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Information technology — Metadata registries (MDR) —

Part 1: **Framework**

Technologies de l'information — Registres de métadonnées (RM) — Partie 1: Cadre de référence

Reference number
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Foreword

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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).

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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*.

This fourth edition cancels and replaces the third edition (ISO/IEC 11179-1:2015), which has been technically revised.

The main changes are as follows:

— some of the detailed descriptions from the Introduction and Clause 5 have been removed to avoid duplication with other parts;

— Clause 7 has been updated to:

  — revise the description for ISO/IEC 11179-3 to reflect its focus on the core metamodel of a metadata registry, and the creation of separate parts to handle other aspects;

  — add a description for ISO/IEC 11179-30;

  — add a description for ISO/IEC 11179-31;

  — add a description for ISO/IEC 11179-32;

  — add a description for ISO/IEC 11179-33;

  — add a description for ISO/IEC 11179-34;

  — add a description for ISO/IEC 11179-35;

— Clause 8 has been added to describe the relationship of other ISO/IEC JTC 1/SC 32 standards on metadata to the ISO/IEC 11179 series;

— references to other standards have been updated, especially ISO 1087, to the latest edition.

A list of all parts in the ISO/IEC 11179 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

The ISO/IEC 11179 series addresses the semantics of data, the representation of data and the registration of the descriptions of that data. It is through these descriptions that an accurate understanding of the semantics and a useful depiction of the data are found.

The purposes of ISO/IEC 11179 are to promote the following:

— standard description of data;

— common understanding of data across organizational elements and between organizations;

— re-use and standardization of data over time, space, and applications;

— harmonization and standardization of data within an organization and across organizations;

— management of the components of descriptions of data;

— re-use of the components of descriptions of data.

Each part of ISO/IEC 11179 is devoted to addressing a different aspect of these needs, as described in Clause 7.

Generally, descriptive data are known as metadata. Metadata can describe books, phone calls, data, etc. ISO/IEC 11179 focuses upon metadata that describe data.

A metadata registry (MDR) is a system for maintaining a database of metadata. Registration is one possible function of that system. Registration accomplishes three main goals: identification, provenance, and monitoring quality. Identification is accomplished by assigning a unique identifier (within the registry) to each object registered there. Provenance addresses the source of the metadata and the object described. Monitoring quality ensures that the metadata does the job it is designed to do.

An MDR may contain the semantics of data. An understanding of data is fundamental to their design, harmonization, standardization, use, re-use and interchange. The underlying model for an MDR is designed to capture all the basic components of the semantics of data, independent of any application or subject matter area.

MDRs, typically, are organized so that those designing applications can ascertain whether a suitable object described in the MDR already exists. Where it is established that a new object is essential, its derivation from an existing description with appropriate modifications is encouraged, thus avoiding unnecessary variations in the way similar objects are described. Registration will also allow two or more administered items describing identical objects to be identified, and more importantly, it will help to identify situations where similar or identical names are in use for administered items that are significantly different in one or more respects.

The names, definitions, datatype and related attributes that are associated with the description of an object in an MDR give that object meaning. The depth of this meaning is limited, because names and definitions convey limited information about the object. The relationships object descriptions have with semantically related object descriptions in a registry provide additional information, but this additional information is dependent on how many semantically related object descriptions there are.

A metadata registry that conforms to ISO/IEC 11179 can describe a wide variety of data. In fact, the attributes described in ISO/IEC 11179 are data elements, and they can be registered in an ISO/IEC 11179 metadata registry. Moreover, any set of descriptors or metadata attributes may be interpreted as data elements and registered in the metadata registry.

There are two main consequences to this:

— the metadata registry can describe itself;

— metadata layers or levels are not defined in ISO/IEC 11179.

As a result, ISO/IEC 11179 is a general description framework for data of any kind, in any organization and for any purpose. ISO/IEC 11179 does not address other data management needs, such as data models, application specifications, programming code, program plans, business plans and business policies. These need to be addressed elsewhere. ISO/IEC 19763 specifies facilities to extend a metadata registry so that information about models can be registered. Such models include information (or data) models, ontologies, process models, role and goal models, and form designs.

The increased use of data processing and electronic data interchange heavily relies on accurate, reliable, controllable and verifiable data recorded in databases. One of the prerequisites for a correct and proper use and interpretation of data is that both users and owners of data have a common understanding of the meaning and descriptive characteristics (e.g. representation) of that data, guaranteed by the definition of several basic attributes.

The basic attributes specified are applicable for the definition and specification of the contents of data dictionaries and interchanging or referencing among various collections of administered items. The "basic" in basic attributes means that the attributes are commonly needed in specifying administered items completely enough to ensure that they will be applicable for a variety of functions, such as:

— design of information processing systems;

— retrieval of data from databases;

— design of messages for data interchange;

— maintenance of metadata registries;

— data management;

— dictionary design;

— dictionary control;

— use of information processing systems.

Basic also implies that they are independent of any:

— application environment;

— function of an object described by an administered item;

— level of abstraction;

— grouping of administered items;

— method for designing information processing systems or data interchange messages;

— MDR system.

Basic does not imply that all attributes specified in ISO/IEC 11179 are required in all cases. Distinction is made between those attributes that are mandatory, conditional, or optional.

Information technology — Metadata registries (MDR) —

Part 1: Framework

1 Scope

This document provides the means for understanding and associating the individual parts of ISO/IEC 11179 and is the foundation for a conceptual understanding of metadata and metadata registries. This document also describes the relationship of ISO/IEC 11179 to other JTC 1/SC 32 standards, technical specifications and technical reports on metadata.

In all parts of ISO/IEC 11179, metadata refers to descriptions of data. It does not contain a general treatment of metadata.

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 704, *Terminology work — Principles and methods*

ISO 1087, *Terminology work and terminology science — Vocabulary*

3 Terms, definitions and abbreviated terms

For the purposes of this document, the terms and definitions given in ISO 704, ISO 1087 and the following 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/

3.1 Terms related to modelling constructs

3.1.1
attribute
characteristic (3.2.6) of an *object* (3.2.4) or set of objects

[SOURCE: ISO/IEC 11179-3:2023, 3.1.11]

3.1.2
class
description of a set of *objects* (3.2.4) that share the same *attributes* (3.1.1), operations, methods, *relationships* (3.1.4) and semantics

Note 1 to entry: Adapted from ISO/IEC 19505-2:2012, 7.3.7.

3.1.3
identifier
<metadata registry> sequence of characters, capable of uniquely identifying that with which it is associated, within a specified *context* (3.3.3)

Note 1 to entry: Unlike a *name* (3.2.17), an identifier is linguistically neutral.

Note 2 to entry: It is possible to define an identifier from the point of view of terminology as defined in ISO 1087 and described in ISO 704, as follows: representation of an object by a sign which denotes it, and is intended for dereferencing that object. Note the parallel with the definition of *designation* (3.2.16), except this applies to any object rather than just for concepts.

[SOURCE: ISO/IEC 11179-3:2023, 3.1.16, modified — Note 2 to entry has been added.]

3.1.4
relationship
<UML> semantic connection among model elements

[SOURCE: ISO 19103:2015, 4.30]

3.2 General terms

3.2.1
subject
area of interest or expertise

[SOURCE: ISO 1087:2019, 3.1.5]

3.2.2
domain
subject field
field of special knowledge

Note 1 to entry: The borderlines and the granularity of a domain are determined from a purpose-related point of view. If a domain is sub-divided, the result is again a domain.

[SOURCE: ISO 1087:2019, 3.1.4]

3.2.3
entity
any concrete or abstract thing that exists, did exist, or might exist, including associations among these things

EXAMPLE A 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, 2121433, modified — some Notes to entry have been deleted.]

3.2.4
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]

3.2.5
property
<terminology> feature of an *object* (3.2.4)

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.

Note 2 to entry: See also 3.3.2.

[SOURCE: ISO 1087:2019, 3.1.3, modified — Note 2 to entry added.]

3.2.6
characteristic
abstraction of a *property* (3.2.5)

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* (3.2.8).

[SOURCE: ISO 1087:2019, 3.2.1]

3.2.7
essential characteristic
characteristic (3.2.6) of a *concept* (3.2.8) which is indispensable to understanding that concept

[SOURCE: ISO 1087:2019, 3.2.3]

3.2.8
concept
unit of knowledge created by a unique combination of *characteristics* (3.2.6)

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.

Note 2 to entry: A concept is independent of its representation.

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

3.2.9
general concept
concept (3.2.8) that corresponds to a potentially unlimited number of *objects* (3.2.4), which form a group by reason of shared *properties* (3.2.5)

EXAMPLE 'planet', 'tower', 'Nobel Prize in Physics', 'moon'.

Note 1 to entry: For a general concept it is essential that a number of corresponding objects greater than 1 can be perceived or conceived of. For example 'spaceship' has been a general concept before such a material object existed, at the time when there existed only 1 such object, and later when there existed several such objects.

[SOURCE: ISO 1087:2019, 3.2.9]

3.2.10
individual concept
concept (3.2.8) which corresponds to only one *object* (3.2.4)

EXAMPLE ‘Saturn’, ‘Eiffel Tower’, 'Moon', 'serial number FRHR603928', '2016 Nobel Prize in Physics'.

Note 1 to entry: Individual concepts are represented by *proper names* (3.2.18).

[SOURCE: ISO 1087:2019, 3.2.8]

3.2.11
definition
representation of a *concept* (3.2.8) by an expression that describes it and differentiates it from related concepts

[SOURCE: ISO 1087:2019, 3.3.1]

3.2.12
extension
<terminology> set of all of the *objects* (3.2.4) to which a *concept* (3.2.8) corresponds

Note 1 to entry: This term has a different meaning in ISO/IEC 11179-3.

[SOURCE: ISO 1087:2019, 3.1.2, modified — Note 1 to entry added.]

3.2.13
intension
set of *characteristics* (3.2.6) that make up a *concept* (3.2.8)

[SOURCE: ISO 1087:2019, 3.2.6]

3.2.14
concept relation
relation between two *concepts* (3.2.8)

[SOURCE: ISO 1087:2019, 3.2.11]

3.2.15
concept system
set of *concepts* (3.2.8) structured in one or more related *domains* (3.2.2) according to the *concept relations* (3.2.14) among its concepts

[SOURCE: ISO 1087:2019, 3.2.28]

3.2.16
designation
designator
representation of a *concept* (3.2.8) by a sign which denotes it in a *domain* (3.2.2) or *subject* (3.2.1)

Note 1 to entry: A designation can be linguistic or non-linguistic. It can consist of various types of characters, but also punctuation marks such as hyphens or parentheses, governed by domain-, subject-, or language specific conventions.

Note 2 to entry: A designation can be a *term* (3.2.19) including *appellations* (3.2.20), a *proper name* (3.2.18) or a *symbol* (3.2.21).

[SOURCE: ISO 1087:2019, 3.4.1]

3.2.17
name
designation (3.2.16) of an *object* (3.2.4) by a linguistic expression

[SOURCE: ISO/IEC 15944-1:2011, 3.35]

3.2.18
proper name
designation (3.2.16) that represents an *individual concept* (3.2.10)

[SOURCE: ISO 1087:2019, 3.4.4]

3.2.19
term
designation (3.2.16) that represents a *general concept* (3.2.9) by linguistics means

EXAMPLE "laser printer", "planet", "pacemaker", "chemical compound", "¾ time", "Influenza A virus", "oil painting".

Note 1 to entry: Terms may be partly or wholly verbal.

[SOURCE: ISO 1087:2019, 3.4.2, modified — EXAMPLE changed to EXAMPLES.]

3.2.20
appellation
term (3.2.19) that is applied to a group of *objects* (3.2.4) whose relevant *properties* (3.2.5) are identical

EXAMPLE "Nokia 7 Plus®" (mobile phone), “Adobe® Acrobat® X Pro” (software), “Road King®” (motorcycle)[1)]

[SOURCE: ISO 1087:2019, 3.4.3]

3.2.21
symbol
designation (3.2.16) that represents a *concept* (3.2.8) by non-linguistic means

Note 1 to entry: There are several types of symbols such as graphical symbols [see ISO 3864 (all parts)] and letter symbols [see ISO 80000[35] (all parts)].

[SOURCE: ISO 1087:2019, 3.4.5]

3.2.22
terminological system
concept system (3.2.15) with *designations* (3.2.16) for each *concept* (3.2.8)

3.2.23
data
reinterpretable 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.

Note 2 to entry: Data can also be described using the terminological notions defined in ISO 1087 and the computational notions defined in ISO/IEC 11404. A datum is a designation of a concept with a notion of equality defined for that concept.

[SOURCE: ISO/IEC 2382:2015, 2121272 — Notes to entry have been modified.]

3.2.24
data model
graphical, lexical or combined representation of *data* (3.2.23), specifying their *properties* (3.2.5), structure, and interrelationships

3.2.25
conceptual model
conceptual data model
data model (3.2.24) that represents an abstract view of the real world

Note 1 to entry: A conceptual model represents the human understanding of a system, which can be anywhere from a paper-based system to a complex database in an IT system.

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3.2.26
metadata
data (3.2.23) that define and describe other data

3.2.27
metamodel
data model (3.2.24) that specifies one or more other models, such as data models, process models, ontologies, etc.

3.2.28
metadata object
object type defined by a *metamodel* (3.2.27)

Note 1 to entry: In all parts of ISO/IEC 11179, this term is applied only to metadata objects described by the metamodels in those parts of ISO/IEC 11179 which specify potential registry content, including *data elements* (3.3.4) in ISO/IEC 11179-31, *concept systems* (3.2.15) in ISO/IEC 11179-32, data sets in ISO/IEC 11179-33, computable data in ISO/IEC 11179-34, and models in ISO/IEC 11179-35.

Note 2 to entry: The term also applies to metadata objects described by the metamodels in the various parts of ISO/IEC 19763, which build upon the metamodel in ISO/IEC 11179-3.

[SOURCE: ISO/IEC 11179-3:2023, 3.2.31]

3.2.29
metadata item
instance of a *metadata object* (3.2.28) in a *metadata registry* (3.2.31)

Note 1 to entry: In all parts of ISO/IEC 11179, this term is applied only to instances of metadata objects described by the metamodels in parts of ISO/IEC 11179 which specify potential registry content, including *data elements* (3.3.4) in ISO/IEC 11179-31, *concept systems* (3.2.15) in ISO/IEC 11179-32, data sets in ISO/IEC 11179-33, computable data in ISO/IEC 11179-34, and models in ISO/IEC 11179-35.

Note 2 to entry: The term also applies to instances of metadata objects described by the metamodels in the various parts of ISO/IEC 19763, which build upon the metamodel in ISO/IEC 11179-3.

Note 3 to entry: A metadata item has associated *attributes* (3.1.1), as appropriate for the *metadata object* it instantiates.

[SOURCE: ISO/IEC 11179-3:2023, 3.2.58]

3.2.30
basic attribute
attribute (3.1.1) of a *metadata item* (3.2.29) commonly needed in its specification

3.2.31
metadata registry
MDR
information system for registering *metadata* (3.2.26)

3.2.32
registry metamodel
metamodel (3.2.27) specifying a *metadata registry* (3.2.31)

3.2.33
registration
set of rules, operations, and procedures for inclusion of an item in a *registry* (3.2.34)

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

3.2.34
registry
information system for *registration* (3.2.32)

3.2.35
registry item
item recorded in a *registry* (3.2.34)

Note 1 to entry: A *registry item* is recorded in the *registry*, but is not necessarily identified, named, defined, classified, registered or administered. Specific information needs to be provided for each of these categories which might or might not be provided when the item is initially recorded. C.f. *registered item* (3.3.20).

[SOURCE: ISO/IEC 11179-3:2023, 3.2.54]

3.2.36
stewardship
<metadata> responsibility for the maintenance of *administrative information* (3.3.22) applicable to one or more *administered items* (3.3.21)

Note 1 to entry: The responsibility for the registration of metadata may be different from the responsibility for stewardship of metadata.

[SOURCE: ISO/IEC 11179-3:2023, 3.2.102]

3.2.37
stewardship organization
organization (3.3.15) that maintains *stewardship* (3.2.36) of an *administered item* (3.3.21)

Note 1 to entry: In the second edition of ISO/IEC 11179-6, this was called *responsible organization*.

[SOURCE: ISO/IEC 11179-3:2023, 3.2.104]

3.2.38
submitting organization
submission organization
organization (3.3.15) that submits a *registry item* (3.2.35) for *registration* (3.2.32)

[SOURCE: ISO/IEC 11179-3:2023, 3.2.108]

3.2.39
data construct
object (3.2.4) that a *metadata item* (3.2.29) describes

Note 1 to entry: Individual *data elements* (3.3.4), *value domains* (3.3.9), *data element concepts* (3.3.5), *conceptual domains* (3.3.11), *object classes* (3.3.1), and *properties* (3.3.2) are data constructs.

3.3 Terms used in the 11179 metamodel

3.3.1
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

[SOURCE: ISO/IEC 11179-31:2023, 3.1]

3.3.2
property
<metamodel>quality common to all members of an *object class* (3.3.1)

Note 1 to entry: See also 3.2.5.

[SOURCE: ISO/IEC 11179-31:2023, 3.2, modified — Domain and Note 1 to entry added.]

3.3.3
context
circumstance, purpose, and perspective under which an *object* (3.2.4) is defined or used

3.3.4
data element
<organization of data> unit of *data* (3.2.23) that is considered in *context* (3.3.3) to be indivisible

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

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

[SOURCE: ISO/IEC 2382:2015, 2121599, modified — Notes to entry replaced.]

3.3.5
data element concept
DEC
concept (3.2.8) that can be represented in the form of a *data element* (3.3.4), described independently of any particular representation

Note 1 to entry: A data element concept is implicitly associated with both the *property* (3.3.2) and the *object class* (3.3.1) whose combination it expresses.

Note 2 to entry: A data element concept may also be associated with zero or more *conceptual domains* (3.3.11) each of which expresses its *value meanings* (3.3.7).

Note 3 to entry: A data element concept may also be associated with zero or more *data elements* (3.3.4) each of which provides representation for the data element concept via its associated *value domain* (3.3.9).

[SOURCE: ISO/IEC 11179-31:2023, 3.25]

3.3.6
value
<ISO 704> sign, used to represent *data* (3.2.23)

Note 1 to entry: A value is a sign as used in ISO 1087:2019 and ISO 704:2022.

Note 2 to entry: A value may be a character string, bitmap, or some other symbol.

3.3.7
value meaning
semantic content of a *value* (3.3.6)

Note 1 to entry: The representation of value meanings in a *registry* (3.2.34) shall be independent of (and shall not constrain) their representation in any corresponding *value domain* (3.3.9).

[SOURCE: ISO/IEC 11179-31:2023, 3.10]

3.3.8
datatype
named set of distinct *values* (3.3.6), characterized by properties of those values and by operations on those values

[SOURCE: ISO/IEC 11404:2007, 3.12, modified — Inserted 'named' before 'set' in the definition.]

3.3.9
value domain
VD
set of *permissible values* (3.3.10)

Note 1 to entry: The *value domain* provides representation but has no implication as to what *data element concept* (3.3.5) the values might be 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.

[SOURCE: ISO/IEC 11179-31:2023, 3.13]

3.3.10
permissible value
designation (3.2.16) of a *value meaning* (3.3.7)

Note 1 to entry: Permissible values may be specified either as part of a *value domain* (3.3.9) or only associated with a *value meaning* (3.3.7).

Note 2 to entry: Within a value domain, permissible values may either be enumerated or described.

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, the described meaning might be associated with a range of values, e.g. weight in kilograms.

Note 4 to entry: As a *designation*, the value is the sign and the *value meaning* is the *concept* (3.2.8).

[SOURCE: ISO/IEC 11179-31:2023, 3.19, modified — Note 4 to entry added.]

3.3.11
conceptual domain
CD
concept (3.2.8) whose meaning is expressed as an enumerated set, a description of subordinate concepts or both, which are *value meanings* (3.3.7)

[SOURCE: ISO/IEC 11179-31:2023, 3.5]

3.3.12
classification scheme
descriptive information for an arrangement or division of *objects* (3.2.4) into groups based on criteria such as *characteristics* (3.2.6), which the objects have in common

Note 1 to entry: A classification scheme is a *concept system* (3.2.15) used for classifying some objects.

EXAMPLE Origin, composition, structure, application, function, etc.

[SOURCE: ISO/IEC 11179-3:2023, 3.2.5.]

3.3.13
classification scheme item
CSI
item of content in a *classification scheme* (3.3.12)

Note 1 to entry: This may be a node in a taxonomy or ontology, a term in a thesaurus, etc.

[SOURCE: ISO/IEC 11179-3:2023, 3.2.6.]

3.3.14
representation class
classification of types of representations

3.3.15
organization
unique framework of authority within which a person or persons act, or are designated to act, towards some purpose

[SOURCE: ISO/IEC 6523-1:1998, 3.1, modified — Edited to conform to ISO/IEC Directives, and NOTE with examples deleted.]

3.3.16
registration authority
RA
organization (3.3.15) responsible for maintaining a register

[SOURCE: ISO/IEC 11179-3:2023, 3.2.92]

3.3.17
registration authority identifier
RA identifier
identifier (3.1.3) assigned to a *registration authority* (3.3.16)

[SOURCE: ISO/IEC 11179-3:2023, 3.2.93]

3.3.18
registrar
representative of a *registration authority* (3.3.16)

[SOURCE: ISO/IEC 11179-3:2023, 3.2.90]

3.3.19
identified item
registry item (3.2.35) identified in a *registry* (3.2.31)

[SOURCE: ISO/IEC 11179-3:2023, 3.2.61]

3.3.20
registered item
identified item (3.3.19) that is recorded and managed in a *registry* (3.2.34)

[SOURCE: ISO/IEC 11179-3:2023, 3.2.65, modified — Notes to entry deleted.]

3.3.21
administered item
registered item (3.2.20) for which *administrative information* (3.3.22) is recorded

[SOURCE: ISO/IEC 11179-3:2023, 3.2.66]

3.3.22
administrative information
<registry> information about the administration of an item in a *registry* (3.2.34)

EXAMPLE Creation date, last change date, origin, change description, explanatory comment.

[SOURCE: ISO/IEC 11179-3:2023, 3.2.67]

3.3.23
administrative status
designation (3.2.16) of the status in the administrative process of a *registration authority* (3.3.16) for handling registration requests

Note 1 to entry: The values and associated meanings of “administrative status” are determined by each *registration authority*. C.f. *registration status* (3.3.24).

[SOURCE: ISO/IEC 11179-3:2023, 3.2.71]

3.3.24
registration status
designation (3.2.16) of the status in the registration life-cycle of an *administered item* (3.3.21)

Note 1 to entry: Designation values are specified in ISO/IEC 11179-3:2023, 9.6.1 and described more fully in ISO/IEC 11179-6:2023, 4.3.2.

[SOURCE: ISO/IEC 11179-3:2023, 3.2.70]

3.3.25
version
unique form differing in certain aspects from an earlier or later form

3.4 Abbreviated terms

API	application programming interface
ASN.1	abstract syntax notation 1
BFO	basic formal ontology
BMM	business motivation model (see Reference [39])
BPMN	business process model and notation (see Reference [40])
CIR	coding-independent representation
CL	common logic
CSR	coding-specific representation
DDL	database definition language
DIVP	dotted identifier value pair
DOLCE	descriptive ontology for linguistic and cognitive engineering (see Reference [43])
EPC	event-driven process chain (see Reference [45])
GPD	general purpose datatypes
HTML	hyper text markup language
HTTP	hyper text transfer protocol
IDEF1X	integration definition for information modeling (see Reference [47])
JSON	JavaScript object notation
KAOS	keep all objects satisfied (see Reference [37])
MDR	metadata registry
MFI	metamodel framework for interoperability
NFRF	non-functional requirement framework (see Reference [42])
NIAM	natural language information analysis method
OPI	organization part identifier
ORM	object role modeling
OWL	web ontology language
OWL-S	semantic markup for web services (see Reference [48])
RA	registration authority
RGPS	role and goal, process, and service (see 8.1.9)
RM-ODP	reference model of open distributed processing (see Reference [27])
SA-REST	semantic annotation of web resources (see Reference [49])
SAWSDL	semantic annotation for WSDL and XML Schema (see Reference [50])
SSADM	structured systems analysis and design method (see Reference [38])
SWRL	semantic web rule language (see Reference [51])
SWSL	semantic web service language (see Reference [52])
TLO	top-level ontology
UML	unified modeling language (see References [22] and [23])
UPU	Universal Postal Union
URI	uniform resource identifier

URL	uniform resource locator
WADL	web application description language (see Reference [53])
WebDAV	web distributed authoring and versioning
WSDL	web service description language (see Reference [54])
WSML	web service modelling language (see Reference [55])
W3C	World Wide Web Consortium
XML	extensible markup language

4 Theory of terminology

This clause describes the concepts from the theory of terminology that are used in this document. They are mostly taken from ISO 704 and ISO 1087. They provide the background and a more thorough explanation of the theory of terminology.

In the theory of terminology, an object is something conceivable or perceivable. Concepts are mental constructs, units of thought, or units of knowledge created by a unique combination of characteristics. Concepts are organized or grouped by characteristics, which are also concepts. Any concept may be a characteristic; being a characteristic is a role for a concept. Essential characteristics are indispensable to understanding a concept, and they differentiate them, though which characteristics are essential depends on context. For instance, the concept person has sex, age, marital status, educational attainment, and race/ethnicity as essential characteristics in demography; however, it has name, sex, date/time of birth, height, weight, and mother's name as essential characteristics in a birth records system. For zoology, the essential characteristics of a person are different still. Other characteristics are inessential. The sum of characteristics for a concept is called its intension. The totality of objects a concept corresponds to is its extension.

In natural language, concepts are expressed through definitions, which specify a unique intension and extension.

A designation (term, appellation or symbol) is the representation of a concept by a sign, which denotes it.

A general concept has two or more objects that correspond to it. An individual concept has one object that corresponds to it. That is, a general concept has two or more objects in its extension, and an individual concept has one object in its extension.

A concept system is set of concepts structured according to the concept relations among them. A terminological system is a concept system with designations for each concept.

5 Metadata

5.1 General

For ISO/IEC 11179 (all parts), metadata are defined to be data that define and describe other data.

NOTE In general, metadata are descriptive data about an object; in ISO/IEC 11179 that object is "data".

This means that metadata are data, and data become metadata when they are used in this way. This happens under particular circumstances, for particular purposes, and with certain perspectives, as no data are always metadata. The set of circumstances, purposes, or perspectives for which some data are used as metadata is called the context. So, metadata are data about data in some context.

Since metadata are data, then metadata can be stored in a database and organized through the use of a model. Some models are very application specific, and others are more general. The model presented and described in ISO/IEC 11179 (particularly ISO/IEC 11179-3, ISO/IEC 11179-31, ISO/IEC 11179-32 and ISO/IEC 11179-33) is general. It is a representation of the human understanding of the metadata

needed to describe data constructs, including the relationships that exist among those metadata, and not necessarily how the metadata will be represented in an application of an MDR. A model of this kind is called a conceptual model. Conceptual models are meant for people to read and understand.

Models that describe metadata are often referred to as metamodels. The conceptual model presented in ISO/IEC 11179-3 is a metamodel in this sense.

Further description of metadata is provided in ISO/IEC TR 19583-1 (see 8.5.2).

5.2 Concepts

5.2.1 General

Several data constructs used in ISO/IEC 11179 are concepts. They are: data element concept, object class, property, conceptual domain and value meaning. These are discussed in more detail in 5.3.

The semantics of data come from the concepts used in their descriptions. The meanings of all the concepts used to describe a datum are combined into a story, sometimes called a fact. This is equivalent to the information conveyed by some datum.

As ISO/IEC 11179-5 describes, the names for data elements, which may convey some of the semantics of their underlying data, can be constructed from the designations of their constituent concepts. So, for some datum, the story it conveys might be written as "The temperature in Washington, DC at the bottom of the Washington Monument on 14 June 2013 at 1600 ET was 25 °C". The designations of concepts (temperature; Washington, DC; Washington Monument, 1600 ET, and 25 °C) are interspersed with English words to create a sentence, which contains the story.

Finally, the relationships some concepts have with others, as defined in a concept system, add semantics to data. For instance, the concept of a temperature measurement is different if it is a measure of the kinetic activity of molecules of air in some location on Earth versus a measure of ambient infrared radiation in inter-planetary space between Jupiter and Saturn. In both cases, instances of temperature are ultimately measures of infrared radiation, but they are obtained far differently. The temperature of air is directly determined by the motion of molecules. There are far too few molecules in inter-planetary space for the same kind of measurement to be meaningful. A different sort of measurement is required.

5.2.2 Management

Looking across all the data elements found in an organization or across organizations, one finds many concepts that are the same. For instance, in statistical survey organizations, data are collected, and estimates produced for some population. But surveys are often conducted on a regular basis – monthly, quarterly, yearly – so the population is repeated. Moreover, many surveys might be conducted on the same population, each for its own specialized purpose. A similar situation applies in a scientific research laboratory, where in a large program, the same scientific experiments are conducted repeatedly.

Since some of the purposes of the MDR are understanding, re-use, harmonization, and standardization of data, then managing meanings is critical for those needs. In the case of re-use in particular, where the same meanings are applied in different situations, it is inefficient, error prone, redundant, and inhibitory to store one concept multiple times. If the same concept is used to describe many data elements, describe it once and re-use it.

5.3 Fundamental model of data elements

For the purposes of the ISO/IEC 11179 series, a data element comprises two parts:

— data element concept;

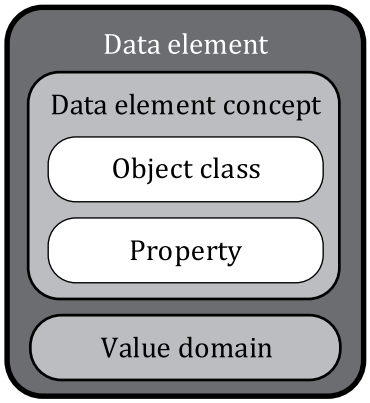
— value domain.

A data element concept also comprises two parts:

— object class;

— property.

Figure 1 illustrates the fundamental model of data elements.



NOTE If a region B is contained within the boundary of a region A, then the region A comprises the region B (and possibly others).

Figure 1 — Fundamental, informal model of a data element

The totality of objects for which data is collected and stored is the extension of an object class. Object classes are concepts, and they correspond to the notions embodied in classes in object-oriented models and entities in entity-relationship models. Examples are cars, persons, households, employees, jobs, and orders. Properties are what humans use to distinguish or describe object classes. They are characteristics, not necessarily essential ones, of the object class and form its intension. They are also concepts, and they correspond to the notions embodied in attributes (without associated datatypes) in object-oriented or entity-relationship models. Examples of properties are colour, model, sex, age, income, address, salary or price.

An object class may be a “general concept”. This happens when the totality of objects corresponding to the object class has two or more members. The examples in the previous paragraph are of this type. Record-level data are described this way. On the other hand, an object class may be an “individual concept”. This happens when the totality of objects corresponding to the object class has one member. An example is a concept corresponding to a single object, such as “the collection of all persons”. Another example is “the collection of service sector establishments”. Aggregate data are described this way. Examples of properties for these object classes are average income or total earnings, respectively.

It is important to distinguish an actual object class or property from its name. This is the distinction between concepts and their designations. Object classes and properties are concepts; their names are designations. Complications arise because people convey concepts through words (designations), and it is easy to confuse a concept with the designation used to represent it. For example, most people will read the word “income” and be certain they have unambiguously interpreted it. But it is possible that the designation “income” does not convey the same concept to all readers, and, more importantly, each instance of “income” does not designate the same concept.

Not all ideas are simply expressed in a natural language, either. For example, “women between the ages of 15 and 45 who have had at least one live birth in the last 12 months” is a valid object class not easily named in English. Some ideas can be more easily expressed in one language than in another. The German word *Götterdämmerung* has no simple English equivalent, for instance.

Value domains are sets of permissible values for data elements. Datatype and possibly a unit of measure are associated with a value domain. For example, the data element representing “annual household income” can have the set of non-negative integers (with units of dollars) in Arabic numerals as a set

of valid values. This is its value domain. The scaled datatype is appropriate for this situation (see ISO/IEC 11404:2007[7], 8.1.9). “Currency” is a likely representation class, and “dollars” a unit of measure.

A data element concept may be associated with different value domains as needed to form conceptually similar data elements. There are many ways to represent similar details about the world, but the data element concept for which the details are examples is the same. Take the data element concept “country of person's birth” as an example. ISO 3166-1[2] contains seven different representations for countries of the world. Each one of these seven representations contains a set of values that may be used in the value domain associated with the data element concept. Each one of the seven associations is a data element. For each representation of the data, the permissible values, the datatype, and possibly the units of measure, are altered.

See ISO/IEC TR 20943-1[28] for details about the registration and management of descriptions of data elements.

5.4 Data elements in data management and interchange

Data elements appear in two basic situations: in databases and in messages. Databases are rendered either in memory or in files stored separately. Data elements are the fundamental units of data that an organization manages, therefore they are of necessity part of the design of databases within the organization and all messages the organization builds to communicate data to other organizations.

Within the organization, databases are composed of records, segments, tuples, rows within tables, etc., which are composed of data elements. The data elements themselves contain various kinds of data that include characters, images, sound, etc.

When the organization needs to transfer data to another organization, data elements are the fundamental units that make up the message. Messages occur between databases, between databases and humans, and between humans. Moreover, the structure (i.e. the records or tuples) of databases don't have to be the same across organizations. So, the common unit for transferring data and related information is the data element.

6 Metadata registries

6.1 General

Metadata are also data, so metadata might be stored in a database. A database of metadata that supports the functionality of registration is a metadata registry (MDR). ISO/IEC 11179-3[11] provides a conceptual model for the common facilities of an MDR and ISO/IEC 11179-31[16] provides a conceptual model for describing data. The requirements and procedures for the ISO/IEC 11179 aspects of registration are described in ISO/IEC 11179-6[14]. For actual metadata registries, there may be additional requirements and procedures for registration, which are outside the scope of this document. Rules and guidelines for providing good definitions and developing naming conventions are described in ISO/IEC 11179-4[12] and ISO/IEC 11179-5[13], respectively. The role of classification is described in ISO/IEC TR 11179-2[10]. Recommendations and practices for registering data elements are described in ISO/IEC TR 20943-1[28]. Recommendations and practices for registering value domains are described in ISO/IEC TR 20943-3[29].

An MDR contains metadata describing data constructs. The attributes for describing a particular data construct (e.g. data elements, data element concept, conceptual domain and value domain) are known, collectively, as a metadata object. When the attributes are instantiated with the description of a particular data construct, they are known as a metadata item. Recording the metadata item in an MDR makes it a registry item, represented by the *Item* class in the MDR metamodel. Depending on

requirements, the registry item may further be identified, registered, administered, named, defined and classified. See ISO/IEC 11179-3:2023, 6.4.2.1 *Item* class for details.

NOTE In common parlance, registering a metadata item describing a data construct is known as registering that data construct. The data construct is not stored in the MDR, its description is. This is analogous to the registries maintained by governments to keep track of motor vehicles. A description of each motor vehicle is entered in the registry, but not the vehicle itself. However, people say they have registered their motor vehicles, not the descriptions.

6.2 Fundamentals of registration

The registration and administration functions specified in ISO/IEC 11179-6 are what separate an MDR from a database of metadata. The means to accomplish these functions are a large part of the design of the MDR metamodel specified in ISO/IEC 11179-3.

Registration is the set of rules, operations, and procedures that apply to an MDR. A detailed description of registration as it applies in ISO/IEC 11179 is found in ISO/IEC 11179-6. The three most important outcomes of registration are the ability to monitor the quality of metadata, provenance (the source of the metadata), and the assignment of an identifier to each object described in an MDR. Registration also requires a set of procedures for managing a registry, submitting metadata for registration of objects, and maintaining subject matter responsibility for metadata already submitted. For actual implementations of a metadata registry, there may be additional requirements, which are outside the scope of this document.

Each administered item is maintained in a uniform and prescribed manner. Identifiers, quality measures, accountable organizations, names and definitions are all part of the general metadata that falls under administration. Registration includes the process of creating or maintaining administrative and other detailed metadata.

The metadata lifecycle is recorded via the use of a registration status. The lifecycle stages, typically, correspond to the level of quality of the metadata. Each level is specified in ISO/IEC 11179-6:2023, 4.3. Every administered item is assigned a registration status, and this status can change over time. In addition, metadata quality is multi-faceted. That is, there are several purposes to monitoring metadata quality. The main purposes are:

— monitoring adherence to rules for providing metadata for each attribute;

— monitoring adherence to conventions for forming definitions, creating names, and performing classifications;

— determining whether an administered item still has relevance;

— determining the similarity of related administered items and harmonizing their differences;

— determining whether it is possible to ever get higher quality metadata for some administered items.

The rules for creating and assigning identifiers are described in ISO/IEC 11179-6. Each administered item within an MDR is assigned one or more unique identifiers.

The registration authority is the organization responsible for setting the procedures, administering, and maintaining an MDR. The individuals responsible are called registrars. The submitting organization is responsible for requesting that a new metadata item be registered in the registry. The stewardship organization is responsible for the subject matter content of each registered item. Each of these roles is described in ISO/IEC 11179-6:2023, Annex B.

7 Overview of ISO/IEC 11179

7.1 General

ISO/IEC 11179 addresses the registration of the descriptions of data, including both the semantics and the representation of that data. It is through these descriptions that an accurate understanding of the semantics and a useful depiction of the data are found.

Each part of ISO/IEC 11179 assists in a different aspect of metadata creation, organization, and registration; and each part shall be used in conjunction with the other parts. ISO/IEC 11179-1 (this document) establishes the relationships among the parts and gives guidance on their usage as a whole.

Metadata items are registered as registered items and administered as administered items in an MDR. ISO/IEC 11179-3 specifies the generic metamodel to support the registration process. ISO/IEC 11179-6 provides guidance on the registration procedures.

The individual parts of ISO/IEC 11179 are described in 7.2 to 7.13.

7.2 ISO/IEC 11179-1 — Part 1: Framework

ISO/IEC 11179-1 (this document) introduces and discusses fundamental ideas of data elements, value domains, data element concepts, conceptual domains, concepts, and concept systems essential to the understanding of this series of standards and provides the context for associating the individual parts of ISO/IEC 11179. It also describes the relationships between ISO/IEC 11179 and other JTC 1/SC 32 standards, technical specifications and technical reports on metadata.

7.3 ISO/IEC TR 11179-2 — Part 2: Classification

The metamodel for registering classification schemes is specified as part of the ISO/IEC 11179-3. ISO/IEC TR 11179-2 expands on this specification to describe the meaning and benefits of classification, and the use of classification schemes to classify other contents of the registry. Concepts from these classification schemes can be associated with administered items through the process of classification. Librarians, terminologists, linguists, and computer scientists are perfecting the classification process, so it is not described here. The additional semantic content derived from classification is the important point.

Associating an object with one or more concepts from one or more classification schemes provides:

— additional understanding of the object;

— comparative information across similar objects;

— understanding of an object within the context of a domain (defined by the scope of a classification scheme);

— ability to determine slight differences of meaning between similar objects.

Therefore, managing classification schemes is an important part of maximizing the information potential within an MDR. ISO/IEC TR 11179-2 provides the framework for this.

7.4 ISO/IEC 11179-3 — Part 3: Metamodel for registry common facilities

ISO/IEC 11179-3 specifies the core metamodel for a Metadata Registry (MDR), but it does so in a generic way, so that the resulting registry could be used to register anything, not just metadata.

The registry metamodel is expressed in the Unified Modelling Language (UML). It is divided into regions for readability. The figures present an overview of each region. All the provisions represented in the model are described in the text. Both text and UML class diagrams are normative and are intended to be complementary. However, if a conflict exists between the text and the UML notation, the text takes precedence.

The registry metamodel is not a complete description of all the metadata an organization may wish to record. So, the model is designed to be extended if required. However, extensions are, by their nature, not part of ISO/IEC 11179-3.

Some extensions to the ISO/IEC 11179-3 metamodel are specified in other parts of ISO/IEC 11179, such as:

— ISO/IEC 11179-31: Metamodel for data specification registration;

— ISO/IEC 11179-32: Metamodel for concept system registration;

— ISO/IEC 11179-33: Metamodel for data set registration;

— ISO/IEC 11179-34: Metamodel for computable data registration;

— ISO/IEC 11179-35: Metamodel for model registration;

and in other standards, such as:

— ISO/IEC 19763 series – Metamodel framework for interoperability.

Organizations may specify their own extensions to any of the above metamodels.

A clause describing conformance criteria is provided. Conformance is described as either *strictly conforming* (all provisions met, no extensions permitted) or *conforming* (all provisions met, but additional provisions may exist).

7.5 ISO/IEC 11179-30 — Part 30: Basic attributes of metadata

ISO/IEC 11179-30 describes basic attributes for data elements and related metadata for use in contexts where a full metadata registry is not appropriate, such as standards documents. It is limited to a set of basic attributes for: data elements, data element concepts, value domains, conceptual domains and other related classes.

7.6 ISO/IEC 11179-31 — Part 31: Metamodel for data specification registration

ISO/IEC 11179-31 provides a specification for an extension to a Metadata Registry (MDR), as specified in ISO/IEC 11179-3, in which metadata that describe data elements and associated concepts, such as data element concepts, conceptual domains and value domains can be registered.

The specification in ISO/IEC 11179-31, together with the relevant clauses of the specification in ISO/IEC 11179-3, provides the ability to record metadata about:

— data elements, units of measure and derivation rules;

— data element concepts and associated object classes and properties;

— conceptual domains and value meanings;

— value domains, value domain subsets and permissible values.

ISO/IEC 11179-31 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.

7.7 ISO/IEC 11179-32 — Part 32: Metamodel for concept system registration

ISO/IEC 11179-32 provides a specification for an extension to a Metadata Registry (MDR), as specified in ISO/IEC 11179-3, in which metadata that describe concept systems can be registered.

The specification in ISO/IEC 11179-32, 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 ISO/IEC 11179-32 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 instead (see 8.1.5).

7.8 ISO/IEC 11179-33 — Part 33: Metamodel for data set registration

ISO/IEC 11179-33 provides a specification for an extension to a Metadata Registry (MDR), as specified in ISO/IEC 11179-3, in which metadata that describe data sets, collections of data available for access or download in one or more formats, can be registered. Since a set can contain a single element, this specification will also allow the recording of metadata about a single data value.

The registered metadata provide information about the data set that includes the provenance and the quality of the data set.

The specification in ISO/IEC 11179-33, together with the relevant clauses of the specification in ISO/IEC 11179-3, provides the ability to record the following data set metadata:

— one or more unique identifiers for the data set;

— the designation or title of the data set;

— a definition or description of the data set that provides sufficient detail to enable a user to quickly understand whether this data set is of interest;

— the date the data set was issued and, if appropriate, the date that subsequent versions of the data set were, or will be, issued;

— the access level and rights associated with the data set;

— the provenance of the data set, i.e. information about the place and time of the origin of the data set, its ownership and the method of the generation of the set;

— a set of keywords or tags that help to explain the data set;

— the language or languages used to describe the data set;

— the temporal and spatial coverages of the data set;

— the accrual periodicity of the data set, i.e. the frequency at which new, revised or updated versions of the data set are made available;

— the details of the distributions of the data set, including the identifier, the title, a description, the media type or file format, the size, the issue date, languages, access level and rights and access and download URLs;

— annotations drawn from a concept system, such as an ontology, to describe the theme or category of the data set or the collection of data sets;

— details of any contexts, such as a programme, project or business area that use the data set;

— details of any quality assessments made in respect of the data set;

— any additional descriptions of the data set, including:

  — any data elements that are already registered that are included in the data set;

  — any information models that describe the structure of the information in the data set;

  — any documents which describe aspects of the data set, such as technical information about the data set or developer documentation such as a graphical representation of the data model of the data set;

  — details of any superset/subset hierarchies containing the data set;

  — details of any replacement data set if this data set is superseded;

  — the details of any collection of data sets of which this data set is a part, including the identifiers, the designation or title, a definition or description, issue dates, languages, access level, rights, the spatial coverage, the provenance and any quality assessments of the collection.

7.9 ISO/IEC 11179-34 — Part: 34 Metamodel for computable data registration

ISO/IEC 11179-34 provides a specification for an extension to a Metadata Registry (MDR), as specified in ISO/IEC 11179-3, in which metadata that describe computable data can be registered. Such metadata can include details related to data pipelines to facilitate efficient communication and interoperability between different platforms, industries, scientists and regulators and improve reproducibility and replicability.

7.10 ISO/IEC 11179-35 — Part 35: Metamodel for model registration

ISO/IEC 11179-35 provides a specification for an extension to a Metadata Registry (MDR), as specified in ISO/IEC 11179-3, in which metadata about models and their associated metamodels can be registered. These models can be information or data models, process models, models of web services or any other type of models used in software engineering or information processing. All such models can be considered as metadata. As such, ISO/IEC 11179-35 provides a generic alternative to the facilities specified in various parts of ISO/IEC 19763.

7.11 ISO/IEC 11179-4 — Part 4: Formulation of data definitions

ISO/IEC 11179-4 provides guidance on how to develop unambiguous data definitions. Several rules and guidelines are presented in ISO/IEC 11179-4 that specify exactly how a data definition should be formed. A precise, well-formed definition is one of the most critical requirements for shared understanding of data. Well-formed definitions are imperative for the exchange of information. Only if every user has a common and exact understanding of the data can they be exchanged trouble-free.

The usefulness of definitions is one aspect of metadata quality. Following the rules and guidelines provided in ISO/IEC 11179-4 helps establish this usefulness.

7.12 ISO/IEC 11179-5 — Part 5: Naming principles

ISO/IEC 11179-5 provides guidance for the designation of administered items. Designation is a broad term for naming or identifying a particular data construct.

Names are applied to data constructs through the use of a naming convention. Naming conventions are algorithms for generating names within a particular context. There are semantic, syntactic, and lexical rules used to form a naming convention. Names are a simple means to provide some semantics about data constructs, however the semantics are not complete. Syntactic and lexical rules address the constituents (e.g. allowable characters), format, and other considerations.

Data constructs may be assigned multiple names, and one name may be identified as preferred. Usually, each assigned name is used within the context for which it was created.

The aim for any naming convention is to allow development of names that are clear and transparent in meaning, concise, demanding minimal effort of interpretation by the end user, and subject to the constraints of the system under which named items are processed. A naming convention can be used to form names by which information about the data is expressed. Ideally, the names resemble short summaries of the formal definition of the information being named.

7.13 ISO/IEC 11179-6 — Part 6: Registration

ISO/IEC 11179-6 provides instruction on how a registration applicant may register a data construct with a registration authority (RA) and the assignment of unique identifiers for each data construct. Maintenance of administered items already registered is also specified in ISO/IEC 11179-6. Registration mainly addresses identification, quality, and provenance of metadata in an MDR.

An administered item identifier may be formed by the combination of the RA identifier, the unique identifier assigned to the administered item within an RA, and the version identifier of the administered item. Other structures for administered item identifiers are permitted as well.

Each registry is maintained by an RA, to which data constructs logically and functionally belong. For example, data constructs related to chemical matter would likely be registered under a chemical manufacturer registration authority.

Registration is more complex than a simple indication whether a metadata item is either registered or not. Although it is tempting to insist that only “good” metadata may be registered, that is not practical. Therefore, improvement in the quality of administered items is divided into levels called “registration status”. In addition, there are status levels for administration between each of these quality levels. Collectively, these status levels are called “administrative status”. They indicate the point in the registration life cycle currently attained for an administered item.

The provenance of metadata, the chain of responsibility, is managed in an MDR, too. The tasks and roles of the registration authority, stewardship organization, and submitting organization are described. A framework for the registration process to be used in an MDR is provided.

Registration is both a process and a goal. The assignment of an identifier, quality status, life-cycle status, and describing provenance are goals. The rules by which these goals are accomplished is the process.

8 Relationship to other JTC 1/SC 32 standards, TRs and TSs on metadata

8.1 ISO/IEC 19763 series — Metamodel framework for interoperability (MFI)

8.1.1 General

The ISO/IEC 19763 series of standards provides a set of specifications that allow the registration of models to facilitate interoperability among systems or persons. In this context, interoperability is interpreted in its broadest sense: the capability to communicate, execute programs, or transfer data among various functional units in a manner that requires the user to have little or no knowledge of the unique characteristics of those units (see ISO/IEC 2382:2015[1], 2121317). The models that are registered may be ontologies, information models, process models, service models, models of roles and goals or any other type of model specified within MFI. The various parts of the standard are described below. The MFI Core (see ISO/IEC 19763-10) uses the common facilities from ISO/IEC 11179-3 as shown in Figure 2.

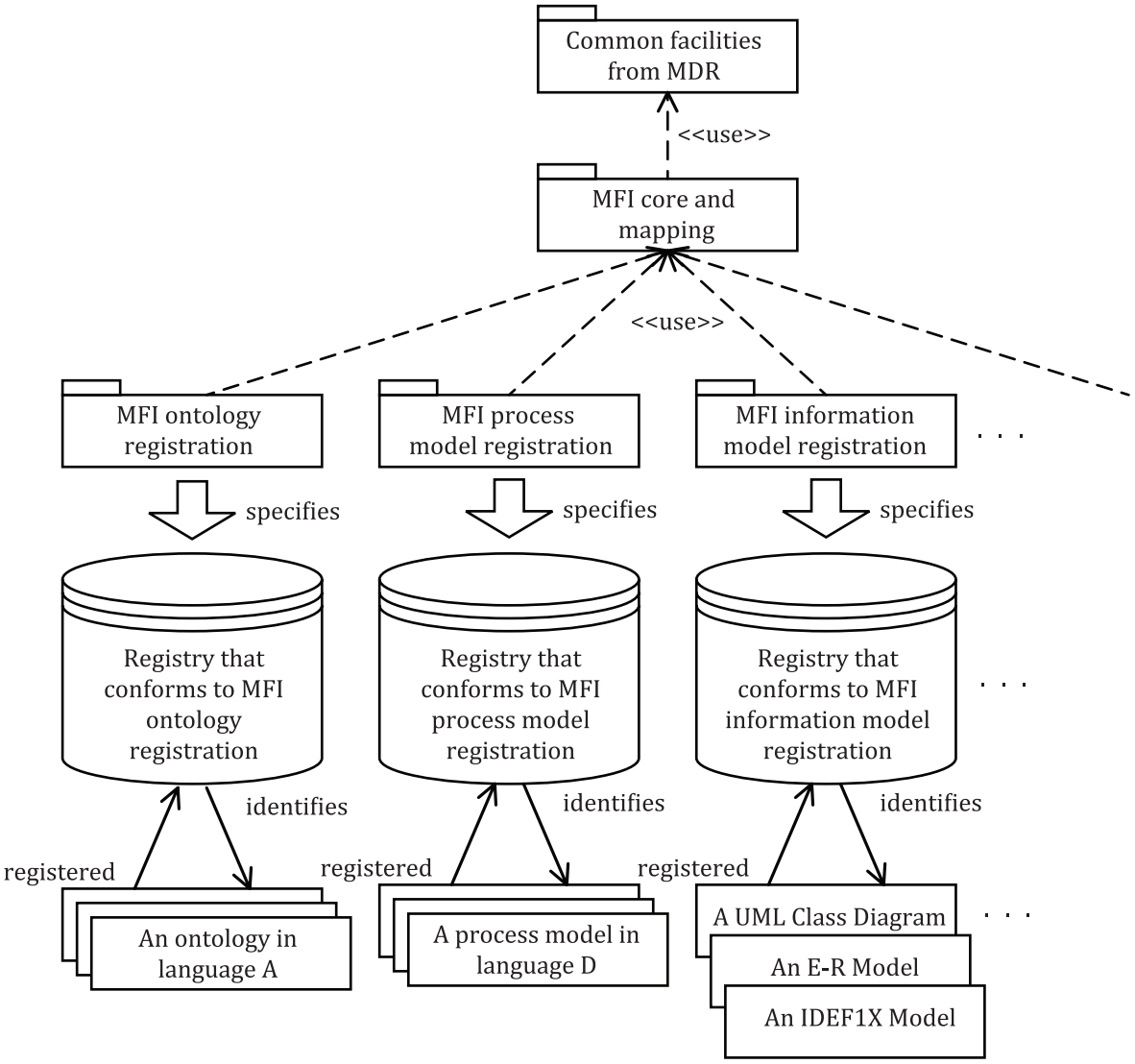


Figure 2 — Relationships between MFI Core and mapping and other parts

8.1.2 ISO/IEC 19763-1 — Part 1: Framework

ISO/IEC 19763-1 provides an overview of the whole MFI series of standards. In particular, the purpose, the underlying concepts, the overall architecture and the requirements for the development of other standards within the MFI series are described. MFI provides a set of normative metamodels to enable the registration of many different types of model. Each of these metamodels is expressed as a UML class diagram.

8.1.3 ISO/IEC 19763-10 — Part 10: Core model and basic mapping

ISO/IEC 19763-10 specifies the metamodel that provides a facility to register administrative information and common semantics of models and mapping between two models.

ISO/IEC 19763-10 does not specify the metamodel of models in a specific language but provides a common core metamodel for the other parts of ISO/IEC 19763, each of which specifies a metamodel for a registry that can register models of a specific type, such as ontologies, process models or information models, in a number of different languages.

ISO/IEC 19763-10 also provides a metamodel for registering the mappings between two models registered in those other parts of ISO/IEC 19763.

NOTE The mapping facility in ISO/IEC 19763-10 is superseded by the mapping facility specified in ISO/IEC 11179-3:2023, Clause 11.

ISO/IEC 19763-10 utilises the common facilities specified in ISO/IEC 11179-3. These common facilities provide the ability to identify and register models and their associated model elements and modelling languages within a metadata registry used to register models.

8.1.4 ISO/IEC 19763-6 — Part 6: Registry summary

The ISO/IEC 19763 series of standards defines normative metamodels for the registration of models (including information models and process models), ontologies, services and roles and goals. Currently, a lot of metadata registries or model registries were constructed and utilized in many different business domains, such as e-business, healthcare, automobile, electronics devices and civil construction.

One of the key issues for cross-domain data or services integration is enabling the easy discovery of metadata that are stored in the different registries that were scattered over different domains. Therefore, it is necessary to provide specific metadata that describe the registry itself to enable interoperation among different registries that were built following different standards.

ISO/IEC 19763-6 specifies an information artefact called the “registry summary”. The registry summary consists of information that describes administrative aspects, the summary of contents and the technical access method of the registry.

A collection of multiple registry summaries is called a “Registry of Registries” or RoR, however, this standard does not mandate a particular implementation. Also, any specific protocol between registry summaries and an RoR, such as creation of an RoR and synchronization of RoRs, is not specified in ISO/IEC 19763-6. Those are to be specified by other standards.

The registry summary and RoR concept should be applied to all Metamodel Framework for Interoperability (MFI) registries, but its use can be applied to any kind of registry.

8.1.5 ISO/IEC 19763-3 — Part 3: Metamodel for ontology registration

ISO/IEC 19763-3 specifies a metamodel that provides a facility to register administrative and evolution information related to ontologies. This metamodel is intended to promote interoperation among application systems, by providing administrative and evolution information related to ontologies, accompanied with standardized ontology repositories that register ontologies themselves in specific languages.

The metamodel consists of two packages:

— the Basic_Model package is used to register administrative information related to ontologies, independently of the languages that are used to express them. The basic idea is that almost any ontology consists of several sentences and that each sentence uses several non-logical symbols;

— the Evolution_Model package is used to register information on how an ontology evolves from one version to another.

8.1.6 ISO/IEC 19763-5 — Part 5: Metamodel for process model registration

ISO/IEC 19763-5 specifies a metamodel that describes a facility to register administrative information and selected metadata about process models. This metamodel is intended to promote semantic discovery and reuse of process models within and across process model repositories. For this purpose, it provides selected metadata and common semantics of process models created with a specific process modelling language, including Business Process Model and Notation (BPMN)[40], UML (Unified Modeling Language) Activity Diagram, and EPC (Event-driven Process Chain)[45], etc. The metamodel can help

discovery of the function and composition of a process and can promote reuse of its components at different levels of granularity.

8.1.7 ISO/IEC 19763-7 — Part 7: Metamodel for service model registration

ISO/IEC 19763-7 specifies a metamodel for registering models of services, facilitating interoperability through the reuse of services. ISO/IEC 19763-7 is only applicable to web services whose capabilities are described by some web service description language, such as: OWL-S[48], WSDL[54], WSML[55], SAWSDL[50], SWRL[51], SWSL[52], WADL[53], SA-REST[49].

8.1.8 ISO/IEC 19763-8 — Part 8: Metamodel for role and goal model registration

ISO/IEC 19763-8 specifies a metamodel for registering the role and goal models of users of services and/or processes.

The metamodel specified is intended to promote the reuse of goals by roles within and across role and goal model repositories, and further promote services selection across service model repositories based on goals. For this purpose, it provides administrative information and common semantics of role and goal models created with a specific role and goal modelling language, including goal-oriented requirements modelling (i*)[56], Keep All Objects Satisfied (KAOS)[37], Non-functional Requirement Framework (NFRF)[42], Business Motivation Model (BMM)[39], Reference Model of Open Distributed Processing (RM-ODP)[27], etc.

8.1.9 ISO/IEC TR 19763-9 — Part 9: On-demand model selection

ISO/IEC TR 19763-9 specifies a technical guideline for how to use the Role and Goal, Process, and Service (RGPS) metamodels to select appropriate combinations of models, services or both to support user requests. The scope of ISO/IEC TR 19763-9 is limited to model selection based on ISO/IEC 19763-5, ISO/IEC 19763-7, and ISO/IEC 19763-8.

8.1.10 ISO/IEC 19763-12 — Part 12: Metamodel for information model registration

ISO/IEC 19763-12 specifies a metamodel for registering information models. This metamodel was developed taking into account two distinct types of information models such as:

— those that are used to document the information requirements of a particular area of interest;

— those that represent the structure of a database which are often expressed using a Database Definition Language (DDL).

Information models that represent information requirements can be developed using several different common diagramming techniques and notations. The metamodel specified in ISO/IEC 19763-12 was developed to cover the registration of models expressed using the following techniques and notations:

— Express-G, an ISO standard entity-relationship modelling notation, as described in Reference [6];

— IDEF1X, a US Federal standard entity-relationship modelling notation, as described in References [36] and [47];

— the entity-relationship modelling notation first developed by Harry Ellis and Richard Barker and later adopted by Oracle for its CASE*Method and by the UK's CCTA for SSADM (Structured Systems Analysis and Design Method), as described in Reference [38];

— the UML Class Diagram notation, as described in References [22] and [23];

— the original entity-relationship modelling notation proposed by Peter Chen, as described in Reference [41];

— the Information Engineering entity-relationship modelling notation, as described in Reference [46].

It is understood that these selected techniques represent all the essential features of all information modelling techniques used to represent information requirements.

The registration of information models that represent the structure of a database is limited in the metamodel specified in ISO/IEC 19763-12 to those database structures that conform to the Core SQL specification. Core SQL is the set of features defined in the conformance requirements specified in ISO/IEC 9075-2[4] and ISO/IEC 9075-11[5].

The registration of information models that are expressed using notations such as Object Role Modeling (ORM) and "Natural language Information Analysis Method" (NIAM), collectively known as fact-based models, is out of scope for ISO/IEC 19763-12.

8.1.11 ISO/IEC TS 19763-13 — Part 13: Metamodel for form design registration

ISO/IEC TS 19763-13 specifies a metamodel for registering form designs. Forms can be printed on paper or encoded in electronic format. Electronic forms can be rendered natively in standard formats such as HTML, XForms or PDF, or propriety ones such as Windows forms, Cocoa or Java Swing. They can also be implemented in a common survey framework such as Survey Monkey or Lime Survey. Despite this diversity, it is eminently possible to create forms in different formats that support the same comparisons and downstream processing provided the spaces and instructions share the same semantic intent. Such a collection of forms could be said to share the same *design.*

A model that is adequate to record these *form designs* is the subject of ISO/IEC TS 19763-13. ISO/IEC TS 19763-13 provides a metamodel to describe the structure and semantics of an implemented form devoid of any specific, domain semantics – e.g. in healthcare, social science, e-government and e-business – or representation format so that data can be faithfully exchanged between systems and system components, and associations expressed between sets of form designs whose data can be compared, joined or composed for analysis.

8.1.12 ISO/IEC 19763-16 — Part 16: Metamodel for document model registration

ISO/IEC 19763-16 specifies a metamodel for registering document models (or schemas). The metamodel was developed considering the following requirements:

— Specifications for XML documents (using XML Schema);

— Specifications for JSON documents (using JSON Schema).

8.2 ISO/IEC 19773 Metadata Registries (MDR) modules

ISO/IEC 19773 describes the technical interoperability details of metadata modules, which are used in the ISO/IEC 11179 series of standards. The current edition contains the following modules:

— Module 10: Data structure for reference-or-literal (reflit)

  provides the description of the data structure for holding a reference to data, or a literal data value, to be chosen at run-time;

— Module 11: Data structure for multiple internationalized/localized values and data

  provides the description of the data structure for holding several values whose meaning is the same, yet their presentation may differ;

— Module 12: Data structure for multiple internationalized/localized strings and texts

  provides the description of the data structure for holding several textual strings whose meanings are the same, yet their presentation may differ;

— Module 13: Data structure for slot tuple

  describes the data structure for slot tuples, a mechanism for describing individual data values;

— Module 14: Data structure for unstructured table of slot tuples

  provides the data structure for bundling a table of unstructured (or structured) data values, based upon the identifier-kind-value slot tuple structure defined in Module 13;

— Module 15: Data for reified relationships and relationship systems

  provides the data structure for representing data (reifying) about relationships and relationship systems;

— Module 16: Data structure for UPU postal data

  provides the description of the data structure for postal addresses. The UPU S42 address elements are used as a basis for constructing a postal address;

— Module 17: Data structure for ITU-T E.164 phone number data

  provides the description of the data structure for phone numbers that may conform to ITU-T E.164. The data structure may store phone numbers of the international numbering plan (e.g. +12125551212) or of private numbering plans (e.g. 0800990011); the phone numbers may include a PBX (private branch exchange) extension (e.g. +12125551212+234, 0800990011+234);

— Module 18: Data structure for who-what-where-when-why-how (W5H) event data

  provides the description of the data structure for who-what-where-when-why-how event data, i.e. an event described by Who (people/entities associated with the event), What (topic/subject data), Where (spatial data), When (temporal data), Why (external relationships), and How (pragmatic details);

— Module 19: Data structure for entity-person-group (EPG) contact data

  provides the description of the data structure for contact data for a person, group, organization, or other entity;

— Module 20: Data structure for entity-person-group (EPG) security credentials data

  provides the description of the data structure for security credentials; specific security methods are not defined, but a container structure for storing credentials and parameters with security methods (e.g. access control and authentication mechanisms) is specified;

— Module 21: Data structure for entity-person-group (EPG) relationships and grouping data

  provides the description of the data structure, a container, that contains relationships to EPGs. An EPG (entity-person-group) is something that is either an entity (e.g. an organization), a person (e.g. an individual), or a group (e.g. a combination of persons and/or entities). These data structures allow the representation of relationships among EPGs.

8.3 ISO/IEC 20943 series — Procedures for achieving metadata registry content consistency

8.3.1 General

The ISO/IEC 20943 series of Technical Reports provides procedures for achieving content consistency within or among metadata registries. Each part focuses on a particular type of content.

8.3.2 ISO/IEC TR 20943-1 — Part 1: Data elements

ISO/IEC TR 20943-1 describes a set of procedures for the consistent registration of data elements and their attributes in a metadata registry. It is not a data entry manual, but a user's guide for conceptualizing a data element and its associated metadata items for the purpose of consistently establishing good quality data elements. An organization may adapt and add to these procedures as necessary.

8.3.3 ISO/IEC TR 20943-3 — Part 3: Value domains

ISO/IEC TR 20943-3 describes a set of procedures for the consistent registration of value domains and their attributes in a metadata registry. This part is not a data entry manual, but a user's guide for conceptualizing a value domain and its components for the purpose of consistently establishing good quality metadata. An organization may adapt and add to these procedures as necessary.

8.3.4 ISO/IEC TR 20943-5 — Part 5: Metadata mapping procedure

ISO/IEC TR 20943-5 describes a metadata mapping procedure (MMP) for establishing metadata crosswalks based on the ISO/IEC 11179 series, thereby improving mapping quality among metadata.

8.3.5 ISO/IEC TR 20943-6 — Part 6: Framework for generating ontologies

ISO/IEC TR 20943-6 describes a method to generate ontologies for a context using concepts in ISO/IEC 11179-3:2013. Most ontologies are basically composed of classes (concepts), properties, relations between the classes, and instances (objects or individuals). ISO/IEC TR 20943-6 specifies the method to generate ontologies using concepts in the ISO/IEC 11179-3:2013 Concept System and Data Description metamodel regions.

NOTE The ISO/IEC 11179-3:2013 Concept system metamodel region has been moved to ISO/IEC 11179-32 and the ISO/IEC 11179-3:2013 Data description metamodel region has been moved to ISO/IEC 11179-31.

8.4 ISO/IEC 20944 series — Metadata Registries Interoperability and Bindings (MDR-IB)

8.4.1 General

The ISO/IEC 20944 series describes codings, APIs, and protocols for interacting with an ISO/IEC 11179-3 metadata registry (MDR). Bindings concern the mapping of one standard (or framework) into another standard (or framework).[2)] More than one standard (or framework) may be used to complete the mapping.[3)]

The ISO/IEC 20944 series uses at least three tiers of mappings. The first tier concerns the main kind of mapping for the binding: coding bindings, API bindings, and protocol bindings. The second tier of mapping concerns the mapping of data model instances to a coding-independent representation (CIR) of data — the ISO/IEC 11404[7] standard specifies the syntax and semantics of this CIR. The third tier of mapping concerns the mapping of CIR to a coding-specific representation (CSR). Additional tiers of mapping are possible, such as specifications of encoding mappings.[4)]

The purpose of a common CIR of data is to support common semantics and interoperability among coding bindings and other bindings, such as API and protocol bindings.

EXAMPLE A CIR is developed for a data model. Based upon this CIR, it is possible to transform one coding binding (e.g. XML coding binding) to another coding binding (e.g. ASN.1 coding binding) while sharing common semantics (the CIR) among the coding bindings. Likewise, one coding-specific representation (e.g. XML) can be transformed into another coding-specific representation (e.g. ASN.1).

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2) For example, an ASN.1 binding of "technical specification XYZ" implies mapping the features and requirements of "technical specification XYZ" to the features and capabilities of the ASN.1 standard.

3) When viewed as a series of layers (e.g., data model = Standard XYZ, coding binding = ASN.1, encoding = ASN.1 Basic Encoding Rules (BER)), bindings may also be viewed as "layered standards" or a "layering of standards".

4) The XML, ASN.1, and DIVP coding bindings all have additional tiers for encoding. XML has two additional encoding tiers: character encoding (e.g., ASCII vs. UTF-8), and a lower level byte-ordering encoding for multi-octet representations (e.g., little endian and big endian orderings for UTF-16 and UTF-32). ASN.1 has an additional layer of encoding: Basic Encoding Rules (BER), Canonical Encoding Rules (CER), and Distinguished Encoding Rules (DER). DIVP may have encoding rules specified by its outer wrapper, but they are not part of the DIVP coding binding.

8.4.2 ISO/IEC 20944-1 — Part 1: Framework, common vocabulary and common provisions for conformance

ISO/IEC 20944-1 provides the overview, framework, common vocabulary and common provisions for conformance for the ISO/IEC 20944 series.

8.4.3 ISO/IEC 20944-2 — Part 2: Coding bindings

ISO/IEC 20944-2 specifies provisions that are common across coding bindings for the ISO/IEC 20944 series of standards and includes the actual coding bindings for XML and DIVP (Dotted Identifier Value Pair).

NOTE XML bindings are useful for integration with other XML technologies. The XML binding provides the requirements of XML interchange without specifying the XML technologies (e.g. XML Schema) to implement the features. DIVP bindings are useful for integration with name-value pair technologies, such as scripting systems, E-mail, and web servers.

8.4.4 ISO/IEC 20944-3 — Part 3: API bindings

ISO/IEC 20944-3 specifies provisions that are common across API bindings for the ISO/IEC 20944 series of standards and includes the actual API bindings for C, Java and EcmaScript programming languages. The purpose of ISO/IEC 20944-3 is to provide a common set of services (common API provisions) and standardized API bindings such that portable programs can be written to access the MDR repositories. These programs are portable in the sense that the same program should behave similarly across all operating environments and the same program should be able to access MDR repositories that conform to ISO/IEC 20944-3.

8.4.5 ISO/IEC 20944-4 — Part 4: Protocol bindings

ISO/IEC 20944-4 specifies provisions that are common across protocol bindings for the ISO/IEC 20944 series of standards and includes the actual protocol bindings for HTTP 1.1 and WebDAV. The purpose of ISO/IEC 20944-4 is to provide a common set of services (common protocol provisions) and standardized protocol bindings such that interoperable systems can be created to access the MDR repositories. These systems are interoperable in that they should be able to access MDR repositories that conform to ISO/IEC 20944-4.

8.4.6 ISO/IEC 20944-5 — Part 5: Profiles

ISO/IEC 20944-5 specifies the common provisions for profiles using the ISO/IEC 20944 series of standards.

This part specifies mapping of metamodel attributes, as specified in ISO/IEC 11179-3:2003, to identifiers for the purpose of navigating metadata registries.

8.5 ISO/IEC 19583 series — Concepts and uses of metadata

8.5.1 General

The ISO/IEC 19583 series of Technical Reports and Technical Specifications provides guidance in various aspects of metadata concepts and usage.

8.5.2 ISO/IEC TR 19583-1 — Part 1: Metadata concepts

ISO/IEC TR 19583-1 describes the basic concept of metadata, and its relationship to both data and metamodels.

For any data to be useful or shareable the meaning of the data (the semantics), the data type and format of the data (the syntax) and the relationship of the data to other data (the structure) has to be known. All of this information about data is metadata.

Metadata are independent of the systems that produce the data. Metadata are usually defined before systems are built, either as part of the systems development of an individual system or as part of an enterprise-wide data management initiative. However, metadata can be recorded after the data has been created in less formal systems as part of a data documentation initiative. The only significant difference between single-system metadata and enterprise-wide metadata is the scope of the metadata, although there might be differences around the degree of formality applied to its creation.

8.5.3 ISO/IEC TR 19583-21 — Part 21: 11179-3 data model in SQL

ISO/IEC TR 19583-21 describes a representation of the ISO/IEC 11179-3 data model in SQL as specified in ISO/IEC 9075-2[4].

8.5.4 ISO/IEC TR 19583-22 — Part 22: Registering and mapping processes using ISO/IEC 19763

ISO/IEC TR 19583-22 describes procedures for registering and mapping process models in an ISO/IEC 19763 registry, based on ISO/IEC 19763-5.

8.5.5 ISO/IEC TR 19583-23 — Part 23: Data element exchange (DEX)

ISO/IEC TR 19583-23 specifies a format for exchanging information about data elements based on a subset of the ISO/IEC 11179-3 data element attributes.

8.6 ISO/IEC 14957 Representation of data element values — Notation of the format

ISO/IEC 14957 specifies the notation to be used for stating the format, i.e. the character classes, used in the representation of data elements and the length of these representations. It also specifies additional notations relative to the representation of numerical figures. The scope of ISO/IEC 14957 is limited to graphic characters, such as digits, letters and special characters. The scope is limited to the basic datatypes of characters, character strings, integers, reals and pointers. ISO/IEC 14957 can be used to represent the values of data elements specified by an ISO/IEC 11179-3 metadata registry supporting ISO/IEC 11179-31.

8.7 ISO/IEC 5218 Codes for the representation of human sexes

ISO/IEC 5218 specifies a uniform representation of human sexes for the interchange of information. Human sex is represented by a one-character numeric code. This is an example of an ISO/IEC 11179 value domain.

8.8 ISO/IEC 11404 General purpose datatypes

ISO/IEC 11404 specifies the nomenclature and shared semantics for a collection of datatypes commonly occurring in programming languages and software interfaces, referred to as the General-Purpose Datatypes (GPD). It specifies both primitive datatypes, in the sense of being defined ab initio without reference to other datatypes, and non-primitive datatypes, in the sense of being wholly or partly defined in terms of other datatypes. These datatypes provide one possible scheme for use in defining value domains within an ISO/IEC 11179 metadata registry.

8.9 ISO/IEC 24707 Common Logic (CL)

ISO/IEC 24707 specifies a family of logic languages designed for use in the representation and interchange of information and data among disparate computer systems. The following are within its scope:

— representation of information in ontologies and knowledge bases;

— specification of expressions that are the input or output of inference engines;

— formal interpretations of the symbols in the language.

ISO/IEC 24707 can represent information on ontologies stored in an ISO/IEC 11179-3 metadata registry supporting ISO/IEC 11179-32 (see 7.7).

8.10 ISO/IEC 21838 series — Top level ontologies

8.10.1 General

The ISO/IEC 21838 series of standards specifies requirements for top level ontologies, and some sample ontologies that conform to these requirements. These ontologies are potential content for registries based on either ISO/IEC 11179-32 or ISO/IEC 19763-3.

8.10.2 ISO/IEC 21838-1 — Part 1: Requirements

ISO/IEC 21838-1 specifies required characteristics of a domain-neutral top-level ontology (TLO) that can be used in tandem with domain ontologies at lower levels to support data exchange, retrieval, discovery, integration and analysis. One primary focus of the standard is to set forth the requirements ontologies shall satisfy if they are to support the design and use of purpose-built suites of ontologies by providing the overarching ontology content which the ontologies in the suite will be required to share in order to promote interoperability. However, the standard is intended to serve also a variety of other goals related to the achievement of semantic interoperability, for example as concerns legacy ontologies developed using heterogeneous upper-level categories, where a coherently designed TLO can provide a target for coordinated re-engineering.

ISO/IEC 21838-1 specifies the characteristics that an ontology shall possess if it is to serve such purposes in support of the goals of exchange, retrieval, integration and analysis of data by computer systems.

8.10.3 ISO/IEC 21838-2 — Part 2: Basic Formal Ontology (BFO)

ISO/IEC 21838-2 specifies Basic Formal Ontology as an implementation of ISO/IEC 21838-1: Top-Level Ontology. This standard defines the terms and relations used in the BFO-ISO version of Basic Formal Ontology and specifies BFO-ISO in the Web Ontology Language (OWL) and in Common Logic (CL). Terms and relations are defined in English, to support human users of the ontology and to enable effective interaction between users and developers.

ISO/IEC 21838-2 describes Basic Formal Ontology as a resource designed to support the interchange of information among heterogeneous information systems. The following are within the scope of this document:

— definitions of BFO-ISO terms and relations;

— axiomatizations of BFO-ISO in OWL 2 and CL;

— documentation of the conformity of BFO-ISO to the requirements specified for top-level ontologies in ISO/IEC 21838-1;

— specification of the requirements a domain ontology shall meet if it is to serve as a module in a suite of ontologies in which BFO serves as top-level ontology hub by providing a starting point for the introduction of the most general terms in those domain ontologies which are its nearest neighbors within the suite;

— specification of the role played by the terms in BFO in the formulation of definitions and axioms in ontologies at lower levels that conform to BFO.

8.10.4 ISO/IEC 21838-3 — Part 3: Descriptive ontology for linguistic and cognitive engineering (DOLCE)

ISO/IEC 21838-3 specifies DOLCE[43] as an implementation of ISO/IEC 21838-1: Top-Level Ontology. DOLCE is widely used by a diverse array of domain ontologies, ranging from event recognition to geographical information systems, through specialization of its backbone taxonomy.

8.10.5 ISO/IEC 21838-4 — Part 4: TUpper

ISO/IEC 21838-4 specifies TUpper[44] as an implementation of ISO/IEC 21838-1: Top-Level Ontology. TUpper is an upper ontology designed by combining the ontologies specified within existing ISO standards.

9 Conformance

There are no specific conformance criteria for this document. ISO/IEC 11179-1 is a framework that ties the other parts of the ISO/IEC 11179 series together and shows the relationship to other standards. As such, conformance is not an issue for ISO/IEC 11179-1. Each of the other documents has its own conformance clause.

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