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Information technology — Metamodel framework for interoperability (MFI) —

Part 9: On demand model selection

Technologies de l'information — Cadre du métamodèle pour l'interopérabilité (MFI) —
Partie 9: Sélection de modèle à la demande

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Foreword

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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).

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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.

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ISO/IEC 19763-9 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: Framework

Part 3: Metamodel for ontology registration

Part 5: Metamodel for process model registration

Part 6: Registry summary

Part 7: Metamodel for service model 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 12: Metamodel for information model registration

Part 13: Metamodel for form design registration

Introduction

Industrial consortia have engaged in the standardization of domain-specific 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.

ISO/IEC 19763 provides registration mechanisms for different kinds of information resources in business domains, such as ontologies, roles, goals, processes, and services. Faced with the abundant and heterogeneous models, how to select appropriate services and/or models to meet user-requests becomes an important issue. Based on the metamodels defined in parts 3, 5, 7 and 8 of ISO/IEC 19763, this technical report describes a framework and procedures for model selection so as to help users discover corresponding models or services that support their requests.

Information technology – Metamodel framework for interoperability (MFI) — Part 9: On demand model selection

1 Scope

This ISO/IEC Technical Report specifies a technical guideline on how to use the Role and Goal, Process, and Service (RGPS) metamodels to select appropriate combinations of models and/or services to support user-requests.

The scope of ISO/IEC TR 19763-9 is limited to model selection based on ISO/IEC 19763-5, ISO/IEC 19763-7, and ISO/IEC 19763-8.

2 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 19763-3, Information technology – Metamodel framework for interoperability (MFI) – Part 3: Metamodel for ontology registration

ISO/IEC 19763-5, Information technology – Metamodel framework for interoperability (MFI) – Part 5: Metamodel for process model registration

ISO/IEC 19763-7, Information technology – Metamodel framework for interoperability (MFI) – Part 7: Metamodel for service model registration

ISO/IEC 19763-8, Information technology – Metamodel framework for interoperability (MFI) – Part 8: Metamodel for role and goal model registration

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

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

3 Terms, definitions and abbreviated terms

3.1 Terms and definitions

For the purposes of this part, the terms and definitions contained in ISO/IEC 19763-1, 3, 5, 7, 8, 10 and the following shall apply.

3.1.1
goal
intended outcome of user interaction with a **process** (3.1.4) or **service** (3.1.10)

[ISO/IEC 19763-8, 3.1.1]

3.1.2
involvement type
statement that indicates the type of involvement of a **role** (3.1.8) with a **process** (3.1.4) or **service** (3.1.10)

NOTE Examples are performer, beneficiary, and customer

[ISO/IEC 19763-8, 3.1.4]

3.1.3
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

[ISO/IEC 19763-3:2010, 3.1.1.1]

3.1.4
process
collection of related, structured activities or tasks that achieve a particular **goal** (3.1.1)

NOTE The activities and tasks are represented by the Process metaclass in this part

[ISO/IEC 19763-5, 3.1.12]

3.1.5
process involvement
statement that specifies how a particular **role** (3.1.8) is engaged in or contributes in a particular **process** (3.1.4)

[ISO/IEC 19763-8, 3.1.6]

3.1.6
request type
target class in the MFI model to be used in the search, e.g., **goal** (3.1.1), **process** (3.1.4) or **service** (3.1.10)

3.1.7
return type
kind of models that the user would like to find in the search

3.1.8
role
named specific behaviour of an entity participating in a particular context

[ISO/IEC 19763-8, 3.1.7]

3.1.9
search term
term specified by the user in the search

3.1.10
service
application which encapsulates one or more computing modules and can be accessed through a specified interface

[ISO/IEC 19763-7, 3.1.17]

3.1.11
service involvement
statement that specifies how a particular **role** (3.1.8) is involved in a particular **service** (3.1.10)

[ISO/IEC 19763-8, 3.1.8]

3.2 Abbreviated terms

BPMN
Business Process Model and Notation

[OMG BPMN version 2, formal/2011-01-03]

KAOS
Keep All Objects Satisfied

MFI
Metamodel framework for interoperability

[ISO/IEC 19763-1: 2007, 4.2]

ODMS
On Demand Model Selection

QoS
Quality of Service

RGPS
Role, Goal, Process, and Service

UML
Unified Modeling Language

[ISO/IEC 19505-1:2012] and [ISO/IEC 19505-2:2012]

WADL
Web Application Description Language

WSDL
Web Service Description Language

4 Preliminaries of ODMS

In order to show how to realize On Demand Model Selection (ODMS), some preliminaries need to be introduced first. The associations in RGPS classes and their semantic annotations form the basis for ODMS. The RGPS associations specify how the different models are related, and the ontology concepts used in the semantic annotations form the basis for matching user-requests with registered models.

4.1 Associations in RGPS

Since the scope of ISO/IEC TR 19763-9 is limited to model selection based on ISO/IEC 19763-5, ISO/IEC 19763-7, and ISO/IEC 19763-8, the three parts will be introduced first.

ISO/IEC 19763-5 specifies a metamodel to enable organizations to create a registry storing the administrative and descriptive information of process models. The process model registration metamodel is intended to promote semantic discovery and reuse of process models within/across organizations.

ISO/IEC 19763-7 specifies a metamodel to enable organizations to create a registry storing the administrative and descriptive information of service models. The service model registration metamodel is intended to promote semantic discovery and reuse of services within/across organizations.

ISO/IEC 19763-8 specifies a metamodel to enable organizations to create a registry storing the administrative and descriptive information of role and goal models. The role and goal model registration metamodel is intended to promote semantic discovery and reuse of role and goal models within/across organizations.

For the purposes of this technical report, RGPS is viewed as a generic term referring to the method of applying associations between RGPS models to support ODMS.

As shown in Figure 1, there are associations between the metamodels defined in parts 5, 7 and 8 of ISO/IEC 19763.

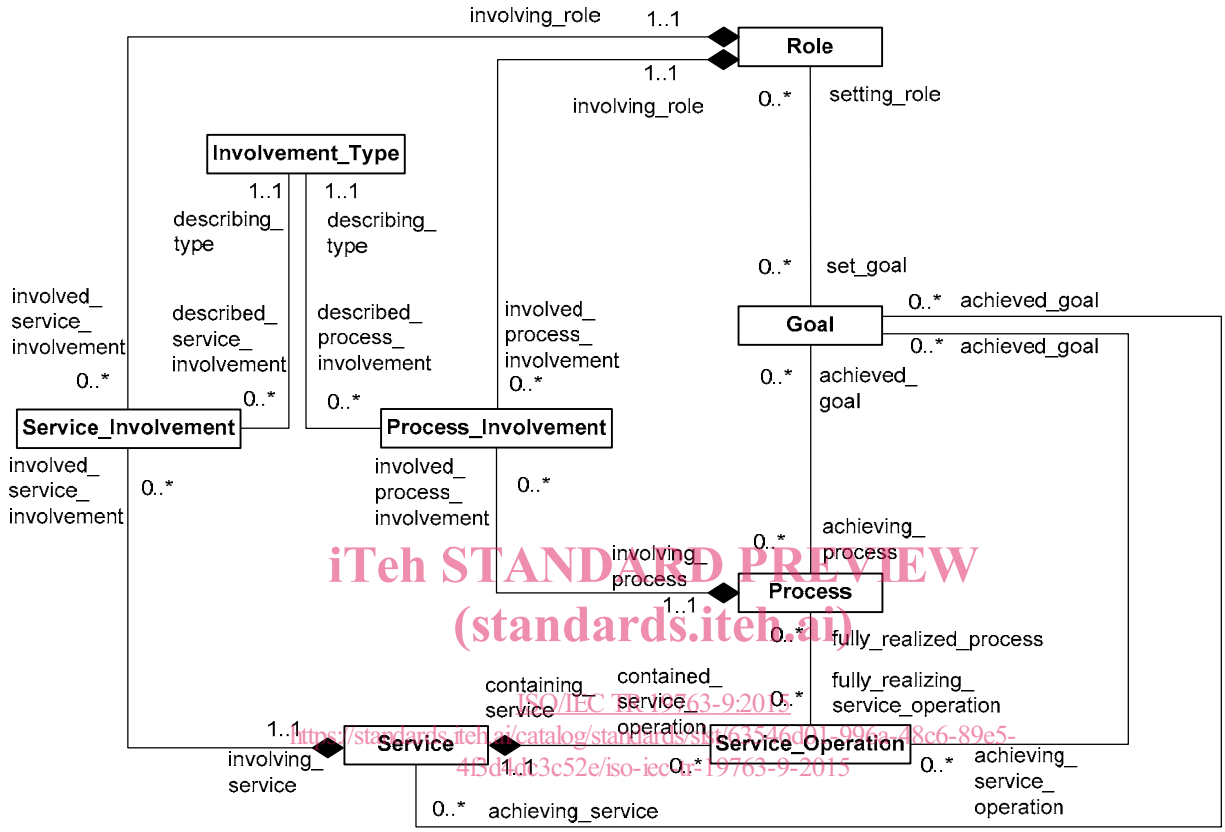

Figure 1 – Associations in RGPS

The associations in ISO/IEC 19763-8 are:

Each role sets zero, one or more goals.
Each goal is set by zero, one or more roles.

Each role is involved in processes through zero, one or more process involvements.
Each process involvement represents the involvement in processes of one and only one role.

Each role is involved in services through zero, one or more service involvements.
Each service involvement represents the involvement in services of one and only one role.

Each involvement type is used to describe zero, one or more process involvements.
Each process involvement is described by one and only one involvement type.

Each involvement type is used to describe zero, one or more service involvements.
Each service involvement is described by one and only one involvement type.

The associations in ISO/IEC 19763-7 are:

Each service contains zero, one or more service operations.
Each service operation is contained by one and only one service.

The associations that associate ISO/IEC 19763-5 with ISO/IEC 19763-8 are:

Each process is used to achieve zero, one or more goals.
Each goal is achieved by zero, one or more processes.

Each process is represented in zero, one or more process involvements.
Each process involvement is involved in one and only one process.

The associations that associate ISO/IEC 19763-7 with ISO/IEC 19763-8 are:

Each service is used to achieve zero, one or more goals.
Each goal is achieved by zero, one or more services.

Each service operation is used to achieve zero, one or more goals.
Each goal is achieved by zero, one or more service operations.

Each service is represented in zero, one or more service involvements.
Each service involvement is involved in one and only one service.

The associations that associate ISO/IEC 19763-7 with ISO/IEC 19763-5 are:

Each service operation is used to fully realize zero, one or more processes.
Each process is fully realized by zero, one or more service operations.

NOTE 1 The instance of involvement type can be performer, beneficiary, customer, and so on.
NOTE 2 In the case that a process is fully realized by a set of service operations, the process should be decomposed into a certain level such that each sub-process of the process can be fully realized by a service operation.

To facilitate ODMS within an organization's set of registries based on the metamodels defined in the various parts of ISO/IEC 19763, the associations in RGPS should be recorded. However, it is not necessary to maintain a separate registry to record these associations. In order to record these associations, the following strategies might be adopted. The associations between processes with their roles and goals will be registered in a registry based on the metamodel defined in ISO/IEC 19763-5, the associations between services with their roles, goals, and processes will be registered in a registry based on the metamodel defined in ISO/IEC 19763-7. Note that Figure 1 only shows the associations among roles, goals, processes and services, not all associations in the metamodels defined in parts 5, 7 and 8 of ISO/IEC 19763.

4.2 Semantic annotation

An essential issue in ODMS is how to match user-requests with registration information of the registered RGPS models. The use of semantic annotations of registered models based on domain specific ontologies can be used to bridge the gap between the registered RGPS models, as well as the gap between user-requests and the registration information.

In order to semantically annotate the registered RGPS models, two kinds of domain sub-ontologies, entity ontology and operation ontology, are considered (Figure 2). The entity ontology mainly describes the entity concepts and semantic relationships among them, and the operation ontology mainly describes the operational or functional concepts as well as semantic relationships among them. The domain ontology can be used to annotate the goal class with attributes <goal operation, goal object> in a registry based on the metamodel defined in ISO/IEC 19763-8. When registering a process in a registry based on the metamodel defined in ISO/IEC 19763-5, the goals achieved by the process can be defined by setting the reference achieved_goal, whose values are from goals registered in the registry based on the metamodel defined in ISO/IEC 19763-8, i.e., the same ontology is used to annotate the goals achieved by the process.

For example, given a transportation domain goal "Book ticket" with attributes <goal operation, goal object>, where the goal operation is annotated by the concept "Book" in the operation ontology of transportation domain, while the goal object would be annotated by the concept "Ticket" in the entity ontology of transportation domain. A user searching for a process that can achieve a goal "Reserve ticket" might find the concept in the transportation domain ontology with a synonym "Book ticket". Using the same ontology to annotate the RGPS models enables the ontology to provide support for semantic matching based on concept synonyms. Then the processes that are associated with the concept, regardless of whether the process is named "Book ticket" or "Reserve ticket", will be searched.