed on both values.

Note 3 to entry: The units of measure "temperature in degrees Celsius" and "temperature in kelvins" do not belong to the same dimensionality. Even though it is easy to convert quantities from one unit of measure to the other (°C = K - 273,15 and K = °C + 273,15), the characterizing operations in kelvins include taking ratios, whereas this is not the case for degrees Celsius. For instance, 20 K is twice as warm as 10 K, but 20 °C is not twice as warm as 10 °C.

Note 4 to entry: Units of measure are not limited to physical categories. Examples of physical categories are: linear measure, area, volume, mass, velocity, time duration. Examples of non-physical categories are: currency, quality indicator, colour intensity.

Note 5 to entry: Quantities may be grouped together into categories of quantities which are mutually comparable. Lengths, diameters, distances, heights, wavelengths and so on would constitute such a category. Mutually comparable quantities have the same dimensionality. ISO 80000-1[13] calls these “quantities of the same kind”.

Note 6 to entry: ISO 80000-1 specifies physical dimensions (e.g. length, mass, velocity). This document also permits non-physical dimensions (e.g. value dimensions such as: currency, quality indicator). The present concept of dimensionality equates to what ISO 80000-1 calls Dimensional Product, rather than to Dimension.

3.30
measure class
set of equivalent *units of measure* (3.33) for association with one or more *dimensionalities* (3.29)

3.31
coordinate
measurement from the origin of a frame of reference

3.32
notation
formal syntax and associated semantics

EXAMPLE UML, MOF, OCL, OWL/RDF, SKOS, CGIF, XCL, XTM or ISO/IEC 11404

Note 1 to entry: Formal syntax is often intended for machine processing.

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

3.33
unit of measure
⟨value domain⟩ actual units in which the associated values are measured

Note 1 to entry: ISO 80000-1[13] specifies a system of physical measurement (the International System of Units, SI). Physical measurement is only one type of measurement. Value measurement is another type of measurement. This document permits the use of any appropriate system of measurement.

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Note 2 to entry: The *dimensionality* (3.29) of the associated *conceptual domain* (3.5) shall be appropriate for the specified *unit of measure*.

3.34
unit of measure dimensionality
dimensionality (3.29) that specifies the equivalence relation that applies to all values representing a particular unit

3.35
quantity
value associated with a *unit of measure* (3.33)

Note 1 to entry: 32º Fahrenheit and 0º Celsius are quantities, and they are equivalent values in different measuring systems.

3.36
registry
information system for *registration* (3.37)

[SOURCE: ISO/IEC 11179-1:2023, 3.2.34]

3.37
registration
set of rules, operations and procedures for inclusion of an item in a *registry* (3.36)

Note 1 to entry: A detailed description of registration as it applies in ISO/IEC 11179 is found in ISO/IEC 11179-6.

[SOURCE: ISO/IEC 11179-1:2023, 3.2.88]

4 Abbreviated terms

CD	conceptual domain
DE	data element
DEC	data element concept
UML	Unified Modeling Language
URI	Universal Resource Identifier
VD	value domain
XML	eXtensible Markup Language

5 Conformance

5.1 Overview of conformance

Conformance rules for a metadata registry are specified in ISO/IEC 11179-3:2023, Clause 4. The subclause “Degree of conformance” is repeated here for convenience. The subsequent subclauses extend the rules from ISO/IEC 11179-3.

5.2 Degree of conformance

5.2.1 General

The distinction between “strictly conforming” and “conforming” implementations is necessary to address the simultaneous needs for interoperability and extensions. This document describes

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