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Information technology — Metamodel framework for interoperability (MFI) —

Part 3: Metamodel for ontology registration

Technologies de l'information — Cadre du métamodèle pour l'interopérabilité (MFI) —
Partie 3: Métamodèle pour l'enregistrement de l'ontologie

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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 19763-3 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 2: Core model*

— *Part 3: Metamodel for ontology registration*

— *Part 4: Metamodel for model mapping*

Introduction

Today, in E-business (EB) or E-commerce (EC) through the Internet, the effective interchange of business transactions or other related information across countries and cultures is an important concern for people in both the IT industry and other non-IT industries.

To follow the current trends of EB or EC, industrial consortia have engaged in the standardization of domain-specific business objects, including business process models and software components using common modeling facilities and interchange facilities such as UML and XML. They are very active in standardizing domain-specific business process models and standard modeling constructs such as data elements, entity profiles and value domains.

Moreover, interoperation among autonomous Web-based applications, such as Web services, is becoming important. For that purpose, ontology is a key issue. Ontology is a description of a universe of discourse. A lexicon, a taxonomy, a thesaurus and a familiar conceptual model such as a business process model in UML are all examples of ontology. In addition, ontology includes a more complex axiomatic theory.

Several efforts to establish standards associated with ontology are under way. For example, OMG will publish a specification called ODM, defining the metamodels of ontologies described in several languages and the mappings among them. This part of ISO/IEC 19763 will be expanded to provide for the metadata associated with ontologies to be specified and registered with respect to this part of ISO/IEC 19763. In addition, to promote ontology-based interoperation, a generic framework for registering administrative information related to ontologies is necessary.

This part of ISO/IEC 19763 intends to provide a generic framework for registering administrative information related to ontologies, based on ISO/IEC 19763-2.

NOTE UML and OMG are the trademarks of the Object Management Group.

Information technology — Metamodel framework for interoperability (MFI) —

Part 3: Metamodel for ontology registration

1 Scope

ISO/IEC 19763 specifies a metamodel framework for interoperability. This part of ISO/IEC 19763 specifies the metamodel that provides a facility to register administrative information related to ontologies.

The metamodel specified in this part of ISO/IEC 19763 is intended to promote interoperation among application systems.

It does not specify the metamodels of ontologies described in specific languages and the mappings among them. They are specified in other specifications such as the Ontology Definition Metamodel from the Object Management Group (see bibliography item [1]).

Figure 1 shows the scope of this part of ISO/IEC 19763.

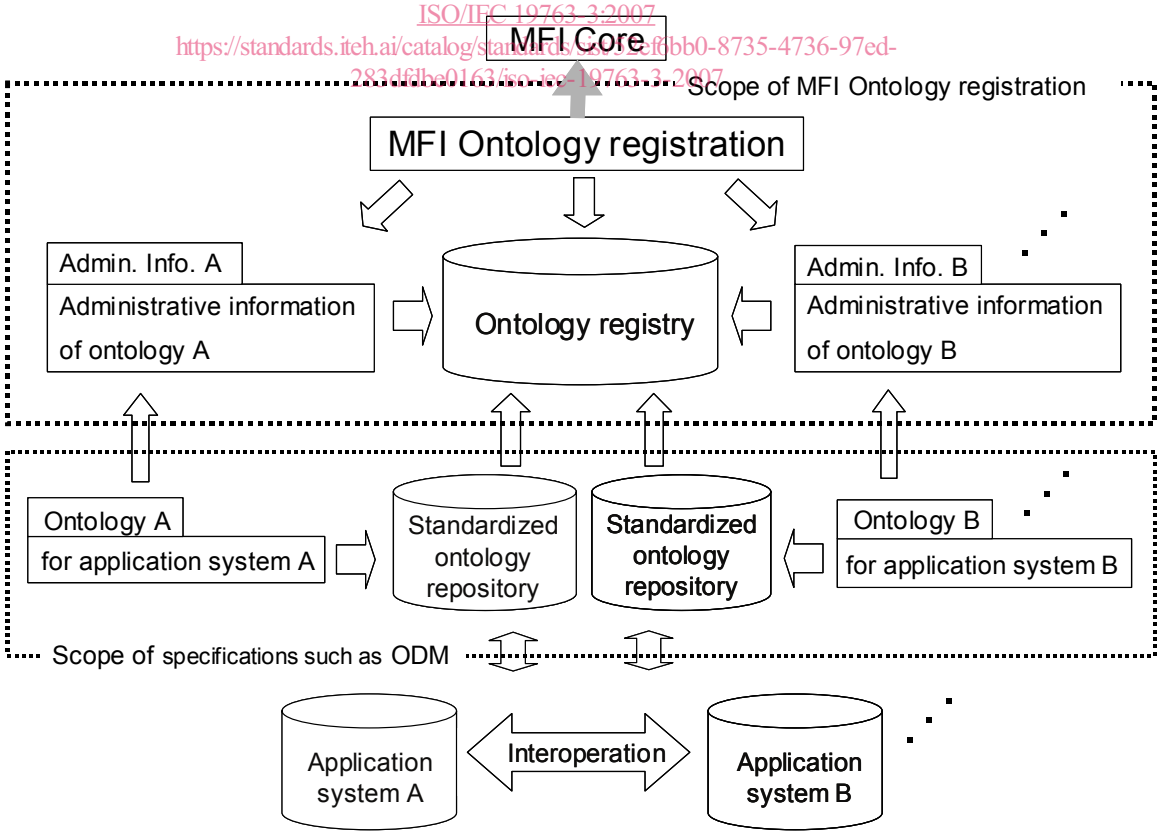

Figure 1 — Scope of MFI Ontology registration

2 Conformance

2.1 General

An implementation claiming conformance with this part of ISO/IEC 19763 shall support the metamodel specified in 5.3, depending on a degree of conformance as described below.

2.2 Degree of conformance

2.2.1 General

The distinction between “strictly conforming” and “conforming” implementations is necessary to address the simultaneous needs for interoperability and extensions. This part of ISO/IEC 19763 describes specifications that promote interoperability. Extensions are motivated by needs of users, vendors, institutions and industries, but are not specified by this part of ISO/IEC 19763.

A strictly conforming implementation may be limited in usefulness but is maximally interoperable with respect to this part of ISO/IEC 19763. A conforming implementation may be more useful, but may be less interoperable with respect to this part of ISO/IEC 19763.

2.2.2 Strictly conforming implementation

A strictly conforming implementation

a) shall support the metamodel specified in 5.3;

b) shall not support any extensions to the metamodel specified in 5.3.

2.2.3 Conforming implementation

A conforming implementation

a) shall support the metamodel specified in 5.3;

b) may support extensions to the metamodel specified in 5.3 that are consistent with the metamodel specified in 5.3.

2.3 Implementation Conformance Statement (ICS)

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

a) whether it is a strictly conforming implementation or a conforming implementation (2.2);

b) what extensions are supported if it is a conforming implementation.

3 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 11179-3:2003, *Information technology — Metadata registries (MDR) — Part 3: Registry metamodel and basic attributes*

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

ISO/IEC 19763-2, *Information technology — Metamodel framework for interoperability (MFI) — Part 2: Core model* [1)]

4 Terms, definitions and abbreviated terms

4.1 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO/IEC 11179-3:2003, ISO/IEC 19763-1, ISO/IEC 19763-2 and the following apply.

4.1.1
universe of discourse
all those things of interest that are concrete or abstract and that have been, are, or ever might be

4.1.2
ontology
description of a universe of discourse in a language that a computer can process

4.1.3
reference ontology
ontology that is usable and sharable by a community of interest

4.1.4
local ontology
ontology that is specialized for defined applications and based on at least one reference ontology

4.1.5
sentence
statement that has a truth value

4.1.6
symbol
the most primitive lexical construct that composes a part of a sentence

4.1.7
logical symbol
symbol whose meaning is defined by its language

EXAMPLE In KIF, “not” and “or” are logical symbols.

4.1.8
non-logical symbol
symbol that is not a logical symbol

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1) To be published.

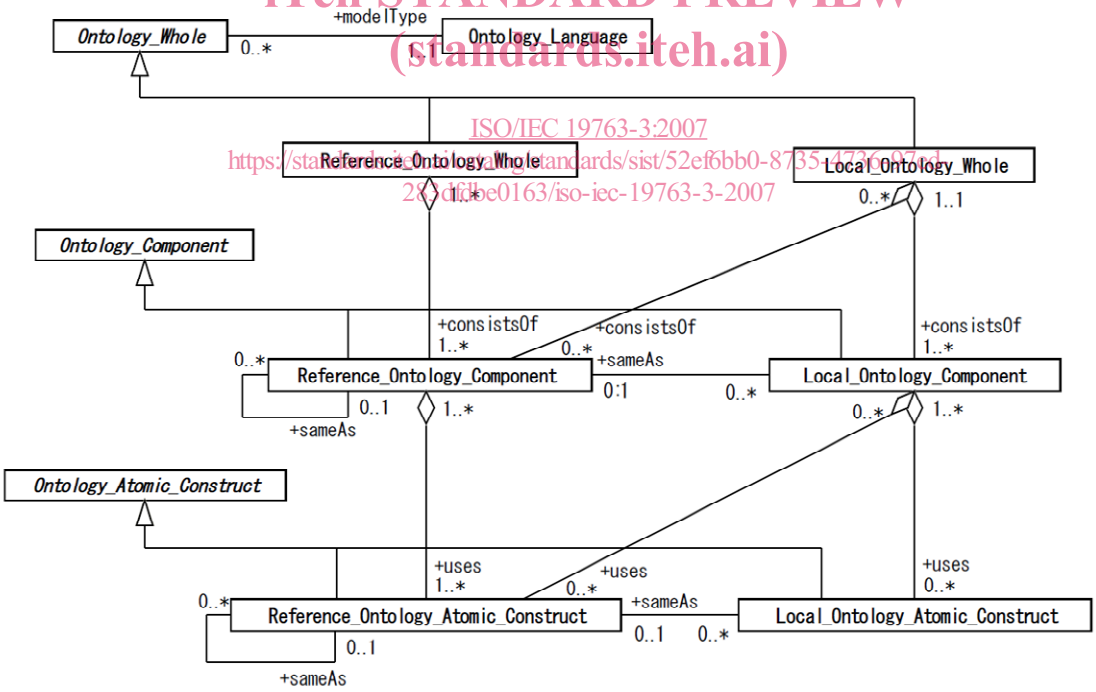
4.2 Abbreviated terms

KIF	Knowledge Interchange Format (see bibliography item [2])
MFI Core	ISO/IEC 19763-2, *Information technology — Metamodel framework for interoperability (MFI) — Part 2: Core model*
MFI Ontology registration	ISO/IEC 19763-3, *Information technology — Metamodel framework for interoperability (MFI) — Part 3: Metamodel for ontology registration*
MDR	Metadata Registry
ODM	Ontology Definition Metamodel (see bibliography item [1])
URI	Uniform Resource Identifiers (see bibliography item [3])

5 Structure of MFI Ontology registration

5.1 Overview of MFI Ontology registration

An ontology consists of several sentences and each sentence uses several non-logical symbols. MFI Ontology registration provides a facility to register administrative information related to ontologies, their sentences and the symbols that they use. Figure 2 shows the metamodel for ontology registration.



NOTE Metaclasses whose names are italicized are abstract metaclasses.

Figure 2 — Metamodel for ontology registration

Ontology_Whole is an abstract metaclass that designates an ontology and contains the associated administrative information. **Ontology_Language** represents a language that describes an ontology that is designated by **Ontology_Whole**. **Ontology_Component** is an abstract metaclass that designates a sentence contained in an ontology and contains the associate administrative information. The granularity of a sentence is not specified but is a user's choice. **Ontology_Atomic_Construct** is an abstract metaclass that designates a non-logical symbol that is used in a sentence and contains the associated administrative information.

Reference_Ontology_Whole and **Local_Ontology_Whole** are subclasses of **Ontology_Whole**. **Reference_Ontology_Whole** designates a reference ontology. **Local_Ontology_Whole** designates a local ontology based on at least one reference ontology that is designated by **Reference_Ontology_Whole**.

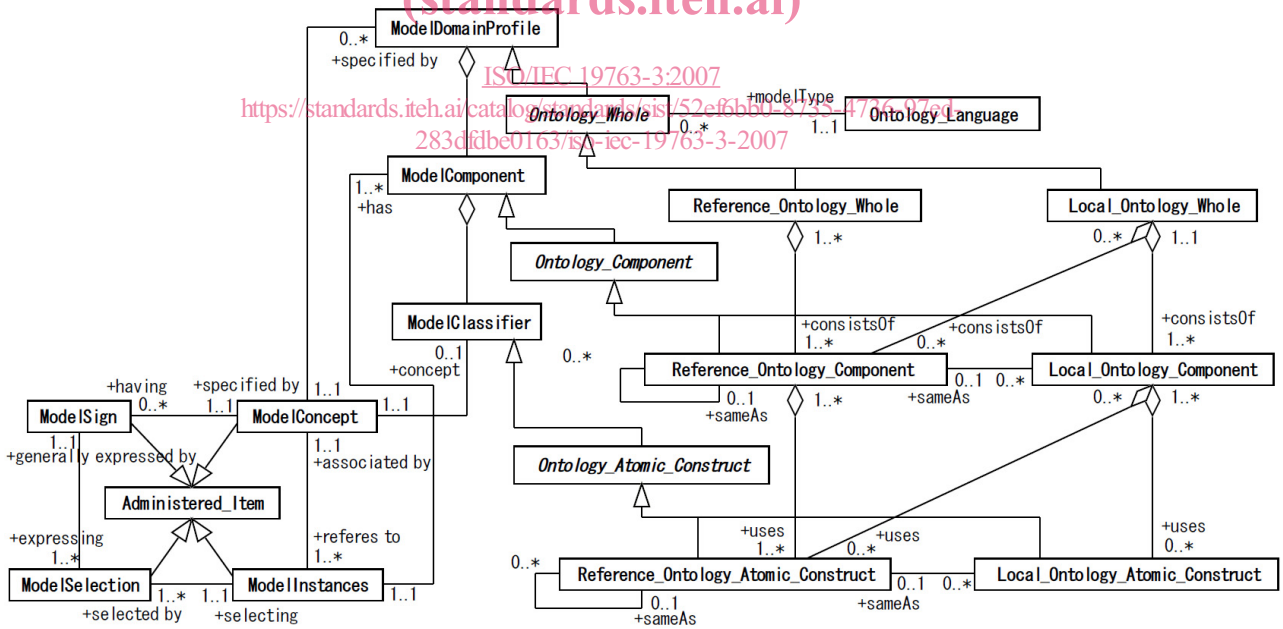
Reference_Ontology_Component and **Local_Ontology_Component** are subclasses of **Ontology_Component**. **Reference_Ontology_Component** designates a sentence contained in ontologies that are designated by **Reference_Ontology_Whole**. A sentence that is designated by **Reference_Ontology_Component** may also be contained in ontologies that are designated by **Local_Ontology_Whole**. **Local_Ontology_Component** designates a sentence contained in one ontology that is designated by **Local_Ontology_Whole**.

Reference_Ontology_Atomic_Construct and **Local_Ontology_Atomic_Construct** are subclasses of **Ontology_Atomic_Construct**. **Reference_Ontology_Atomic_Construct** designates a non-logical symbol that is used in sentences that are designated by **Reference_Ontology_Component**. A non-logical symbol that is designated by **Reference_Ontology_Atomic_Construct** may also be used in sentences that are designated by **Local_Ontology_Component**. **Local_Ontology_Atomic_Construct** designates a non-logical symbol that is used in sentences that are designated by **Local_Ontology_Component**. A non-logical symbol that is designated by **Local_Ontology_Atomic_Construct** can be used in only one ontology that is designated by **Local_Ontology_Whole.**

The exact specification of each metaclass is given in 5.3.

5.2 Relationship between MFI Core and MFI Ontology registration

MFI Ontology registration inherits the basic structure from MFI Core. Figure 3 shows the relationship between MFI Core and MFI Ontology registration.



NOTE Metaclasses whose names are italicized are abstract metaclasses.

Figure 3 — Relationship between MFI Core and MFI Ontology registration