
**Information technology — Metadata
registries (MDR) —**

**Part 1:
Framework**

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

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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. In the field of information technology, ISO and IEC have established a joint technical committee, ISO/IEC JTC 1.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of the joint technical committee is to prepare International Standards. Draft International Standards adopted by the joint technical committee are circulated to national bodies for voting. Publication as an International Standard requires approval by at least 75 % of the national bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO and IEC shall not be held responsible for identifying any or all such patent rights.

ISO/IEC 11179-1 was prepared by Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 32, *Data management and interchange*.

This second edition cancels and replaces the first edition (ISO/IEC 11179-1:1999), which has been technically revised.

ISO/IEC 11179 consists of the following parts, under the general title *Information technology — Metadata registries (MDR)*:

- *Part 1: Framework*
- *Part 2: Classification*
- *Part 3: Registry metamodel and basic attributes*
- *Part 4: Formulation of data definitions*
- *Part 5: Naming and identification principles*
- *Part 6: Registration*

Introduction

ISO/IEC 11179 - *Metadata registries (MDR)*, 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 data
- Re-use of the components of data

ISO/IEC 11179 is six part standard. Each part is devoted to addressing a different aspect of the needs listed above. The parts and a short description follow:

- Part 1 – *Framework* – Contains an overview of the standard and describes the basic concepts
- Part 2 – *Classification* – Describes how to manage a classification scheme in a metadata registry
- Part 3 – *Registry metamodel and basic attributes* – Provides the basic conceptual model, including the basic attributes and relationships, for a metadata registry
- Part 4 – *Formulation of data definitions* – Rules and guidelines for forming quality definitions for data elements and their components
- Part 5 – *Naming and identification principles* – Describes how to form conventions for naming data elements and their components
- Part 6 – *Registration* – Specifies the roles and requirements for the registration process in an ISO/IEC 11179 metadata registry

Generally, descriptive data is known as metadata. That is, metadata is data that is used for describing other data. As the use of the term has evolved, metadata now refers, generally, to data that is used for describing some other objects. We limit the scope of the term as it is used here in ISO/IEC 11179 to descriptions of data - the more traditional use of the term.

An MDR is a database of metadata that supports the functionality of registration. 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 manages the semantics of data. Understanding data is fundamental to its 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.

MDR's 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 identify situations where similar or identical names are in use for administered items that are significantly different in one or more respects.

In ISO/IEC 11179 the basic container for data is called a data element. It may exist purely as an abstraction or exist in some application system. In either case, the description of a data element is the same in ISO/IEC 11179. Data element descriptions have both semantic and representational components. The semantics are further divided into contextual and symbolic types.

The contextual semantics are described by the data element concept (DEC). The DEC describes the kinds of objects for which data are collected and the particular characteristic of those objects being measured. The symbolic semantics are described by the conceptual domain (CD). A CD is a set of categories, not necessarily finite, where the categories represent the meaning of the permissible values in a value domain - the allowed values for a data element.

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

The representational component is about the permitted values a data element may use. Each value corresponds to one of the categories in the CD. The set of these permitted values is called a value domain (VD). A VD specifies all the values that are allowed either through an enumeration, a rule, or a combination of these. The computational model the values follow is given by their datatype.

The semantic and representational components are described through attributes contained in the conceptual model of a metadata registry as specified in ISO/IEC 11179-3. A metadata registry that conforms to ISO/IEC 11179 can describe a wide variety of data. In fact, the attributes described in ISO/IEC 11179-3 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. This standard 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.

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. To guarantee this shared view, a number of basic attributes has to be defined.

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 EDI-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 11179-3 are required in all cases. Distinction is made between those attributes that are mandatory, conditional, or optional.

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Information technology — Metadata registries (MDR) —

Part 1: Framework

1 Scope

ISO/IEC 11179 specifies the kind and quality of metadata necessary to describe data, and it specifies the management and administration of that metadata in a metadata registry (MDR). It applies to the formulation of data representations, concepts, meanings, and relationships between them to be shared among people and machines, independent of the organization that produces the data. It does not apply to the physical representation of data as bits and bytes at the machine level.

In ISO/IEC 11179, metadata refers to descriptions of data. ISO/IEC 11179 does not contain a general treatment of metadata. This part of ISO/IEC 11179 provides the means for understanding and associating the individual parts and is the foundation for a conceptual understanding of metadata and metadata registries.

2 Normative references

The following referenced documents are indispensable for the application 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 704:2000, *Terminology work — Principles and methods*

ISO 1087-1:2000, *Terminology work — Vocabulary — Part 1: Theory and application*

ISO/IEC 11179 (all parts), *Information technology — Metadata registries (MDR)*

3 Terms and definitions

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

3.1 Definitions of modeling constructs

This sub-clause defines the modeling constructs used in this part of ISO/IEC 11179.

3.1.1

attribute

characteristic of an **object** or **entity**

3.1.2

class

description of a set of **objects** that share the same **attributes**, operations, methods, **relationships**, and semantics

[ISO/IEC 19501-1:2001, 2.5.2.9].

3.1.3

identifier (in **Metadata Registry**)

sequence of characters, capable of uniquely identifying that with which it is associated, within a specified **context**

NOTE A name should be used as an identifier because it is not linguistically neutral.

3.1.4

relationship

connection among model elements

[ISO/IEC 19501-1:2001, 2.5.2.36].

3.2 General terms used in this part of ISO/IEC 11179

This sub-clause defines terms that have general usage beyond the specific needs of this part of ISO/IEC 11179, but are not modeling constructs defined in 3.1.

3.2.1

basic attribute

attribute of a **metadata item** commonly needed in its specification

3.2.2

characteristic

abstraction of a property of an **object** or of a set of objects

NOTE Characteristics are used for describing **concepts**.

[ISO 1087-1:2000, 3.2.4].

3.2.3

concept

unit of knowledge created by a unique combination of **characteristics**

[ISO 1087-1:2000, 3.2.1].

3.2.4

concept system

set of **concepts** structured according to the relations among them

[ISO 1087-1:2000, 3.2.11]

3.2.5

conceptual data model

conceptual model

data model that represents an abstract view of the real world

NOTE A conceptual model represents the human understanding of a system.

3.2.6

data

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

NOTE Data can be processed by humans or by automatic means.

[ISO 2382-1:1993, 01.01.02].

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3.2.7**data model**

graphical and/or lexical representation of **data**, specifying their properties, structure and inter-relationships

3.2.8**definition**

representation of a **concept** by a descriptive statement which serves to differentiate it from related **concepts**

[ISO 1087-1:2000, 3.3.1].

3.2.9**designation**

representation of a concept by a sign which denotes it

[ISO 1087-1:2000, 3.4.1].

3.2.10**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 An entity exists whether data about it are available or not.

[ISO/IEC 2382-17:1999, 17.02.05].

3.2.11**essential characteristic**

characteristic which is indispensable to understanding a **concept**

[ISO 1087-1:2000, 3.2.6].

3.2.12**extension**

<terminology>

totality of **objects** to which a **concept** corresponds

[ISO 1087-1:2000, 3.2.8].

NOTE This term has a different meaning in ISO/IEC 11179-3.

3.2.13**general concept**

concept which corresponds to two or more **objects**, which form a group by reason of common properties

NOTE Examples of general concepts are 'planet', 'tower'.

[ISO 1087-1:2000, 3.2.3]

3.2.14**individual concept**

concept which corresponds to only one **object**

NOTE Examples of individual concepts are: 'Saturn', 'the Eiffel Tower'.

[ISO 1087-1:2000, 3.2.2].

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3.2.15

intension

<terminology>

set of **characteristics** which makes up the **concept**

[ISO 1087-1:2000, 3.2.9].

3.2.16

metadata

data that defines and describes other **data**

3.2.17

metadata item

instance of a **metadata object**

3.2.18

metadata object

object type defined by a metamodel

3.2.19

metadata registry

MDR

information system for registering **metadata**

3.2.20

metamodel

data model that specifies one or more other data models

3.2.21

name

designation of an **object** by a linguistic expression ISO/IEC 11179-1:2004

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3.2.22

object

anything perceivable or conceivable

NOTE Objects may also be material (e.g. an engine, a sheet of paper, a diamond), immaterial (e.g. a conversion ratio, a project plan), or imagined (e.g. a unicorn).

[ISO 1087-1:2000, 3.1.1].

3.2.23

registry item

metadata item recorded in a **metadata registry**

3.2.24

registry metamodel

metamodel specifying a **metadata registry**

3.2.25

terminological system

concept system with **designations** for each **concept**

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