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Information technology — Metadata registries (MDR)

Part 1: Framework

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A list of organizations represented on this committee can be obtained on request to its secretary.

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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

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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.

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).

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. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

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For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: Foreword - Supplementary information

The committee responsible for this document is ISO/IEC JTC1, *Information technology*, SC32, *Data management and interchange*.

This third edition of ISO 11179-1 cancels and replaces ISO 11179-1:2004, 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 principles*

— *Part 6: Registration*

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Introduction

ISO/IEC 11179 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 is 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:

— 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 conceptual model, including the basic attributes and relationships, for a metadata registry;

— Part 4: *Formulation of data definitions* – Gives rules and guidelines for forming quality definitions for data elements and their components;

— Part 5: *Naming 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 are known as metadata. Metadata can describe books, phone calls, data, etc. ISO/IEC 11179 focuses upon metadata that describes data.

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

A metadata registry (MDR) is a database of metadata. Registration is one possible function of that database. 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.

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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 kind 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 concepts, not necessarily finite, where the concepts represent the meaning of the permissible values in a value domain. A value domain contains the allowed values for a data element.

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.

This third edition of ISO/IEC 11179-1 introduces concepts and concept systems in the description of the semantics of data. Object classes, properties, DECs, value meanings and CDs are concepts. Therefore, they have definitions and may be designated by names or codes. They may also be organized through the use of relations among them into concept systems. A classification scheme is a concept system that is used for classifying some objects and classification of an object adds meaning to that object.

Features needed for formal reasoning are also new to this third edition of ISO/IEC 11179-1. Applying the rules of some form of formal logic (1st order logic, predicate calculus, description logic, etc.) may add additional abilities to query and reason with concept systems. Ontologies are concept systems that allow the application of formal logic and this edition provides for their use.

The representational component is about the permitted values a data element may use. Each such permissible value is a designation of one of the concepts in the CD. The set of these permissible 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. 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.

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

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"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 11179-3 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

This part of ISO/IEC 11179 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 part of ISO/IEC 11179 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.

In this part of ISO/IEC 11179 (and all other parts), metadata refers to descriptions of data. It does not contain a general treatment of metadata.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 704:2009, *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, definitions and abbreviations

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

3.1 Definitions of modelling constructs

3.1.1
attribute
characteristic (3.2.2) of an *object* (3.2.22) or set of objects

3.1.2
class
description of a set of *objects* (3.2.22) that share the same *attributes* (3.1.1), operations, methods, *relationships* (3.1.4) and semantics

[SOURCE: ISO/IEC 19505-2:2012, 7.3.7 modified]

3.1.3
identifier
<metadata registry> sequence of characters, capable of uniquely identifying that with which it is associated, within a specified *context* (3.3.7)

Note 1 to entry: A name should not be used as an identifier because it is not linguistically neutral.

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