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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*

ICS: 35.040.50

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31	Contents	Page
32	Foreword	vi
33	Introduction	viii
34	1 Scope	1
35	2 Normative references	2
36	3 Terms, definitions and abbreviated terms	2
37	3.1 Terms and definitions	2
38	3.1.1 Terms on ontology	2
39	3.1.2 Other terms	2
40	3.2 Abbreviated terms	3
41	4 Conformance	4
42	4.1 General	4
43	4.2 Levels of conformance	4
44	4.2.1 General	4
45	4.2.2 Conformance level 1	4
46	4.2.3 Conformance level 2	4
47	4.3 Degree of conformance	4
48	4.3.1 General	4
49	4.3.2 Strictly conforming implementation	4
50	4.3.3 Conforming implementation	4
51	4.4 Implementation Conformance Statement (ICS)	5
52	5 Structure of MFI Ontology registration	5
53	5.1 Overview of MFI Ontology registration	5
54	5.2 Overview of Basic_Model package	5
55	5.3 Overview of Evolution_Model package	7
56	5.4 Association between MFI Ontology registration and MFI Core and mapping	8
57	5.5 Basic_Model package	9
58	5.5.1 Authoritative_Extent	9
59	5.5.2 Local_Item	10
60	5.5.3 Ontology_Language	10
61	5.5.4 Ontology_Whole	11
62	5.5.5 Registered_Ontology_Whole	12
63	5.5.6 Unregistered_Ontology_Whole	13
64	5.5.7 Reference_Registered_Ontology_Whole	13
65	5.5.8 Local_Registered_Ontology_Whole	14
66	5.5.9 Ontology_Component	15
67	5.5.10 Registered_Ontology_Component	16
68	5.5.11 Reference_Registered_Ontology_Component	17
69	5.5.12 Local_Registered_Ontology_Component	18
70	5.5.13 Ontology_Atomic_Construct	19
71	5.5.14 Registered_Ontology_Atomic_Construct	20
72	5.5.15 Unregistered_Ontology_Atomic_Construct	21
73	5.5.16 Reference_Registered_Ontology_Atomic_Construct	22
74	5.5.17 Local_Registered_Ontology_Atomic_Construct	23
75	5.6 Evolution_Model package	23
76	5.6.1 Item_Evolution	23
77	5.6.2 Registered_Ontology_Whole_Evolution	24
78	5.6.3 Registered_Ontology_Component_Evolution	25
79	5.6.4 Registered_Ontology_Atomic_Construct_Evolution	26
80	Annex A (informative) List of Ontology_Languages	27

81	Annex B (informative) Example of Basic_Model	28
82	B.1 Example of a reference registered ontology	28
83	B.2 Example of another reference registered ontology	30
84	B.3 Example of a local registered ontology	32
85	B.4 Example of another local registered ontology	35
86	Annex C (informative) Example of Evolution_Model	38
87	C.1 Example of evolution	38
88	C.2 Example of items evolution	42
89	Annex D (informative) Mapping from ISO/IEC 19763-3:2010 to ISO/IEC 19763-3:2019	44
90	Bibliography	45

91

92

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93	Figures	
94	Figure 1 — Scope of MFI Ontology registration	1
95	Figure 2 — Package structure of MFI Ontology registration	5
96	Figure 3 — Metamodel in Basic_Model package	6
97	Figure 4 — Metamodel in Evolution_Model package	8
98	Figure 5 — The associations between MFI Ontology registration and MFI Core and mapping	8
99	Figure B.1 — Three examples of the sentences in RO1	28
100	Figure B.2 — Registration of RO1	29
101	Figure B.3 — Two examples of the sentences in RO2	30
102	Figure B.4 — Registration of RO2	31
103	Figure B.5 — Three examples of the sentences in LO1	32
104	Figure B.6 — Registration of LO1	32
105	Figure B.7 — An example of the sentences in LO2	35
106	Figure B.8 — Registration of LO2	35
107	Figure C.1 — Three examples of the sentences in LO3	38
108	Figure C.2 — Registration of LO3	39
109	Figure C.3 — Registration of items evolution from LO1 to LO3	42
110		
111	Tables	
112	Table A.1 — List of Ontology_Languages	27
113	Table D.1 — Mappings the attributes and references	44

114 Foreword

115 ISO (the International Organization for Standardization) and IEC (the International Electrotechnical
116 Commission) form the specialized system for worldwide standardization. National bodies that are members of
117 ISO or IEC participate in the development of International Standards through technical committees
118 established by the respective organization to deal with particular fields of technical activity. ISO and IEC
119 technical committees collaborate in fields of mutual interest. Other international organizations, governmental
120 and non-governmental, in liaison with ISO and IEC, also take part in the work. In the field of information
121 technology, ISO and IEC have established a joint technical committee, ISO/IEC JTC 1.

122 The procedures used to develop this document and those intended for its further maintenance are described
123 in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of
124 document should be noted. This document was drafted in accordance with the editorial rules of the
125 ISO/IEC Directives, Part 2 (see www.iso.org/directives).

126 Attention is drawn to the possibility that some of the elements of this document may be the subject of patent
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130 Any trade name used in this document is information given for the convenience of users and does not
131 constitute an endorsement.

132 For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment,
133 as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the
134 Technical Barriers to Trade (TBT) see the following URL www.iso.org/iso/foreword.html.

135 The committee responsible for this document is ISO/IEC JTC 1, *Information technology*, SC 32, *Data
136 management and interchange*.

137 This third edition cancels and replaces the second edition (ISO/IEC 19763-3:2010), clauses of which has been
138 technically revised

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

141 — *Part 1: Framework*

142 — *Part 3: Metamodel for ontology registration*

143 — *Part 5: Metamodel for process model registration*

144 — *Part 6: Registry Summary*

145 — *Part 7: Metamodel for service model registration*

146 — *Part 8: Metamodel for role and goal model registration*

147 — *Part 9: On demand model selection [Technical Report]*

148 — *Part 10: Core model and basic mapping*

149 — *Part 12: Metamodel for information model registration*

150 — *Part 13: Metamodel for form design registration [Technical Specification]*

151

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152 Introduction

153 Interoperation among autonomous applications, such as Web services, is becoming important. To promote
154 interoperation among application systems, unambiguous and formal specifications of the systems, especially
155 of their inputs and outputs, are indispensable. Ontologies have a key role for that.

156 Several efforts to establish standards associated with ontologies have been made. But, most of them specify
157 languages or are based on some particular language. To promote ontology-based interoperation, in addition
158 to them, a generic framework for registering administrative and evolution information related to ontologies,
159 independent of languages, is necessary.

160 This part of ISO/IEC 19763 intends to provide a generic framework for registering administrative and evolution
161 information related to ontologies.

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Information technology — Metamodel framework for interoperability (MFI) —

Part 3: Metamodel for ontology registration

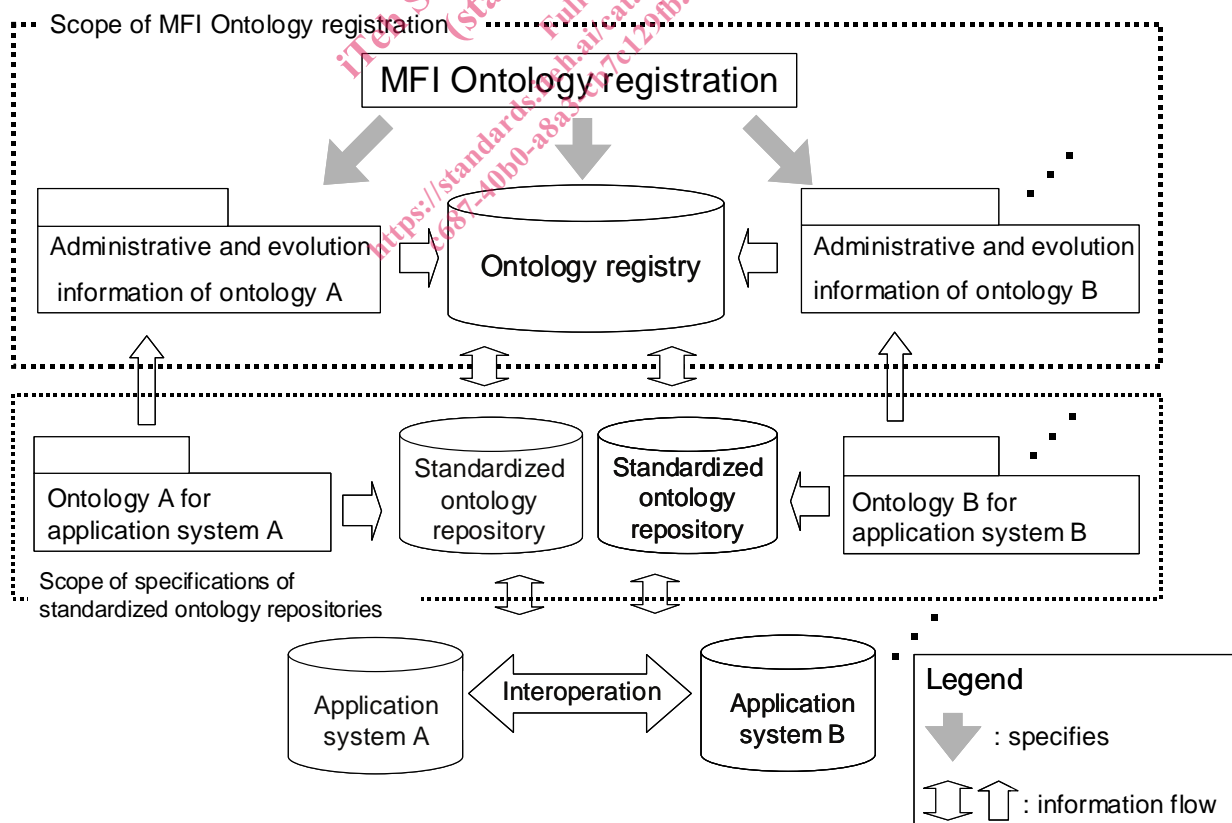
166 1 Scope

167 The primary purpose of the multipart standard ISO/IEC 19763 is to specify a metamodel framework for
168 interoperability. This part of ISO/IEC 19763 specifies the metamodel that provides a facility to register
169 administrative and evolution information related to ontologies.

170 The metamodel that this part specifies is intended to promote interoperation among application systems, by
171 providing administrative and evolution information related to ontologies, accompanied with standardized
172 ontology repositories that register ontologies themselves in specific languages.

173 This part of ISO/IEC 19763 does not specify the metamodels of ontologies expressed in specific languages
174 and the mappings among them. They are specified in other specifications such as the Ontology Definition
175 Metamodel from the Object Management Group (see bibliography item [1]).

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



177

Figure 1 — Scope of MFI Ontology registration

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 19763-1, Information technology – Metamodel framework for interoperability (MFI) – Part 1: Framework

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

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, ISO/IEC 19763-1 and ISO/IEC 19763-10 and the following apply.

3.1.1 Terms on ontology

3.1.1.1

ontology

specification of concrete or abstract things, and the relationships among them, in a prescribed domain of knowledge

NOTE The specification should be computer processable.

3.1.1.2

registered ontology

ontology that is registered in a registry that conforms to MFI Ontology registration

3.1.1.3

unregistered ontology

ontology that is not registered in a registry that conforms to MFI Ontology registration

3.1.1.4

reference registered ontology

registered ontology that is usable and sharable by a community of interest

3.1.1.5

local registered ontology

registered ontology that is specialized for defined applications

3.1.2 Other terms

3.1.2.1

sentence

statement that has a truth value

3.1.2.2

symbol

most primitive lexical construct that is a part of a sentence

- 216 **3.1.2.3**
 217 **logical symbol**
 218 **symbol** whose meaning is defined by its language
- 219 EXAMPLE In KIF, "not" and "or" are logical symbols.
- 220 **3.1.2.4**
 221 **non-logical symbol**
 222 **symbol** that is not a **logical symbol**
- 223 **3.1.2.5**
 224 **authoritative extent**
 225 extent that indicates authoritativeness
- 226 NOTE1 An authoritative extent is used to determine whether a thing may use another thing. A thing may use another
 227 thing if and only if the authoritative extent of the former is less than or equal to the authoritative extent of the
 228 latter because the usage of the latter by the former does not affect the authoritative extent of the former since
 229 the authoritative level of the latter is greater than or equal to the one of the former.
- 230 EXAMPLE A product with some authoritative extent can only use as its component a part with an authoritative extent
 231 which is greater than or equal to the one of it, to keep its authoritative extent.
- 232 NOTE2 In this part of the standard, an authoritative extent is used to determine whether a Local_Item can consist of or
 233 use another Local_Item. See 5.5.2 Local_Item.
- 234 **3.2 Abbreviated terms**
- 235 **IRI**
 236 Internationalized Resource Identifier (see bibliography item [2])
- 237 **KIF**
 238 Knowledge Interchange Format (see bibliography item [3])
- 239 **MDR**
 240 Metadata Registry
- 241 [ISO/IEC 11179-3:2013, 3.2.78]
- 242 **MFI**
 243 Metamodel framework for interoperability
- 244 [ISO/IEC 19763-1:2015, 4.2]
- 245 **MFI Ontology registration**
 246 ISO/IEC 19763-3, Information technology – Metamodel framework for interoperability (MFI) – Part 3:
 247 Metamodel for ontology registration
- 248 **ODM**
 249 Ontology Definition Metamodel (see bibliography item [1])
- 250 **OWL**
 251 Web Ontology Language (see bibliography item [4])
- 252 **UML**
 253 Unified Modeling Language (see ISO/IEC 19501:2005)

254 4 Conformance

255 4.1 General

256 An implementation claiming conformance to this part of ISO/IEC 19763 shall support one or both of the
257 metamodels specified in this part of ISO/IEC 19763 and may or shall not support any extensions, depending
258 on which level of conformance and which degree of conformance it claims.

259 4.2 Levels of conformance

260 4.2.1 General

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

263 4.2.2 Conformance level 1

264 The metamodel specified in Clause 5.5 Basic_Model package is supported.

265 4.2.3 Conformance level 2

266 The metamodels specified in Clause 5.5 Basic_Model package and Clause 5.6 Evolution_Model package are
267 supported.

268 4.3 Degree of conformance

269 4.3.1 General

270 In each conformance level, the distinction between "strictly conforming" and "conforming" implementations is
271 necessary to address the simultaneous needs for interoperability and extensions. This part of ISO/IEC 19763
272 describes specifications that promote interoperability. Extensions are motivated by needs of users, vendors,
273 institutions, and industries, but are not specified by this part of ISO/IEC 19763.

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

277 4.3.2 Strictly conforming implementation

278 A strictly conforming implementation for some conformance level:

- 279 a) shall support the metamodels required in the conformance level;
- 280 b) shall not support any extensions to the metamodels required in the conformance level.

281 4.3.3 Conforming implementation

282 A conforming implementation:

- 283 a) shall support the metamodels required in the conformance level;
- 284 b) may support extensions to the metamodels required in the conformance level, and the extensions shall
285 be consistent with the metamodels required in the conformance level.

286 4.4 Implementation Conformance Statement (ICS)

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

- 289 a) which conformance level it claims(4.2);
- 290 b) whether it is a strictly conforming implementation or a conforming implementation (4.3);
- 291 c) what extensions are supported if it is a conforming implementation.

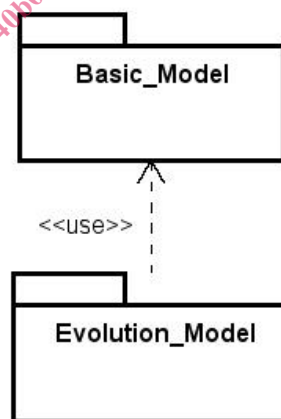
292 5 Structure of MFI Ontology registration

293 5.1 Overview of MFI Ontology registration

294 MFI Ontology registration consists of two packages: **Basic_Model** package and **Evolution_Model** package.
295 Figure 2 shows the package structure of MFI Ontology registration.

296 The **Basic_Model** package is used to register administrative information related to ontologies, independently
297 of the languages that are used to express them. The basic idea is that almost any ontology consists of several
298 sentences and that each sentence uses several non-logical symbols. The metaclasses in **Basic_Model**
299 package include **Ontology_Whole**, **Ontology_Component** and **Ontology_Atomic_Construct**, which have
300 administrative information of ontologies, sentences and non-logical symbols respectively. Since an ontology
301 evolves, **Basic_Model** package can register as many versions of an ontology as necessary. But, in
302 **Basic_Model** package, each version of an ontology is treated as a different ontology.

303 The **Evolution_Model** package is used to register information on how an ontology evolves from one version
304 to another. **Evolution_Model** package basically consists of three metaclasses, **Registered_**
305 **Ontology_Whole_Evolution**, **Registered_Ontology_Component_Evolution** and **Registered_Ontology_**
306 **Atomic_Construct_Evolution**, which have evolution information on **Registered_Ontology_Whole**,
307 **Registered_Ontology_Component** and **Registered_Ontology_Atomic_Construct** respectively.



308
309 **Figure 2 — Package structure of MFI Ontology registration**

311 5.2 Overview of Basic_Model package

312 Figure 3 shows the metamodel in **Basic_Model** package.