ISO/IEC 11179-35:2022(E)

ISO/IEC JTC 1/SC 32/WG 2

2022-11-11

Secretariat: ANSI

Information technology — Metadata registries (MDR) — Part 35: Metamodel for model registration

~~Pre publication stage~~

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Foreword

ISO (the International Organization for Standardization) and IEC (the International Electrotechnical Commission) form the specialized system for worldwide standardization. National bodies that are members of ISO or IEC participate in the development of International Standards through technical committees established by the respective organization to deal with particular fields of technical activity. ISO and IEC technical committees collaborate in fields of mutual interest. Other international organizations, governmental and non-governmental, in liaison with ISO and IEC, also take part in the work.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of document should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see ~~www.iso.org/directives~~www.iso.org/directives or ~~www.iec.ch/members_experts/refdocs~~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 first edition of ISO/IEC 11179-35 is part of the 4th Edition modularization of ISO/IEC 11179. This document brings into ISO/IEC 11179 the ability to register models and metamodels. As such, it provides alternative facilities to those specified in ISO/IEC 19763 (see ~~references [4] to [14]).~~References [4] to [14]).

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~~www.iso.org/members.html and ~~www.iec.ch/national-committees~~www.iec.ch/national-committees.

Introduction

In the ISO/IEC 11179 series, the structure of a Metadata Registry is specified in the form of a conceptual data model. ISO/IEC 11179-3:2022 specifies a metamodel for registry common facilities, which is intended to be extended by other parts of ISO/IEC 11179 for specific purposes.

This document provides a specification of the extensions to the registry metamodel specified in ISO/IEC 11179-3 to enable the registration of metadata about models and their associated metamodels. 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.

In clauses Clauses 6 and 7 and Annex C, this document uses:

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

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

EXAMPLE **Model_Element** (7.2.2.3) is a class each instance of which models a model element.

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Information technology -- Metadata registries (MDR) -- Part 35: Metamodel for model registration

1 Scope

This document provides a specification for an extension to a Metadata Registry (MDR), as specified in ISO/IEC 11179-3, in which metadata that describes models, and their associated metamodels, can be registered.

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

~~a)~~ a) models used in software engineering or information processing, for example, information or data models, process models, models of web services or any other type of models used to develop software systems or the processing of information;

~~b)~~ b) the concepts associated with the various elements within the models;

~~c)~~ c) the metamodels associated with the models;

~~d)~~ d) the mappings identified between the models, between the metamodels, and between the models and their associated metamodels – this is achieved by using the mapping facilities specified in ISO/IEC 11179-3.

This document is applicable to the formulation of models and metamodels to be shared among people and machines, independent of the organization that produces the model or metamodel. It is not applicable to the physical instantiation of any model.

2 Normative references

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

ISO/IEC 11179-~~-~~3:2022, Information technology — ~~-~~Metadata registries (MDR) — Part 3: Metamodel for registry common facilities

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO/IEC 11179-3 and the following apply.

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

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

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

3.1
~~3.1~~ **concept**
unit of knowledge created by a unique combination of characteristics

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

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

[SOURCE: ISO/IEC 11179-3:2022, 3.2.7]

3.2
~~3.2~~ **modelling language**
language or notation that is used to represent some aspect of a universe of discourse

Note 1 to entry: Examples of modelling languages are languages or notations used to express ontologies or to model information requirements, processes, services, forms, roles, goals or some other set of concepts that can be modelled.

[SOURCE: ISO/IEC 19763-10:2014, 3.1.1 modified ~~–~~ — "model" replaced by "represent", "domain of interest" replaced by "universe of discourse", and Note 1 added~~].~~]

3.3
~~3.3~~ **model**
representation of some aspect of a universe of discourse using a recognised *modelling language* (3.2)

Note 1 to entry: Models can be used to express a set of information requirements, processes, services, roles, goals or some other aspect of a universe of discourse.

[SOURCE: ISO/IEC 19763-1:2015, 4.1.12 modified ~~–~~ — "normative modelling facility and model constructs" replaced by "recognised modelling language", "domain of interest" replaced by "universe of discourse", and references added~~].~~]

3.4
~~3.4~~ **model element**
element or component in a *model* (3.3)

Note 1 to entry: Examples of model elements are representations of an entity type in an information model, a representation of an event in a process model, a representation of a service operation in a service model, or a representation of an actor in a role and goal model.

[SOURCE: ISO/IEC 19763-10:2014, 3.1.3 ~~modified – reference added~~]

3.5
~~3.5~~ **model element characteristic**

individual characteristic that is used to qualify, identify, classify, quantify or in some other way express the state of a *model element* (3.4)

Note 1 to entry: The state of a model element is the aggregation of the model element characteristics of that model element.

3.6
~~3.6~~ **concept annotation**
use of a *concept* (3.1) to annotate a *model* (3.3) or a *model element* (3.4) in order to provide meaning to the *model* or *model element*

4 Abbreviated terms

BPMN	Business Process Model and Notation (see ~~reference [16]~~Reference [16])
IDEF1X	Integrated Definition 1 Extended (an information modelling language) (see ~~reference [15]~~Reference [15])
UML	Unified Modeling Language (see ~~references [2], [3]~~References [2] and [3])

5 Conformance

5.1 Overview of conformance

Conformance rules for a Metadata Registry are specified in ISO/IEC 11179-3:2022, Clause 4. The clause "Degree of Conformance" is repeated here for convenience. The subsequent subclauses extend the rules from ISO/IEC 11179-3.

5.2 Degree of conformance

5.2.1 General

The distinction between "strictly conforming" and "conforming" implementations is necessary to address the simultaneous needs for interoperability and extensions. This document describes specifications that promote interoperability. Extensions are motivated by needs of users, vendors, institutions, and industries, and:

~~a)~~ a) are not directly specified by this document;

~~b)~~ b) are specified and agreed to outside this document;

~~c)~~ c) may serve as trial usage for future editions of this document.

A strictly conforming implementation might be limited in usefulness but is maximally interoperable with respect to this document. A conforming implementation might be more useful but might be less interoperable with respect to this document.

5.2.2 Strictly conforming implementations

A strictly conforming implementation:

~~a)~~ a) shall support all mandatory, optional and conditional classes, attributes, datatypes and associations;

b) b) shall not use, test, access, or probe for any extension features nor extensions to classes, attributes, datatypes or associations or a combination of thereof;

c) c) shall not recognize, nor act on, nor allow the production of classes, attributes, datatypes or associations or a combination thereof that are dependent on any unspecified, undefined or implementation-defined behaviour.

NOTE The use of extensions to the metamodel might cause undefined behaviour.

5.2.3 Conforming implementations

A conforming implementation:

a) a) shall support all mandatory, optional and conditional classes, attributes, datatypes and associations;

b) b) as permitted by the implementation, may use, test, access, or probe for extension features or extensions to classes, attributes, datatypes, associations or any combination thereof;

c) c) may recognize, act on, or allow the production of classes, attributes, datatypes, associations or any combination thereof that are dependent on implementation-defined behaviour.

NOTE 1 All strictly conforming implementations are also conforming implementations.

NOTE 2 The use of extensions to the metamodel mightcan cause undefined behaviour.

5.3 Conformance by feature

Conformance claims can be made to the whole of clause Clause 7 or to specific features within that clause. Clause 7 is dependent upon one or more clauses of ISO/IEC 11179-3, so conformance to all or part of clause Clause 7 shall be understood to imply conformance also to relevant provisions specified in one or more of the clauses in ISO/IEC 11179-3.

A conformance statement shall specify exactly the features supported and not supported.

5.4 Standard profiles for edition 4 registries

This document specifies the following standard profiles in addition to those specified in ISO/IEC 11179-3:2022, 4.4.2.

— — **Model registry**: Implements clause Clause 7 of this document, in addition to all provisions of the Basic registry profile of ISO/IEC 11179-3:2022, 4.4.2;

— — **Model registry with mapping**: Implements clause Clause 7 of this document, in addition to all provisions of the Basic registry with mapping profile of ISO/IEC 11179-3:2022, 4.4.2.

Conformance to the above profiles can be claimed using the following labels, respectively:

— — ISO/IEC 11179-35:2022 Model registry;

— — ISO/IEC 11179-35:2022 Model registry with mapping.

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5.5 Implementation conformance statement (ICS)

An implementation claiming conformance to this document shall include an Implementation Conformance Statement stating:

a) whether it conforms or strictly conforms;

b) which clauses are or are not supported;

c) what extensions, if any, are supported or used.

A standard profile may be referenced, if applicable.

EXAMPLE Product X conforms to ISO/IEC 11179-35:2022 Model Registry with Mapping.

5.6 Obligation

Attributes and associations specified in this document are stated to be Mandatory, Conditional or Optional. The obligation is not explicitly stated but is to be inferred from the multiplicity of the attribute or association, and the presence or absence of a condition.

For the purpose of conformance:

a) Mandatory attributes and associations shall exist and shall conform to the provisions of this document.

b) Anything specified as Conditional within this document shall be treated as Mandatory if the associated condition is satisfied and shall otherwise be not present.

c) Optional attributes and associations are not required to exist, but if they do exist they shall conform to the provisions of this document.

Such obligation is enforced if and only if the Registration Status of the associated registry items is Recorded or higher (ISO/IEC 11179-3:2022, 9.4.4.3 and ISO/IEC 11179-6:2022, 4.4 (see reference [1])).[1]).

6 Relationship to ISO/IEC 11179-3:2022

6.1 Metamodel for a metadata registry

A metamodel is a model that describes other models. A metamodel provides a mechanism for understanding the precise structure and components of the specified models, which are needed for the successful sharing of the models by users and software facilities.

ISO/IEC 11179-3 uses a metamodel to describe the information model of a metadata registry. The registry in turn will be used to describe and model other data, for example about enterprise, public administration or business applications. The registry metamodel is specified as a conceptual data model, i.e. one that describes how relevant information is structured in the natural world. In other words, it is how the human mind is accustomed to thinking of the information.

6.2 Specification of the metamodel

The conventions used in specifying the metamodel are described in ISO/IEC 11179-3:2022, 5.3. All the classes specified in the Model package (clause see Clause 7 of this document) inherit from **Item**, which

is specified in the Core model region in ISO/IEC 11179-3:2022, 6.4.2.1. As instances of the **Item** class, instances of these classes may be identified, registered, administered, named, defined and classified.

6.3 Use of UML Class diagrams and textual description

This document uses both text and UML class diagrams (~~references~~ References [5~~],[~~], [6]) to describe the metamodel. Both are normative and are intended to be complementary. However, if a conflict exists between what is specified in the UML Class diagrams and what is specified in text, the text takes precedence until a correction is made to make them consistent. Further, if a conflict exists between a formal definition and other normative text, the formal definition takes precedence until a correction is made to make them consistent.

A consolidated UML class hierarchy is included as Annex A.

While the model diagrams are presented in UML notation, this document does not assume nor endorse any specific system environment, database management system, database design paradigm, system development methodology, data definition language, command language, system interface, user interface, computing platform, or any technology required for implementation.

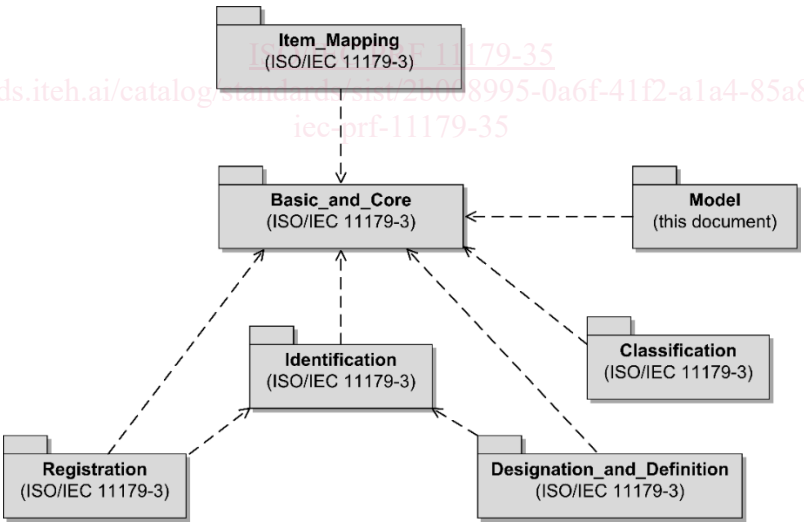
~~In this clause, clause 7 and Annex C, this document uses:~~

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

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

~~EXAMPLE **Model_Element** (7.2.2.3) is a class each instance of which models a model element.~~

6.4 Package dependencies



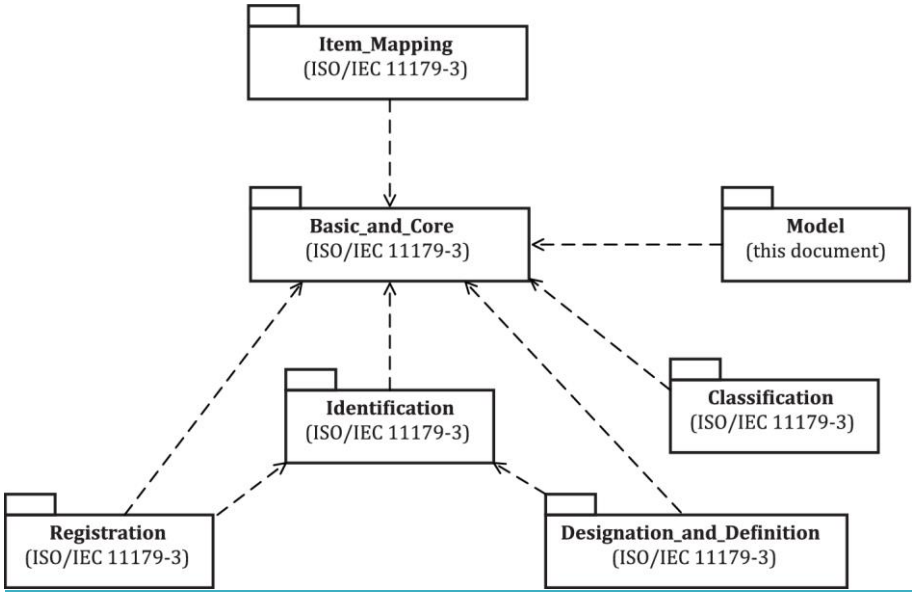


Figure 1 — Package dependencies

Figure 1 illustrates the dependencies among the packages. The lines in the figure illustrate dependencies in the direction of the arrow. The Model package is specified in clause Clause 7 of this document. The other packages shown in the Figure 1 are specified in IS0/IEC 11179-3:2022. In order to implement a package that has dependencies, the packages on which it is dependent shall also be implemented. The dependencies are of three types:

a) a) Subclassing from classes in another package, e.g. **Model** (7.2.2.2) and **Model_Element** (7.2.2.3) in the Model metamodel package (7) are subclassed from the **Item** class in the Basic_and_Core metamodel package in ISO/IEC 11179-3:2022.

b) b) Relationship between classes, e.g. **Registered_Item** in the Registration metamodel package in ISO/IEC 11179-3:2022 has a relationship with **Reference_Document** in the Basic_and_Core metamodel package in ISO/IEC 11179-3:2022.

c) c) Some attributes use a predefined datatype or a class from another package as a datatype, e.g. the **contact** attribute of the **Stewardship_Record** class in the Registration metamodel package in ISO/IEC 11179-3:2022 uses the **Contact** class of the Basic_and_Core metamodel package in ISO/IEC 11179-3:2022 as a data type.

Conformance options are specified in clause 5 and standard conformance profiles in 5.4.

7 Model package

7.1 Overview of the Model package

The Model package consists of a single metamodel region, the Model metamodel region.