

## Information technology — Metamodel framework for interoperability (MFI) — Part 10: Core model and basic mapping

*Technology de l'information — Cadre du métamodèle pour l'interopérabilité (MFI) — Partie 10: Modèle de base et de cartographie de base*

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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 19763-10 was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information Technology*, Subcommittee SC 32, *Data management and Interchange*.

ISO/IEC 19763 consists of the following parts, under the general title *Information technology — Metamodel framework for interoperability (MFI)*:

- *Part 1: Reference model*
- *Part 3: Metamodel for ontology registration*
- *Part 5: Metamodel for process model registration*
- *Part 6: Registry summary*
- *Part 7: Metamodel for service registration*
- *Part 8: Metamodel for role and goal model registration*
- *Part 9: On demand model selection [Technical Report]*
- *Part 10: Core model and basic mapping*
- *Part 11: Structured model registering [Technical Report]*
- *Part 12: Metamodel for information model registration*

## Introduction

Industrial consortia have engaged in the standardization of domain-specific business objects including business process models and software components using common modelling facilities and interchange facilities such as UML and XML. They are very active in standardizing domain-specific business process models and standard modelling constructs such as data elements, entity profiles, and value domains.

However, to promote interoperability across business domains, a generic framework for registering a variety of models and the mapping between them is required. This part of ISO/IEC 19763 provides a core metamodel as the basis for the other parts of ISO/IEC 19763 and a metamodel for registering for registering the mappings between models registered in those other parts of ISO/IEC 19763.

NOTE UML is a trademark of the Object Management Group.

# Information technology — Metamodel framework for interoperability (MFI) — Part 10: Core model and basic mapping

## 1 Scope

The primary purpose of the multipart standard ISO/IEC 19763 is to specify a metamodel framework for interoperability. This part of ISO/IEC 19763 specifies the metamodel that provides a facility to register administrative information and common semantics of models and mapping between two models.

This part of ISO/IEC 19763 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.

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

Figure 1 shows the relationship between this part of ISO/IEC 19763 and other parts of ISO/IEC 19763.

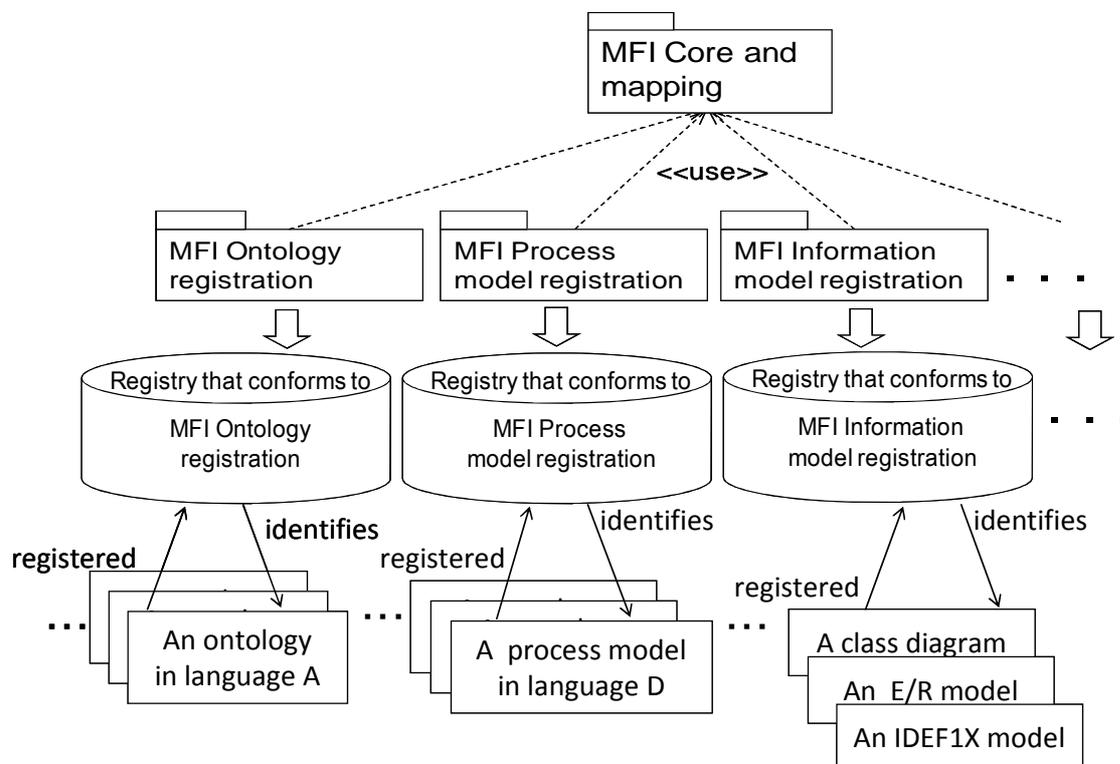


Figure 1 — Relation between MFI Core and Mapping and other parts

## 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/IEC 11179-3:2012, Information technology – Metadata registries (MDR) – Part 3: Registry metamodel and basic attributes

ISO/IEC 11179-6, Information technology – Metadata registries (MDR) – Part 6: Registration

ISO/IEC 19763-1, Information technology – Metamodel framework for interoperability (MFI) – Part 1: Reference model

## 3 Terms, definitions and abbreviated terms

### 3.1 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO/IEC 11179-3:2012, ISO/IEC 11179-6, ISO/IEC 19763-1 and the following apply.

#### 3.1.1

##### **modelling language**

language or notation that is used to model some aspect of a domain of interest

#### 3.1.2

##### **model**

representation of some aspect of a domain of interest using a normative modelling facility and modelling constructs

[Adapted from ISO/IEC 19763-1:2013.]

NOTE models can be used to express a set of information requirements, processes, services, roles, goals or some other aspect of a domain of interest

#### 3.1.3

##### **model element**

element or component in a model

NOTE examples of model elements are an entity type in an information model, an event in a process model, a service operation in a service model, or an actor in a role and goal model.

#### 3.1.4

##### **model element set**

means by which a set of model elements are grouped together for the purposes of mapping, with each set forming one half of a model element set mapping

#### 3.1.5

##### **model mapping**

collection of model element set mappings

NOTE a model mapping is a statement that the domains represented by two models intersect and there is a need to register details of the correspondence between the structures in the models that semantically represent this overlap to achieve interoperability.

### 3.1.6

#### **model element set mapping**

part of a model mapping, comprising two sets of model elements, one from each of the models being mapped, that model similar real-world requirements.

### 3.1.7

#### **model element set mapping type**

classification for a set of model element set mappings

## 3.2 Abbreviated terms

### **MFI**

Metamodel framework for interoperability

### **MFI Core and mapping**

ISO/IEC 19763-10, Information technology – Metamodel framework for interoperability (MFI) – Part 10: Core model and basic mapping

### **MDR**

Metadata Registry

### **IRI**

Internationalized Resource Identifier<sup>[1]</sup>

## 4 Conformance

### 4.1 General

An implementation claiming conformance to this part of ISO/IEC 19763 shall support some part of the metamodel specified in this part of ISO/IEC 19763, depending on which level of conformance and which degree of conformance it claims.

### 4.2 Levels of Conformance

#### 4.2.1 General

An implementation may conform to one of the two levels of conformance to this part of ISO/IEC 19763, depending on what packages it supports.

#### 4.2.2 Conformance Level 1

The metamodel specified in clause 6 the Core\_Model package is supported.

#### 4.2.3 Conformance Level 2

The metamodels specified in clause 6 the Core\_Model package and clause 7 the Basic\_Mapping\_Model package are supported.

### 4.3 Implementation Conformance Statement (ICS)

An implementation claiming conformance to this part of ISO/IEC 19763 shall include an Implementation Conformance Statement stating:

- a) which conformance level it claims (4.2);

- b) what types (including none) specified in clause 5.5 of ISO/IEC 11179-3:2012 each of the metaclasses in the one or more metamodells supported is and/or whether clause 12, ISO/IEC 11179-3:2012, each of the metaclasses in the one or more metamodells supported supports.

NOTE Other parts of ISO/IEC 19763 will require a conformance to this part of ISO/IEC 19763 as a part of its conformance claim. It will follow 4.4.

## 5 Overview of MFI Core and mapping

### 5.1 Basic Structure

MFI Core and mapping consists of two packages: **Core\_Model** package and **Basic\_Mapping\_Model** package. Figure 2 shows the package structure of MFI Core and mapping.

The **Core\_Model** package specifies a core model that is inherited by other parts of ISO/IEC 19763 to register administrative information and common semantics of models. The **Basic\_Mapping\_Model** package specifies a basic mapping model allows the registration of information about mappings between models.

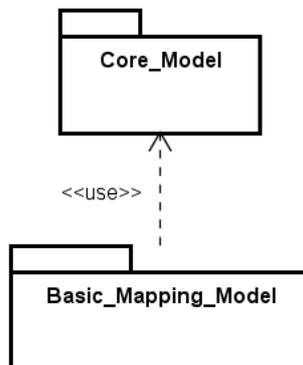


Figure 2 — Package structure of MFI Core and Mapping

### 5.2 Overview of the Core\_Model package

Figure 3 shows the metamodel in the **Core\_Model** package.

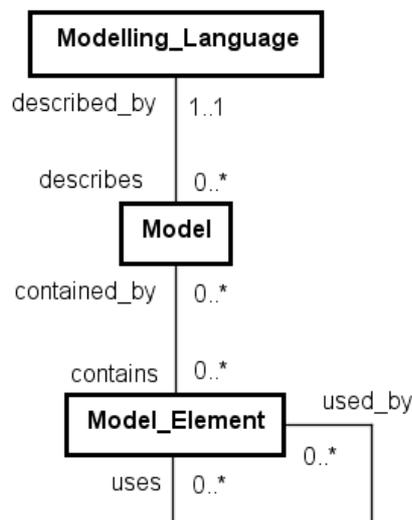


Figure 3 — The Metamodel in the Core\_Model package

It comprises the following metaclasses:

- **Modelling\_Language**
- **Model**
- **Model\_Element**

The metaclasses that represent models in other parts of ISO/IEC 19763 will be subclasses of **Model** and the metaclasses representing the content of these models will be subclasses of **Model\_Element**. Some of the metaclasses in other parts of ISO/IEC 19763 inherited from **Model** or **Model\_Element** may override some attributes and/or references of the metaclasses defined in this part. The metaclasses that represent the language in which these models are expressed will be subclasses of **Modelling\_Language**.

Each modelling language is a language or notation that is used to express ontologies and/or to model information requirements, processes, services, roles, goals or some other set of concepts that can be modelled.

Each model is an ontology or is used to represent a set of information requirements, processes, services, roles, goals or some other set of concepts that can be represented in a model.

Each model element is an element or component in a model, such as a non-logical symbol in an ontology, an entity type in an information model, an event in a process model, a service operation in a service model, or an actor in a role and goal model.

Each model shall be expressed in one and only one modelling language. Each modelling language is used for zero, one or more models.

Each model contains zero, one or more model elements. Each model element is part of zero, one or more models.

Each model element uses zero, one or more other model elements. Each model element is used by zero, one or more other model elements.

The exact specification of each metaclass in the **Core\_Model** package is given in clause 6.

### 5.3 Overview of the **Basic\_Mapping\_Model** package

Figure 4 shows the metamodel in the **Basic\_Mapping\_Model** package.

It comprises the following metaclasses:

- **Model\_Mapping**
- **Model\_Element\_Set\_Mapping**
- **Model\_Element\_Set\_Mapping\_Type**
- **Model\_Element\_Set**

Each model mapping is a mapping from a model to another model, one of which is the subject model and the other is the object model.

Each model element set is the means by which a set of model elements are grouped together for the purposes of mapping, with each set forming one half of a model element set mapping.

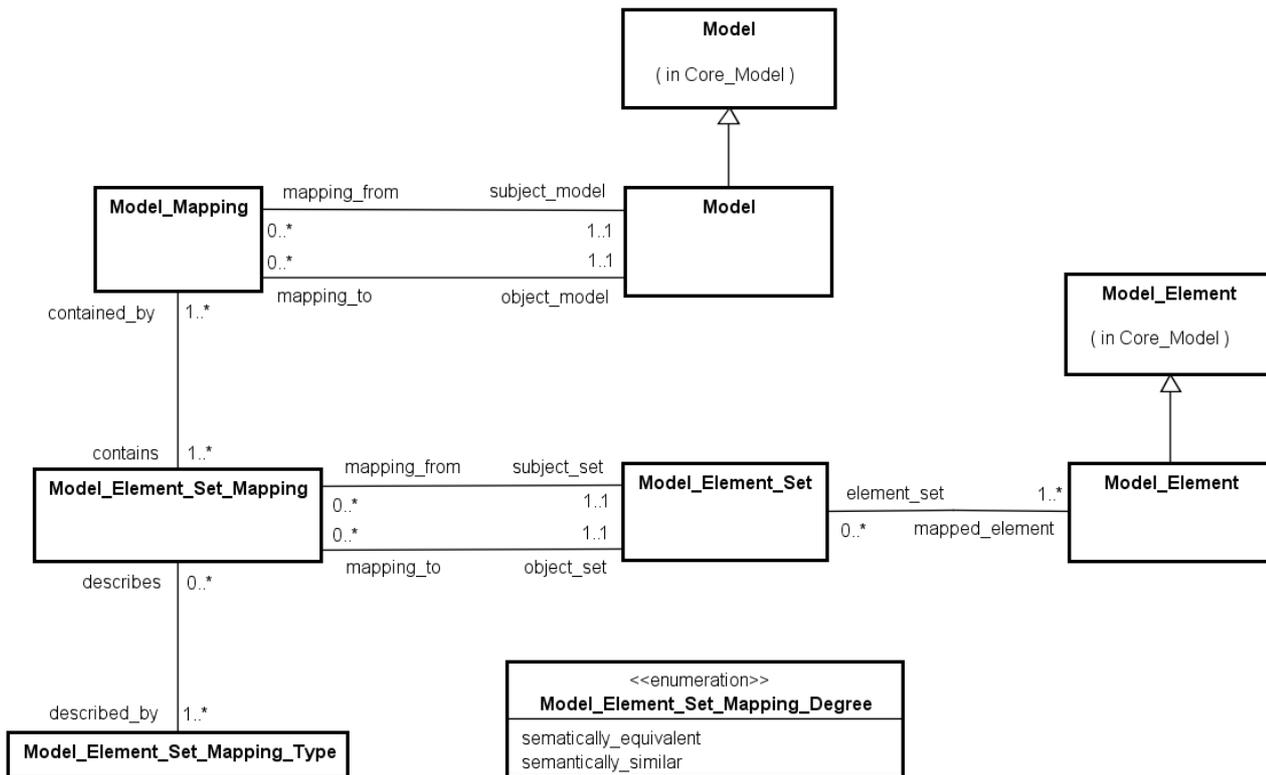


Figure 4 —The Metamodel in the Basic\_Mapping\_Model package

Each model element set mapping is part of a model mapping. Each model element set mapping comprises a set of model elements from the subject model and a set of elements from the object model that model similar real-world requirements.

Each model element set mapping type is a classification for a set of model element mappings.

Each model mapping shall be of one and only one model, which is the subject model. Each model is the subject of zero, one or more model mappings.

Each model mapping shall be to one and only one model, which is the object model. Each model is the object of zero, one or more model mappings.

Each model element set mapping shall be described by one and only one model element set mapping type. Each model element set mapping type is the description of zero, one or more model element set mappings.

Each model element set mapping shall be of one and only one model element set, which is the subject model element set. Each model element set is the subject of zero, one or more model element set mappings.

Each model element set mapping shall be to one and only one model element set, which is the object model element set. Each model element set is the object of zero, one or more model element set mappings.

Each model mapping shall be comprised of one or more model element set mappings. Each model element set mapping shall be part of one or more model mappings.

Each model element set contains zero, one or more model elements. Each model element is mapped though zero, one or more model element sets.

The exact specification of each metaclass in the **Basic\_Mapping\_Model** package is given in clause 7.

## 6 Detail provided in each metaclass definition

In this part of ISO/IEC 19763, each metaclass is defined in the following form. Other parts of ISO/IEC 19763 also use this notation and format unless otherwise specified.

Each metaclass is defined at its relevant subclause.

Title of a subclause is the metaclass name and the first paragraph is a brief description of the metaclass.

Its direct superclass is specified under the heading of **Superclass**.

Its attributes are listed and defined under the heading of **Attribute**, **Data Type**, **Multiplicity** and **Description**, under each of which, each name, its datatype, its multiplicity and its brief descriptions are given, respectively.

Its references are listed and defined under the heading of **Reference**, **Class**, **Multiplicity**, **Description**, **Inverse** and **Precedence**, under each of which, each name, a name of the metaclass of its range, its multiplicity, its brief description, its inverse reference name and whether it has precedence of its inverse reference or not, are given, respectively. The inverse reference name shall be interpreted within the namespace which is a range of the reference.

If a class has other constraints, they are described in a natural language under the heading of **Constraints**.

In UML an association is equivalent to a reference and its inverse reference. In this part of ISO/IEC 19763, to formally define a metaclass, associations are not used, but each association is replaced by two references, a reference and its inverse reference. If a reference has precedence over its inverse reference, it means that instances of the relevant metaclass have responsibility for maintenance of the links of the association defined by it and its inverse reference.

For better understandability, diagrams show associations, rather than references. A reference name is shown as a role name.

For simplicity, a diagram does not show attributes.

Multiplicity constraints of attributes and references and other constraints of a metaclass are to be enforced when registration status of an instance of the metaclass is "recorded" or higher.

NOTE Registration statuses are defined in ISO/IEC 11179-6.

## 7 The Core\_Model package

### 7.1 Modelling\_Language

Modelling\_Language is a metaclass each instance of which represents a language or notation that is used to express ontologies and/or to model information requirements, processes, services, roles, goals or some other set of concepts that can be modelled.

**Superclass**

None

Attribute	Datatype	Multiplicity	Description		
name	String	1..1	The name of this language		
Reference	Class	Multiplicity	Description	Inverse	Precedence
describes	Model	0..*	The models that this language describes	described_by	No

**Constraints**

None

### 7.2 Model

Model is a metaclass each instance of which represents a model that is used to model an ontology, information requirements, processes, services, roles, goals or some other set of concepts that can be modelled.

**Superclass**

None

Attribute	Datatype	Multiplicity	Description		
Identifier	String	1..1	The identifier that globally identifies the corresponding model. It is recommended that this should be an IRI.		
Reference	Class	Multiplicity	Description	Inverse	Precedence
described_by	Modelling_Language	1..1	The language used to express this model	describes	Yes
contains	Model_Element	0..*	The model elements that are part of this model	contained_by	Yes

**Constraints**

None

### 7.3 Model\_Element

Model\_Element is a metaclass each instance of which represents an element or component in a model, such as an entity type in an information model, an event in a process model, a service operation in a service model, or an actor in a role and goal model.

#### Superclass

None

#### Attribute

None

Reference	Class	Multiplicity	Description	Inverse	Precedence
uses	Model_Element	0..*	The model elements that are used by this model	contains	Yes
contained_by	Model	0..*	The models that contain this model	contains	No
used_by	Model_Element	0..*	The model elements that use this model element	contains	No
element_set	Model_Element_Set	1..*	The model elements that comprise this model element	mapped_element	Yes

#### Constraints

None

## 8 The Basic\_Mapping\_Model package

### 8.1 Model (as specialized)

Model is a subclass of Model in the Core\_Model package, each instance of which represents a model that is mapped to and/or from by zero, one or more model mappings.

#### Superclass

Model (in the Core\_Model package)

Attribute	Datatype	Multiplicity	Description
Nonidentifier			

Reference	Class	Multiplicity	Description	Inverse	Precedence
mapping_from	Model_Mapping	0..*	The model mappings that map from this model	subject_model	No

mapping_to	Model_Mapping	0..*	The model mappings that map to this model	object_model	No
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**Constraints**

None

**8.2 Model\_Element (as specialized)**

Model\_Element is a subclass of Model\_Element in the Core\_Model package, each instance of which represents a model element forms zero, one or more model element sets.

**Superclass**

Model\_Element (in the Core\_Model package)

**Attribute**

None

Reference	Class	Multiplicity	Description	Inverse	Precedence
element_set	Model_Element_Set	0..*	The model elements that comprise this model element	mapped_element	Yes

**Constraints**

None

**8.3 Model\_Mapping**

Model\_Mapping is a metaclass each instance of which represents a mapping from a model to another model, one of which is known as the subject model and the other is known as the object model.

**Superclass**

None

**Attribute**

None

Reference	Class	Multiplicity	Description	Inverse	Precedence
subject_model	Model	1..1	The model that is the subject of this model mapping.	mapping_from	Yes

object_model	Model	1..1	The model that is the object of this model mapping.	mapping_to	Yes
contains	Model_Element_Set_Mapping	1..*	The set of model mapping components that are contained by this model mapping.	contained_by	Yes

**Constraints**

None

**8.4 Model\_Element\_Set\_Mapping**

Model\_Element\_Set\_Mapping is a metaclass each instance of which represents some part of a model mapping; each model element set mapping comprises a set of model elements from the subject model and a set of model elements from the object model that model similar real-world requirements.

Superclass

None

Attribute	Datatype	Multiplicity	Description		
degree	Model_Element_Set_Mapping_Degree	1..1	The degree of semantic equivalence exhibited by this model mapping component.		
Reference	Class	Multiplicity	Description	Inverse	Precedence
subject_set	Model_Element_Set	1..1	The model element set that forms the subject of this model mapping component.	mapping_from	Yes
object_set	Model_Element_Set	1..1	The model element set that forms that forms the object of this model mapping component.	mapping_to	Yes
described_by	Model_Element_Mapping_Type	1..1	The model element mapping type that describes or classifies this model mapping component.	describes	Yes
contained_by	Model_Mapping	0..*	The set of model mapping components that are contained by this model mapping.	contains	No

**Constraints**

None

## 8.5 Model\_Element\_Mapping\_Type

Model\_Element\_Mapping\_Type is a metaclass each instance of which represents a classification for a set of model mapping components.

### Superclass

None

### Attribute

None

Reference	Class	Multiplicity	Description	Inverse	Precedence
describes	Model_Element_Mapping	0..*	The model element mappings that are described or classified by this model mapping component set	described_by	Yes

### Constraints

None

## 8.6 Model\_Element\_Set

Model\_Element\_Set is a metaclass each instance of which represents the means by which a set of model elements are grouped together for the purposes of mapping; each set forms one half of a model mapping component.

### Superclass

None

### Attribute

None

Reference	Class	Multiplicity	Description	Inverse	Precedence
mapped_element	Model_Element	1..*	The model elements that comprise this model mapping component set	element_set	Yes
mapping_from	Model_Element_Set_Mapping	0..*	The model element set mappings that include this model element set as the subject set	subject_set	No
mapping_to	Model_Element_Set_Mapping	0..*	The model element set mappings that include this model element set as the object set	object_set	No

### Constraints

None

## 8.7 Model\_Element\_Set\_Mapping\_Degree

Model\_Element\_Set\_Mapping\_Degree is an enumerated datatype that is comprised of 'semantically\_equivalent', 'semantically\_similar'

## Annex A (informative)

### Possible Types for Metaclasses

The followings are possible types for metaclasses of this part of ISO/IEC 19763. Each subordinate part of ISO/IEC 19763 will specify the types of each metaclass that it uses.

- Instances of **Modelling\_Language** should be instances of **Identified\_Item**.
- Some instances of **Model** are instances of **Administered\_Item**, but other instances are not necessarily instances of **Administered\_Item**. Instances of **Registered\_Ontology\_Whole** of ISO/IEC 19763-3 can be examples of the former are and instances of **Unregistered\_Ontology\_Whole** can be examples of the latter, since they are not even instances of **Registered\_Item**.
- Some instances of **Model\_Element** are instances of **Administered\_Item**, but other instances are not necessarily instances of **Administered\_Item**. Instances of **Registered\_Ontology\_Atomic\_Construct** can be examples of the former are and instances of **Unregistered\_Ontology\_Atomic\_Construct** can be examples of the latter, since they are not even instances of **Registered\_Item**. Instances of **Entity\_Type** also can be examples of the latter, since they are instances of **Attached\_Item**.
- Instances of **Model\_Mapping**, **Model\_Element\_Set\_Mapping** and **Model\_Element\_Set** are instances of **Administered\_Item**.
- Instances of **Model\_Element\_Set\_Mapping\_Type** can be examples which are not even instances of **Identified\_Item**.

## Annex B (informative)

### Examples

#### B.1 Description of examples

This annex shows how some of the examples of the subordinate parts of ISO/IEC 19763 are registered, according to this part of ISO/IEC 19763. The examples are the ontologies called "LO1" at **B.3 Examples of a local registered ontology, ISO/IEC 19763-3:2010** and "LO3" at **C.1 Examples of evolution, ISO/IEC 19763:2010**. "LO1" evolves to "LO3" so that "LO3" uses non-logical symbol "micrometer" rather than "micron", and they are different ontologies consisting of different sentences, but they are semantically equivalent.

Figure B.1 shows three examples of the sentences in "LO1", named "LC1", "LC2", and "LC3", as shown in Figure B.1.

LC1

```
(and (KernelUnit metre) (Dimensionality length) (dimensionality metre length))
```

LC2

```
(and (PrefixedUnit micron) (MetricPrefix micro) (KernelUnit metre)
(prefix micron micro) (kernel micron metre))
```

LC3

```
((forall ?Unit1 ?Unit2 ?Dimensionality1 ?Dimensionality2)
(implies (and (PrefixedUnit ?Unit1) (kernel ?Unit1 ?Unit2)
(dimensionality ?Unit1 ?Dimensionality1) (dimensionality ?Unit2 ?Dimensionality2))
(equal ?Dimensionality1 ?Dimensionality2)))
```

**Figure B.1 — Three examples of the sentences in LO1**

Figure B.2 shows three examples of the sentences in "LO3". These sentences are named "LC5", "LC6", and "LC7", as shown in Figure C.1, corresponding to "LC1", "LC2" and "LC3" in "LO1" respectively.

LC5

```
(and (KernelUnit metre) (Dimensionality length) (dimensionality metre length))
```

LC6

```
(and (PrefixedUnit micrometre) (MetricPrefix micro) (KernelUnit metre)
(prefix micrometre micro) (kernel micrometre micron metre))
```

LC7

```
((forall ?Unit1 ?Unit2 ?Dimensionality1 ?Dimensionality2)
(implies (and (PrefixedUnit ?Unit1) (kernel ?Unit1 ?Unit2)
(dimensionality ?Unit1 ?Dimensionality1) (dimensionality ?Unit2 ?Dimensionality2))
(equal ?Dimensionality1 ?Dimensionality2)))
```

**Figure B.2 — Three examples of the sentences in LO3**

## B.2 Registration at Conformance Level 1

Figure B.3 shows how the ontology "LO1" is registered at a registry that conforms to this part of ISO/IEC 19763 at Conformance Level 1.

### <Model (Local\_Registered\_Ontology\_Whole)>

Object20

Attribute/Reference	Literal/Instance
Identifier	http://local1.org/unit
(ontologyName)	"LO1"
described_by	Object40
contains	Object21
	Object22
	Object23
	...

### <Model\_Element (Local\_Registered\_Ontology\_Component)>

Object21

Attribute/Reference	Literal/Instance
(sentenceIdentifier)	"LC1"
uses	Object05
	Object07
	Object08
	Object09
	Object10

Object23

Attribute/Reference	Literal/Instance
(sentenceIdentifier)	"LC3"
uses	Object05
	Object14
	Object16

Object22

Attribute/Reference	Literal/Instance
(sentenceIdentifier)	"LC2"
uses	Object08
	Object09
	Object14
	Object15
	Object16
	Object18
	Object19
	Object24

### <Model\_Element (Local\_Registered\_Ontology\_Atomic\_Construct)>

Object05

Attribute/Reference	Literal/Instance
(nonLogicalSymbol)	"dimensionality"

Object08

Attribute/Reference	Literal/Instance
(nonLogicalSymbol)	"KernelUnit"

Object10

Attribute/Reference	Literal/Instance
(nonLogicalSymbol)	"length"

Object15

Attribute/Reference	Literal/Instance
(nonLogicalSymbol)	"prefix"

Object18

Attribute/Reference	Literal/Instance
(nonLogicalSymbol)	"MetricPrefix"

Object24

Attribute/Reference	Literal/Instance
(nonLogicalSymbol)	"micron"

Object07

Attribute/Reference	Literal/Instance
(nonLogicalSymbol)	"Dimensionality"

Object09

Attribute/Reference	Literal/Instance
(nonLogicalSymbol)	"metre"

Object14

Attribute/Reference	Literal/Instance
(nonLogicalSymbol)	"PrefixedUnit"

Object16

Attribute/Reference	Literal/Instance
(nonLogicalSymbol)	"kernel"

Object19

Attribute/Reference	Literal/Instance
(nonLogicalSymbol)	"micro"

### <Modelling\_Language (Ontology\_Language)>

Object40

Attribute/Reference	Literal/Instance
name	"KIF"

Figure B.3 — Registration of LO1 at Conformance Level 1

- NOTE1 Within angle brackets, first, a name of a metaclass of this part where instances exist is given, then, with parentheses, a name of a metaclass of ISO/IEC 19763-3:2010 where they directly belongs to is given.
- NOTE2 For simplicity, the sentences other than "LC1", "LC2", and "LC3" are ignored.
- NOTE3 Some of the attributes and references of ISO/IEC 19763-3:2010 are given with parentheses for better understandability.
- NOTE4 The attributes and references of types of items specified in 5.5, ISO/IEC 11179-3:2012 and the common attributes specified at clause 12, ISO/IEC 11179-3:2012 are not shown for simplicity.
- NOTE5 Objectxx (xx= 05 to 40) are object identifiers introduced only for the descriptive purpose of this example. The detailed specifications of them are beyond the scope of this part of the standard. These object identifiers are the same as the ones of the corresponding example at ISO/IEC 19763-3:2010 as far as possible.
- NOTE 6 The corresponding example at ISO/IEC 19763-3:2010 is registered based on the registration of "RO1" and "RO2", on which "LO1" is based. However, "LO1" here is registered independent from "RO1" and "RO2" because here a self-contained example is enough and easier to understand.

Figure B.4 shows how the ontology "LO3" is registered at a registry that conforms to this part of ISO/IEC 19763 at Conformance Level 1.

**<Model (Local\_Registered\_Ontology\_Whole)>**

Object31

Attribute/Reference	Literal/Instance
Identifier	http://local3.org/unit
(ontologyName)	"LO3"
described_by	Object40
contains	Object32
	Object33
	Object34
	...

**<Model Element (Local\_Registered\_Ontology\_Component)>**

Object32

Attribute/Reference	Literal/Instance
(sentenceIdentifier)	"LC5"
uses	Object05
	Object07
	Object08
	Object09
	Object10

Object34

Attribute/Reference	Literal/Instance
(sentenceIdentifier)	"L7"
uses	Object05
	Object14
	Object16

Object33

Attribute/Reference	Literal/Instance
(sentenceIdentifier)	"LC6"
uses	Object08
	Object09
	Object14
	Object15
	Object16
	Object17
	Object18
	Object19

**<Model Element (Local\_Registered\_Ontology\_Atomic\_Construct)>**

Object17

Attribute/Reference	Literal/Instance
(nonLogicalSymbol)	"micrometre"

**Figure B.4 — Registration of LO3 at Conformance Level 1**

- NOTE1 Within angle brackets, first, a name of a metaclass of this part where instances exist is given, then, with parentheses, a name of a metaclass of ISO/IEC 19763-3:2010 where they directly belongs to is given.
- NOTE2 For simplicity, the sentences other than "LC1", "LC2", and "LC3" are ignored.

- NOTE3 Some of the attributes and references of ISO/IEC 19763-3:2010 are given with parentheses for better understandability.
- NOTE4 The attributes and references of types of items specified in 5.5, ISO/IEC 11179-3:2012 and the common attributes specified at clause 12, ISO/IEC 11179-3:2012 are not shown for simplicity.
- NOTE5 Objectxx (xx= 05 to 34) are object identifiers introduced only for the descriptive purpose of this example. The detailed specifications of them are beyond the scope of this part of the standard. These object identifiers are the same as the ones of the corresponding example at ISO/IEC 19763-3:2010 as far as possible.
- NOTE 6 The corresponding example at ISO/IEC 19763-3:2010 is registered based on the registration of "RO1" and "RO2", on which "LO1" is based. However, "LO1" here is registered independent from "RO1" and "RO2" because here a self-contained example is enough and easier to understand.

### B.3 Registration at Conformance Level 2

At a registry that conforms to this part of ISO/IEC 19763 at Conformance Level 2, the mapping information from "LO1" to "LO3" can be registered.

Figure B.5 shows how the mapping information from "LO1" to "LO3" is registered at a registry that conforms to this part of ISO/IEC 19763 at Conformance Level 2.

**<Model\_Mapping>**

Object41

Attribute/Reference	Literal/Instance
subject_model	Object20
object_model	Object31
contains	Object42
	Object43
	Object44
	...

**<Model\_Element\_Set\_Mapping>**

Object42

Attribute/Reference	Literal/Instance
degree	"semantically_equivalent"
subject_set	Object46
object_set	Object47
described_by	Object54

Object43

Attribute/Reference	Literal/Instance
degree	"semantically_equivalent"
subject_set	Object48
object_set	Object49
described_by	Object54

Object44

Attribute/Reference	Literal/Instance
degree	"semantically_equivalent"
subject_set	Object50
object_set	Object51
described_by	Object54

Object45

Attribute/Reference	Literal/Instance
degree	"semantically_equivalent"
subject_set	Object52
object_set	Object53
described_by	Object55

**<Model\_Element\_Set>**

Object46

Attribute/Reference	Literal/Instance
mapped_element	Object21

Object47

Attribute/Reference	Literal/Instance
mapped_element	Object32

Object48

Attribute/Reference	Literal/Instance
mapped_element	Object22

Object49

Attribute/Reference	Literal/Instance
mapped_element	Object33

Object50

Attribute/Reference	Literal/Instance
mapped_element	Object23

Object51

Attribute/Reference	Literal/Instance
mapped_element	Object34

Object52

Attribute/Reference	Literal/Instance
mapped_element	Object24

Object53

Attribute/Reference	Literal/Instance
mapped_element	Object17

**<Model\_Elemnt\_Mapping\_Type>**

Object54

Attribute/Reference	Literal/Instance
description	"single sentence mapping"

Object55

Attribute/Reference	Literal/Instance
description	"single sentence mapping"

**Figure B.5 — Registration of mapping information from LO1 to LO3**

- NOTE1 Within angle brackets, a name of a metaclass of this part where instances exist is given..
- NOTE2 For simplicity, instances of Model\_Element\_Set\_Mapping and Model\_Element\_Set not related to the sentences "LC1", "LC2", "LC3", "LC5", "LC6" and "LC7".
- NOTE4 The attributes and references of types of items specified in 5.5, ISO/IEC 11179-3:2012 and the common attributes specified at clause 12, ISO/IEC 11179-3:2012 are not shown for simplicity.
- NOTE5 Objectxx (xx= 20 to 53) are object identifiers introduced only for the descriptive purpose of this example. The detailed specifications of them are beyond the scope of this part of the standard. These object identifiers are the same as the ones of the corresponding example at ISO/IEC 19763-3:2010 as far as possible.

## Bibliography

- [1] M. Duerst, et. al., RFC 3987 – Internationalized Resource Identifiers (IRIs), January 2005