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**Information technology — Metamodel Framework for Interoperability
(MFI) — Part 8: Metamodel for role and goal registration**

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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.

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ISO/IEC 19763-8 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*
- *Part 5: Metamodel for process model registration*
- *Part 6: Registration procedure*
- *Part 7: Metamodel for service registration*
- *Part 8: Metamodel for role and goal registration*
- *Part 9: On demand model selection*

Introduction

Due to the spread of e-Business (EB) and e-Commerce (EC) over 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 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, processes, is becoming important. Goals provide a method that describes processes in a higher abstraction level. Effective management of goals will be helpful for reusing information resources such as processes in a larger granularity. A goal is a descriptive statement of intent of a users or an organization, and it can be viewed as an objective that the system under consideration should achieve. Roles are abstract characterizations of organizational behaviours and responsibilities within specified organizational context. Description of roles will be helpful in characterizing goals in a more complete and correct way, and reusing goals based on roles.

User-centric mechanism, that is providing personalized services for users, is becoming a kind of urgent requirements in IT industry. For goal description, OMG's Business Motivation Model (BMM) provides a characterization mechanism of business intent and motivation. However, BMM is absent in directly relating business plan with business implementation, and the relationships between goals specified in BMM are insufficient for complex goal decomposition, reasoning, and reusing. There are also many other existing standards and specifications that can be used to describe roles and goals, which results in the interoperation issue of role and goal descriptions.

This part of ISO/IEC 19763 intends to provide a generic framework for registering description information of roles and goals.

Information technology — Metamodel Framework for Interoperability (MFI) — Part 8: Metamodel for role and goal registration

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 a metamodel for registering users' roles and goal information in specific domains.

The metamodel that this part specifies is intended to promote the reuse of goals by roles within/across role and goal repositories. For the purpose, it provides administrative information and common semantics of role and goal models created with a specific role and goal modeling language, including Friend of a Friend (FOAF) [1], Goal-oriented requirements modeling (i*) [2], Keep All Objects Satisfied (KAOS) [3], Non-functional Requirement Framework (NFRF) [4], Business Motivation Model (BMM) [5], Reference Model of Open Distributed Processing (RM-ODP) [6], ArchiMate [7], Zachman Framework for Enterprise Architecture (ZACHMAN) [8], The Open Group Architecture Framework (TOGAF) [9], etc. Figure 1 shows the scope of this part. In this figure, "register" refers to the registration activity of registering administrative information for role&goal models into the role&goal registry based on MFI role&goal metamodel, including the mapping between various role&goal metamodels (modeling languages, e.g., BMM) and MFI role&goal metamodel. URI (Uniform Resource Identifier) is included in the administrative information for registration to identify the role & goal models to be registered in the registry.

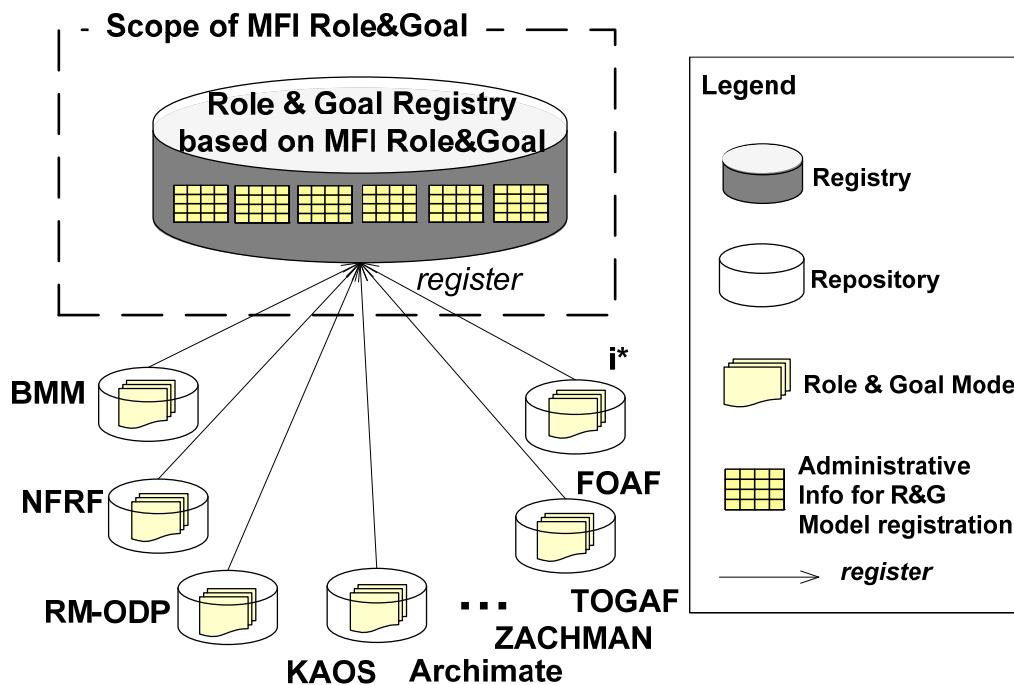


Figure 1 — The scope of MFI role and goal

2 Conformance

2.1 General

An implementation claiming conformance with this part of ISO/IEC 19763 shall support the metamodel specified in 5.1, 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 5.1;
- b) shall not support any extensions to the metamodel specified in 5.1.

2.2.3 Conforming implementation

A conforming implementation

- a) shall support the metamodel specified in 5.1;
- b) may support extensions to the metamodel specified in 5.1 that are consistent with the metamodel specified in 5.1.

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 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

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

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 19763-1, ISO/IEC 19763-2 and ISO/IEC 19763-3 and the following apply.

4.2 Broad terms

4.2.1

Role

Abstract characterizations of organizational behaviours and responsibilities within specified organizational context.

4.2.2

Goal

A descriptive statement of intent of a user or an organization, and it can be viewed as an objective that the system under consideration should achieve.

4.3 Abbreviated terms

FOAF

Friend of a Friend

i*

Goal-oriented requirements modeling

KAOS

Keep All Objects Satisfied

NFRF

Non-functional Requirement Framework

BMM

Business Motivation Model

RM-ODP

Reference Model of Open Distributed Processing

ZACHMAN

Zachman Framework for Enterprise Architecture

TOGAF

The Open Group Architecture Framework

MFI Role&Goal

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

MFI Core

ISO/IEC 19763-2, Information technology –Metamodel Framework for Interoperability – Part-2 : Core model

MFI Role and Goal registration

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

MFI Ontology registration

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

URI

Uniform Resource Identifier

5 Structure of MFI role and goal registration

5.1 Overview of MFI role and goal registration

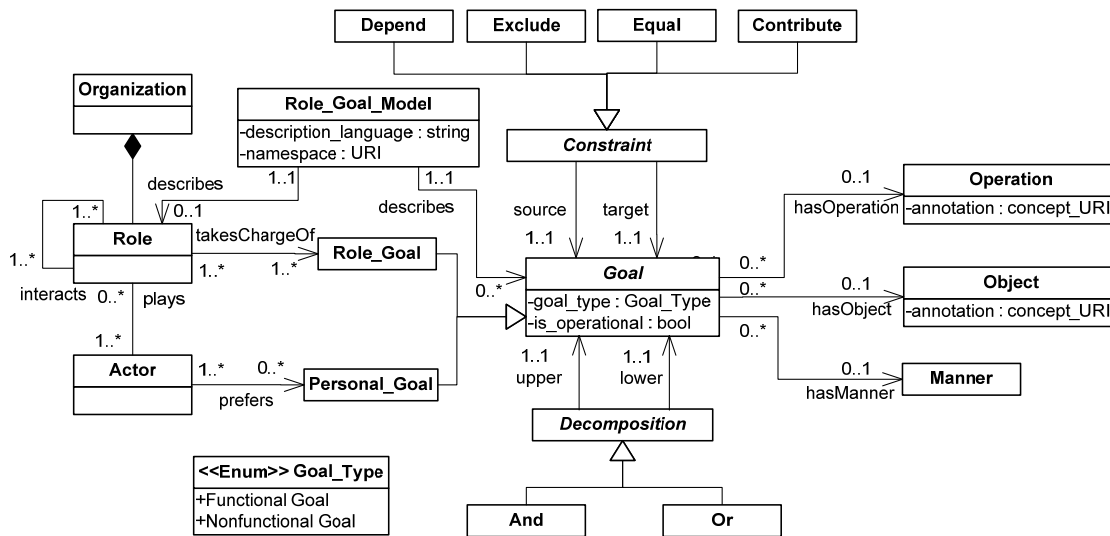
Role can be played by different **Actors**. An **Actor** is an intentional entity that can be either a human actor or a software agent. In an organizational context, **Role_Goals** are the goals that a role is in charge of. Actors also have their personal preferences, and these personal preferences are modelled as **Personal_Goals**. **Organization** is composed of **Roles**.

A goal consists of three optional parts, that is, a verb that indicates the **Operation**, a noun that indicates the **Object** dealt with by the operation, and the **Manner**, a prefix or a suffix that indicates how the operation affects the object. Each operation has its **annotation**, which should come from verb concepts of domain ontology. Similarly, each object has its **annotation**, which should come from noun concepts of domain ontology.

Usually, a **Goal** is a high-level statement when first proposed, and it needs to be decomposed in order to get a concrete and operational description. **Decomposition** is a process that a high-level goal is decomposed into sub-goals. The decomposition relations that characterize the relation between the upper goal and the lower goal set can be divided into **And** and **Or** relations. When the upper goal is selected, the **And** relation indicates that the lower goal set must also be selected; the **Or** relation indicates that at least one goal from the lower goal set must be selected.

In addition, the **Constraint** relation may exist between goals, and the **Constraint** relations can be **Depend**, **Exclude**, **Equal**, and **Contribute** relations. The **Depend** relation means that the realization of a goal depends on the realization of another goal; the **Exclude** relation means that the two goals can't be satisfied simultaneously; the **Equal** relation means that the two goals are the same in the semantics; the **Contribute** relation means that the realization of a goal can make contribution or hinder the realization of another goal.

Role_Goal_Model describes the basic information of the role and goal registration model.



NOTE Metaclasses whose names are italicized are abstract metaclasses

Figure 2 — Metamodel of MFI role and goal registration

5.2 Relationship between MFI role and goal registration and other parts in MFI

Figure 3 shows the relationship between MFI role and goal registration and other parts in MFI. That is, **Goal** could be achieved by **Process** in MFI-5; **Goal** could be accomplished by **Service** in MFI-7; **Goal** has an optional **Operation** and **Object** which are annotated by **concept_URI**, i.e., the URI of the registered **Ontology_Atomic_Construct** based on MFI Ontology Registration; **Service** in MFI-7 could serves for **Role**.

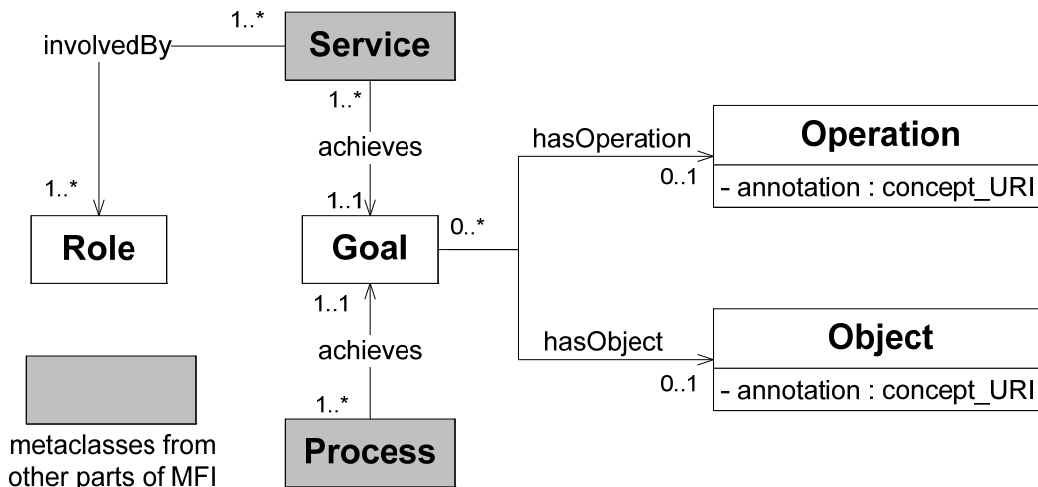


Figure 3 — Relationship between MFI role and goal registration and other parts in MFI

5.3 MFI role and goal registration

5.3.1 Goal

Goal is an abstract metaclass that represents the business intent of a user or an organization.

Attribute	Data Type	Multiplicity	Description
name	string	1..1	Name of the corresponding goal
goal_type	Goal_type	1..1	Goal_type that indicates whether the goal is functional goal or nonfunctional goal
is_operational	bool	1..1	is_operational that indicates whether the goal is operational. An Operational_goal is a goal that is indecomposable further. When the value of is_operational is <i>true</i> , the Goal is an Operational_goal, which should have one Operation and one Object.

Reference	Class	Multiplicity	Description
hasOperation	Operation	0..1	Operation that denotes the action that a goal has
hasObject	Object	0..1	Object that denotes the objects dealt by the goal
hasManner	Manner	0..1	Manner that indicates how the operation affects the object

5.3.2 Constraint

Constraint is an abstract metaclass that is a superClass of Depend, Exclude, Equal, and Contribute.

Reference	Class	Multiplicity	Description
source	Goal	1..1	The goal that is the source end of the constraint relation
target	Goal	1..1	The goal that is the target end of the constraint relation

5.3.3 Depend

Depend is a metaclass that denotes the dependency relation between two goals.

SuperClass

Constraint

5.3.4 Exclude

Exclude is a metaclass that denotes the exclusive relation between two goals.

SuperClass

Constraint

5.3.5 Equal

Equal is a metaclass that denotes the two goals are the same in the semantics.

SuperClass

Constraint

5.3.6 Contribute

Contribute is a metaclass that denotes one goal makes contribution to another goal.

SuperClass

Constraint

5.3.7 Decomposition

Decomposition is an abstract metaclass that is a superClass of And and Or. It describes the decomposition relationship between two goal.

Reference	Class	Multiplicity	Description
upper	Goal	1..1	The goal that is the upper end of the decomposition relation
lower	Goal	1..1	The goal that is the lower end of the decomposition relation

5.3.8 And

And is a metaclass that describes a kind of decomposition relationship. It indicates that when the upper goal is selected, the lower goal set must also be selected.

SuperClass

Decomposition

5.3.9 Or

Or is a metaclass that describes a kind of decomposition relationship. It indicates that when the upper goal is selected, the lower goal can be selected.

SuperClass

Decomposition

5.3.10 Operation

Operation is a metaclass that denotes the action or behavior that a goal has.

Attribute	Data Type	Multiplicity	Description
name	string	1..1	Name of the corresponding operation
annotation	concept_URI	0..*	URI of the registered <code>Ontology_Atomic_Construct</code> based on MFI Ontology Registration. The concepts in ontology can be used to annotate the operation of a goal.

Constraints

The value of attribute “name” has to be unique in this metaclass.

5.3.11 Object

Object is a metaclass that denotes the objects dealt by the goal.

Attribute	Data Type	Multiplicity	Description
name	string	1..1	Name of the corresponding object
annotation	concept_URI	0..*	URI of the registered <code>Ontology_Atomic_Construct</code> based on MFI Ontology Registration. The concepts in ontology can be used to annotate the object operated by a goal.

Constraints

The value of attribute “name” has to be unique in this metaclass.

5.3.12 Manner

Manner is a metaclass that indicates how the operation affects the object

Attribute	Data Type	Multiplicity	Description
name	string	1..1	Name of the corresponding manner

Constraints

The value of attribute “name” has to be unique in this metaclass.

5.3.13 Role

Role is a metaclass that denotes abstract characterizations of organizational behaviours and responsibilities within specified organizational context

Attribute	Data Type	Multiplicity	Description
name	string	1..1	Name of the corresponding role
Reference	Class	Multiplicity	Description
takesChargeOf	Role_Goal	1..*	The role_goal that owned by the role
interacts	Role	1..*	The role with which another role interacts

Constraints

The value of attribute "id" has to be unique in the scope of the model in this metaclass.

5.3.14 Actor

Actor is a metaclass that denotes an intentional entity.

Attribute	Data Type	Multiplicity	Description
name	string	1..1	Name of the corresponding actor
Reference	Class	Multiplicity	Description
plays	Role	0..*	The roles that the actor can play
prefers	Personal_Goal	0..*	The personal_goal that owned by the actor

Constraints

The value of attribute "id" has to be unique in the scope of the model in this metaclass.

5.3.15 Role_Goal

Role_Goal is a metaclass that denotes the goals that a role is in charge of.

SuperClass

Goal

5.3.16 Personal_Goal

Personal_Goal is a metaclass that denotes the goals that an actor prefers.

SuperClass

Goal

5.3.17 Organization

Organization is a metaclass that is composed of roles.

Attribute	DataType	Multiplicity	Description
name	string	1..1	Name of the corresponding organization

Constraints

The value of attribute "id" has to be unique in the scope of the model in this metaclass.

5.3.18 Role_Goal_Model

Role_Goal_Model is a metaclass that describes the basic information of the model.

Attribute	DataType	Multiplicity	Description
Description_language	string	1..1	The description language of the model.
namespace	URI	1..1	The namespace of the model.

Reference	Class	Multiplicity	Description
describes	Goal	0..*	The goal model described by the Role_Goal_Model
describes	Role	0..1	The role model described by the Role_Goal_Model

Annex A (informative)

Example of MFI Role and Goal Registration

In this section, three cases will be studied to illustrate how to register role and goal models based on MFI-8 and enable semantic interoperation between them. It shows that MFI-8 can harmonize with existing specifications related to role and goal models.

Registration Case 1: *Meeting Arrangement* (“Towards Modelling and Reasoning Support for Early-phase Requirements Engineering”, Proceedings of the 3rd IEEE International Symposium on Requirements Engineering, 1997)

Meeting Arrangement is expressed in i* model to designate the roles and goals related to it as shown in Figure A.1. More specifically, *Meeting Arrangement* consists of 2 Roles, 4 Goals, 7 Soft-Goals, 9 Tasks, 11 Task-Decomposition Links, 3 Means-ends Links, and 8 Contribution Links to soft-goals. We map Role in i* to Role in MFI-8, Goal in i* to Goal in MFI-8 with attribute goal_type having the value Functional Goal, Soft-Goal in i* to Goal in MFI-8 with attribute goal_type having value Nonfunctional Goal, Task in i* to Goal in MFI-8 with attribute goal_type having value Functional Goal, Task-Decomposition Link in i* to a kind of Decomposition “And” in MFI-8, Means-ends Links in i* to a kind of Decomposition “And” in MFI-8, and Contribution Link in i* to a kind of Constraint “Contribute” in MFI-8. Details of this registration case are illustrated in Figure A.2.

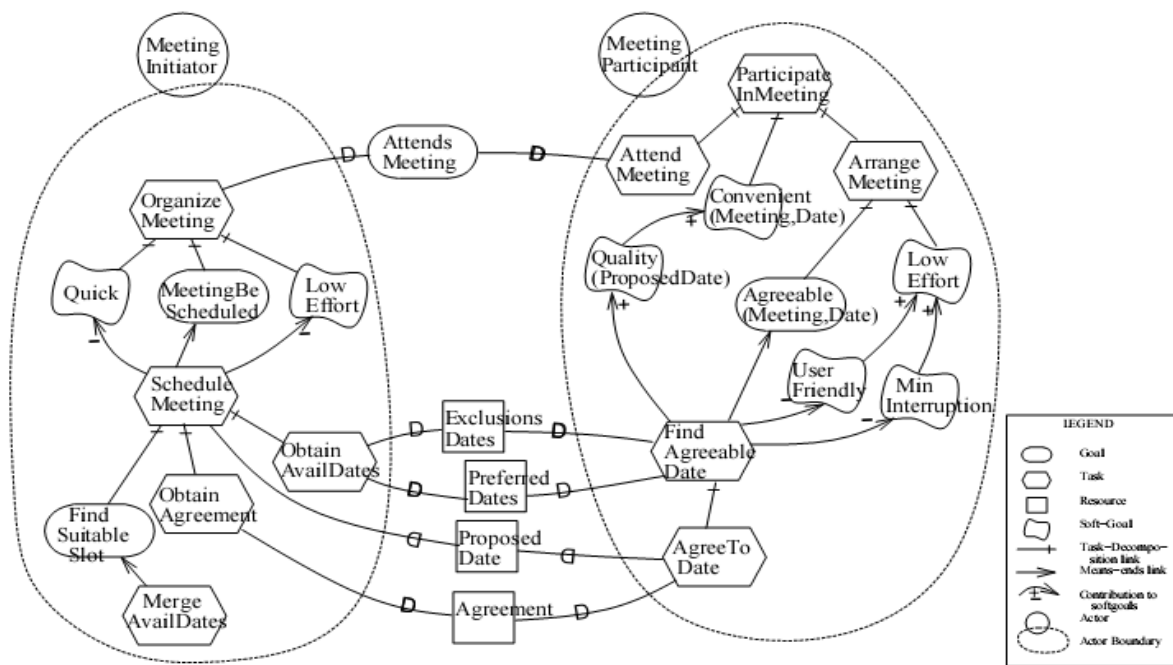


Figure A.1 — An Example of i* model from Eric Yu’s paper “Towards Modelling and Reasoning Support for Early-phase Requirements Engineering”, Proceedings of the 3rd IEEE International Symposium on Requirements Engineering, 1997.

The examples of roles and goals in i* Model in Figure A.1 are registered by MFI role and goal registration as below:

Role_Goal_Model	
description_language	i*
namespace	

Role00	
name	<i>Meeting Initiator</i>
takesChargeOf	Role_Goal00:Organize Meeting
	Role_Goal01:Quick
	Role_Goal02:MeetingBeScheduled
	Role_Goal03:LowEffort
	Role_Goal04:Schedule Meeting
	Role_Goal05:Find Suitable
	Role_Goal06:Obtain Agreement
	Role_Goal07:Obtain AvailableDates
	Role_Goal08:Merge AvailableDates
interacts	<i>Role01:Meeting Participant</i>

Role01	
name	<i>Meeting Participant</i>
takesChargeOf	Role_Goal10:ParticipateIn Meeting
	Role_Goal11:Attend Meeting
	Role_Goal12:Convenient
	Role_Goal13:Arrange Meeting
	Role_Goal14:Quality
	Role_Goal15:Agreeable
	Role_Goal16:Low Effort
	Role_Goal17>User Friendly
	Role_Goal18:Min
	Role_Goal19:Find AgreeableDate

	Role_Goal20:AgreeTo Date
interacts	<i>Role00:Meeting Initiator</i>

Operation00	
name	<i>Organize</i>
annotation	

Operation01	
name	<i>Schedule</i>
annotation	

Operation02	
name	<i>Find</i>
annotation	

Operation03	
name	<i>Obtain</i>
annotation	

Operation04	
name	<i>Merge</i>
annotation	

Operation05	
name	<i>Attends</i>
annotation	

Operation06	
name	<i>ParticipateIn</i>
annotation	

Operation07	
name	<i>Attend</i>
annotation	

Operation08	
-------------	--

name	<i>Arrange</i>
annotation	

Operation09

name	<i>AgreeTo</i>
annotation	

Object00

name	<i>Meeting</i>
annotation	

Object01

name	<i>Suitable Slot</i>
annotation	

Object02

name	<i>Agreement</i>
annotation	

Object03

name	<i>AvailDates</i>
annotation	

Object04

name	<i>AgreeableDate</i>
annotation	

Object05

name	<i>Date</i>
annotation	

Role_Goal00

name	<i>Organize Meeting</i>
goal_type	<i>Functional Goal</i>
is_operational	<i>false</i>
hasOperation	<i>Operation00:Organize</i>
hasObject	<i>Object00:Meeting</i>
hasManner	

Role_Goal01

name	<i>Quick</i>
------	--------------

goal_type	<i>Nonfunctional Goal</i>
is_operational	<i>false</i>
hasOperation	
hasObject	
hasManner	

Role_Goal02

name	<i>MeetingBeScheduled</i>
goal_type	<i>Functional Goal</i>
is_operational	<i>false</i>
hasOperation	
hasObject	
hasManner	

Role_Goal03

name	<i>LowEffort</i>
goal_type	<i>Nonfunctional Goal</i>
is_operational	<i>false</i>
hasOperation	
hasObject	
hasManner	

Role_Goal04

name	<i>Schedule Meeting</i>
goal_type	<i>Functional Goal</i>
is_operational	<i>false</i>
hasOperation	<i>Operation01:Schedule</i>
hasObject	<i>Object00:Meeting</i>
hasManner	

Role_Goal05

name	<i>Find Suitable Slot</i>
goal_type	<i>Functional Goal</i>
is_operational	<i>false</i>
hasOperation	<i>Operation02:Find</i>
hasObject	<i>Object01:Suitable Slot</i>
hasManner	

Role_Goal06	
name	<i>Obtain Agreement</i>
goal_type	<i>Functional Goal</i>
is_operational	<i>false</i>
hasOperation	<i>Operation03:Obtain</i>
hasObject	<i>Object02:Agreement</i>
hasManner	

Role_Goal07	
name	<i>Obtain AvailableDates</i>
goal_type	<i>Functional Goal</i>
is_operational	<i>false</i>
hasOperation	<i>Operation03:Obtain</i>
hasObject	<i>Object03:AvailDates</i>
hasManner	

Role_Goal08	
name	<i>Merge AvailableDates</i>
goal_type	<i>Functional Goal</i>
is_operational	<i>false</i>
hasOperation	<i>Operation04:Merge</i>
hasObject	<i>Object03:AvailDates</i>
hasManner	

Role_Goal09	
name	<i>Attends Meeting</i>
goal_type	<i>Functional Goal</i>
is_operational	<i>false</i>
hasOperation	<i>Operation05:Attends</i>
hasObject	<i>Object00:Meeting</i>
hasManner	

Role_Goal10	
name	<i>ParticipateIn Meeting</i>

goal_type	<i>Functional Goal</i>
is_operational	<i>false</i>
hasOperation	<i>Operation06:ParticipateIn</i>
hasObject	<i>Object00:Meeting</i>
hasManner	

Role_Goal11	
name	<i>Attend Meeting</i>
goal_type	<i>Functional Goal</i>
is_operational	<i>false</i>
hasOperation	<i>Operation07:Attend</i>
hasObject	<i>Object00:Meeting</i>
hasManner	

Role_Goal12	
name	<i>Convenient</i>
goal_type	<i>Nonfunctional Goal</i>
is_operational	<i>false</i>
hasOperation	
hasObject	
hasManner	

Role_Goal13	
name	<i>Arrange Meeting</i>
goal_type	<i>Functional Goal</i>
is_operational	<i>false</i>
hasOperation	<i>Operation08:Arrange</i>
hasObject	<i>Object00:Meeting</i>
hasManner	

Role_Goal14	
name	<i>Quality</i>
goal_type	<i>Nonfunctional Goal</i>
is_operational	<i>false</i>
hasOperation	
hasObject	
hasManner	

Role_Goal15	
name	<i>Agreeable</i>

goal_type	<i>Functional Goal</i>
is_operational	<i>false</i>
hasOperation	
hasObject	
hasManner	

Role_Goal16

name	<i>Low Effort</i>
goal_type	<i>Nonfunctional Goal</i>
is_operational	<i>false</i>
hasOperation	
hasObject	
hasManner	

Role_Goal17

name	<i>User Friendly</i>
goal_type	<i>Nonfunctional Goal</i>
is_operational	<i>false</i>
hasOperation	
hasObject	
hasManner	

Role_Goal18

name	<i>Min Interruption</i>
goal_type	<i>Nonfunctional Goal</i>
is_operational	<i>false</i>
hasOperation	
hasObject	
hasManner	

Role_Goal19

name	<i>Find AgreeableDate</i>
goal_type	<i>Functional Goal</i>
is_operational	<i>false</i>
hasOperation	<i>Operation02:Find</i>
hasObject	<i>Object04:AgreeableDate</i>
hasManner	

Role_Goal20

Name	<i>AgreeTo Date</i>
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goal_type	<i>Functional Goal</i>
is_operational	<i>false</i>
hasOperation	<i>Operation09:AgreeTo</i>
hasObject	<i>Object05:Date</i>
hasManner	

And00

upper	<i>Role_Goal00:Organize Meeting</i>
lower	<i>Role_Goal01:Quick</i>

And01

upper	<i>Role_Goal00:Organize Meeting</i>
lower	<i>Role_Goal02:MeetingBeScheduled</i>

And02

upper	<i>Role_Goal00:Organize Meeting</i>
lower	<i>Role_Goal03:LowEffort</i>

And03

upper	<i>Role_Goal04:Schedule Meeting</i>
lower	<i>Role_Goal05:Find Suitable Slot</i>

And04

upper	<i>Role_Goal04:Schedule Meeting</i>
lower	<i>Role_Goal06:Obtain Agreement</i>

And05

upper	<i>Role_Goal04:Schedule Meeting</i>
lower	<i>Role_Goal07:Obtain AvailableDates</i>

And06

upper	<i>Role_Goal02:MeetingBeScheduled</i>
lower	<i>Role_Goal04:Schedule Meeting</i>

And07

upper	<i>Role_Goal05:Find Suitable Slot</i>
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lower	<i>Role_Goal08:Merge AvailableDates</i>
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And08	
upper	<i>Role_Goal10:ParticipateIn Meeting</i>
lower	<i>Role_Goal11:Attend Meeting</i>

And09	
upper	<i>Role_Goal10:ParticipateIn Meeting</i>
lower	<i>Role_Goal12:Convenient</i>

And10	
upper	<i>Role_Goal10:ParticipateIn Meeting</i>
lower	<i>Role_Goal13:Arrange Meeting</i>

And11	
upper	<i>Role_Goal13:Arrange Meeting</i>
lower	<i>Role_Goal15:Agreeable</i>

And12	
upper	<i>Role_Goal13:Arrange Meeting</i>
lower	<i>Role_Goal16:Low Effort</i>

And13	
upper	<i>Role_Goal15:Agreeable</i>
lower	<i>Role_Goal19:Find AgreeableDate</i>

And14	
upper	<i>Role_Goal19:Find AgreeableDate</i>
lower	<i>Role_Goal20:AgreeTo Date</i>

Contribute00	
upper	<i>Role_Goal01:Quick</i>
lower	<i>Role_Goal04:Schedule Meeting</i>

Contribute01	
upper	<i>Role_Goal03:LowEffort</i>
lower	<i>Role_Goal04:Schedule Meeting</i>

Contribute02	
upper	<i>Role_Goal12:Convenient</i>
lower	<i>Role_Goal14:Quality</i>

Contribute03	
upper	<i>Role_Goal14:Quality</i>
lower	<i>Role_Goal19:Find AgreeableDate</i>

Contribute04	
upper	<i>Role_Goal16:Low Effort</i>
lower	<i>Role_Goal17:User Friendly</i>

Contribute05	
upper	<i>Role_Goal16:Low Effort</i>
lower	<i>Role_Goal18:Min Interruption</i>

Contribute06	
upper	<i>Role_Goal17:User Friendly</i>
lower	<i>Role_Goal19:Find AgreeableDate</i>

Contribute07	
upper	<i>Role_Goal18:Min Interruption</i>
lower	<i>Role_Goal19:Find AgreeableDate</i>

Figure A.2 — Results of the registered roles and goals in i* model

Registration Case 2: Library System

As shown in Figure A.3, the package containing the specification of the **Library community** is stereotyped <<EV_CommunityContract>>, and contains the component, **Library**, stereotyped as <<EV_Community>> that expressed that *community* and owns the *process* of the *community*, three packages containing, respectively, the *roles* in the *community*, the set of *enterprise objects* specific to the *community* (**Library Enterprise Objects**, which model its structure), and *policies* for the *community*, and one class (stereotyped <<EV_Objective>>) which has a tagged value that expresses the *community objective* as follows: "To allow the use, by authorised borrowers, of the varying collection of Library items, as fairly and efficiently as possible". This class has an association, stereotyped as <<EV_ObjectiveOf>>, with the component expressing the **Library community**. In this example, <<EV_CommunityContract>> and <<EV_Community>> are mapped into Organization in MFI-8, <<EV_Objective>> is mapped into Goal in MFI-8. Details of this registration case are illustrated in Figure A.4.

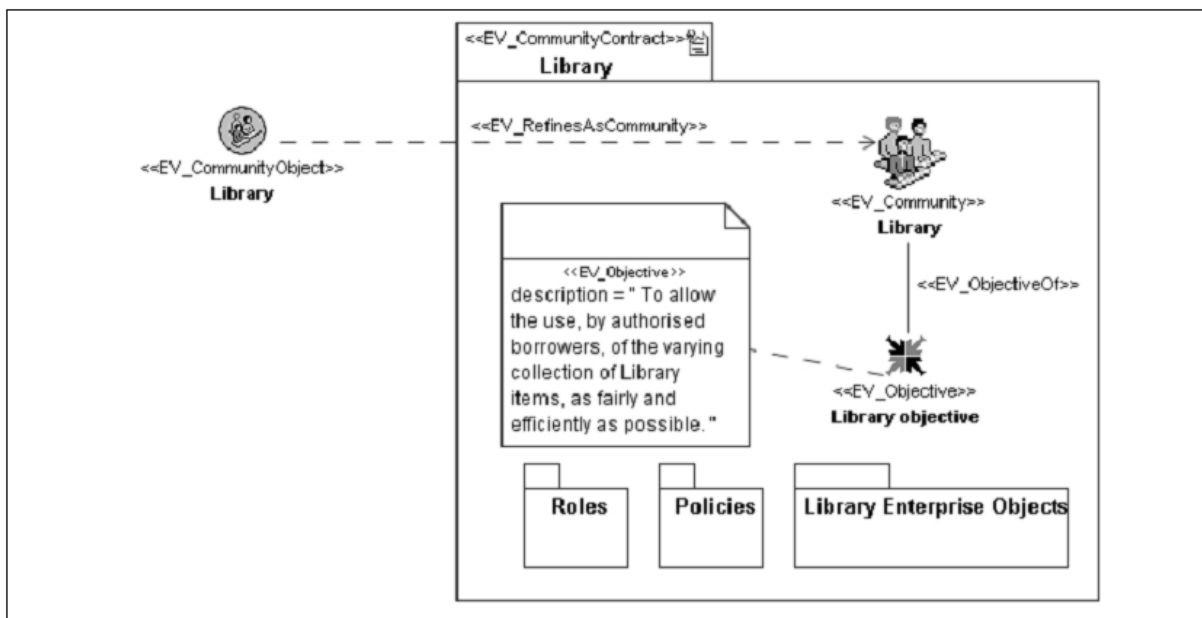


Figure A.3 — An example of ODP model on library system from “Information technology — Open distributed processing — Use of UML for ODP system specifications”

The examples of roles and goals in ODP Model in Figure A.3 are registered by MFI role and goal registration as below:

Role_Goal_Model	
description_language	ODP
namespace	

Role_Goal00	
name	Library objective
goal_type	Functional Goal
is_operational	false
hasOperation	
hasObject	
hasManner	

Organization00	
name	Library

Figure A.4 — Results of the registered model in ODP

As shown in Figure A.5, there are 5 roles in the community. Role in ODP is mapped into Role in MFI-8.

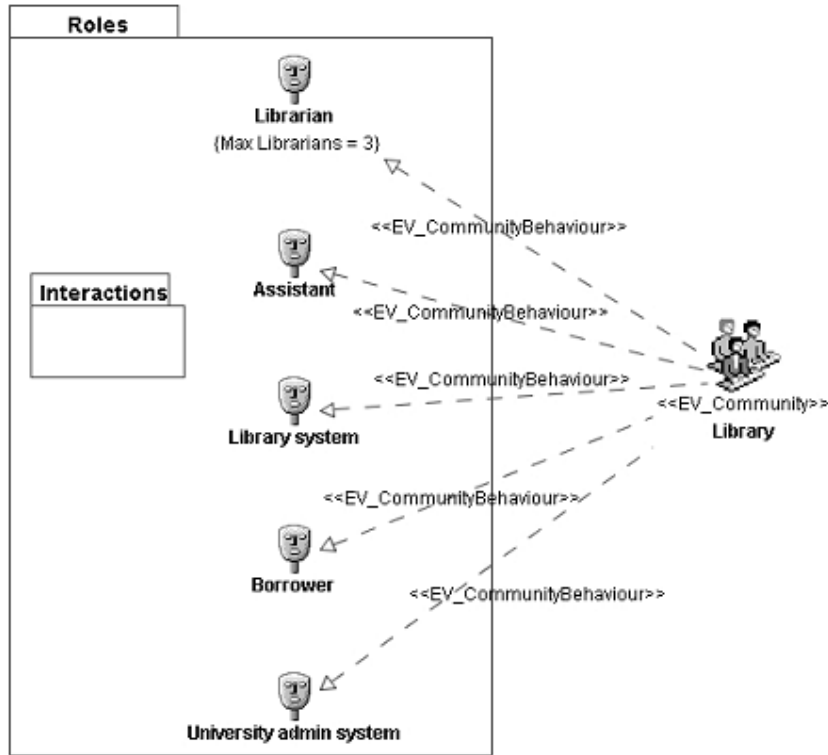


Figure A.5 — Another example of ODP model on library system from “Information technology — Open distributed processing — Use of UML for ODP system specifications”

The examples of roles and goals in ODP Model in Figure A.5 are registered by MFI Role and Goal as below:

Role00		takesChargeOf	
name	<i>Librarian</i>	interacts	
takesChargeOf			
interacts			

Role01		takesChargeOf	
name	<i>Assistant</i>	interacts	
takesChargeOf			
interacts			

Role02		takesChargeOf	
name	<i>Library System</i>	interacts	
takesChargeOf			
interacts			

Role03		takesChargeOf	
name	<i>Borrower</i>	interacts	
takesChargeOf			
interacts			

Role04		takesChargeOf	
name	<i>University admin System</i>	interacts	
takesChargeOf			
interacts			

Figure A.6 — Results of the registered model in ODP

Registration Case 3: Meeting Scheduler

The roles and goals of *Meeting Scheduler* are expressed in KAOS (Keep All Objects Satisfied) model as shown in Figure A.7. In detail, *Meeting Scheduler* consists of 3 Agents, 8 Goals, 2 Entities, 2 Operations, 3 “AND” Goal-refinement links, and 1 “OR” Goal-refinement links in the fragment of the KAOS model. We map Agent in KAOS to Role in MFI-8, Goal in KAOS to Goal with the value Functional Goal of attribute goal_type in MFI-8, Entity in KAOS to Object in MFI-8, Operation in KAOS to Operation in MFI-8, “AND” Goal-refinement link in KAOS to “And” Decomposition relationship in MFI-8, “OR” Goal-refinement link in KAOS to “Or” Decomposition relationship in MFI-8. Details of the registration case are illustrated in Figure A.8.

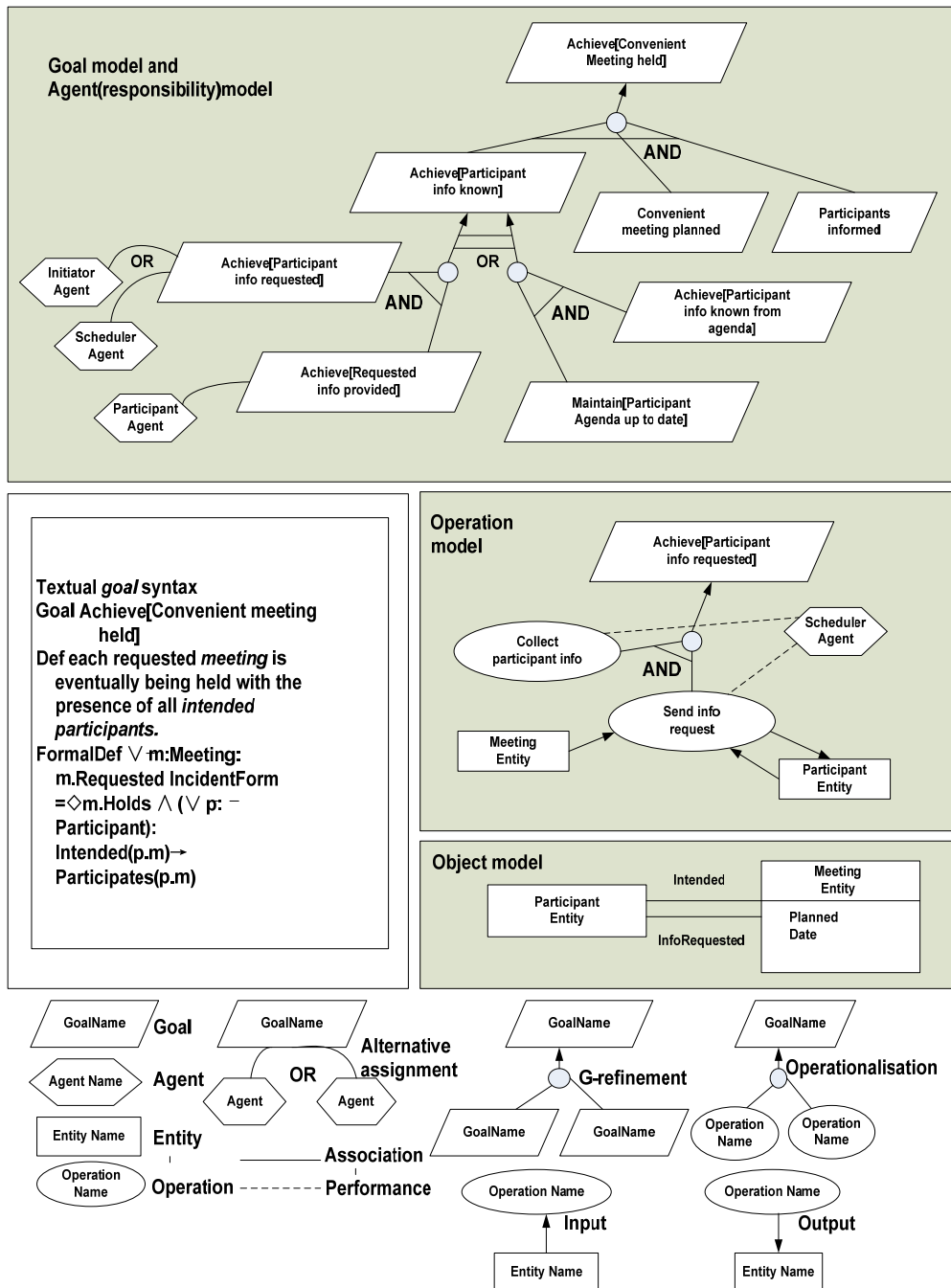


Figure A.7 – An Example of Fragment of the KAOS model for the Meeting Scheduler [10, 11]

The examples of roles and goals in KAOS Model in Figure A.7 are registered by MFI role and goal registration as below:

Role_Goal_Model	
description_language	KAOS
namespace	

Role00	
name	Initiator Agent
takeCharge	Role_Goal00: Achieve[Participant info requested]
	Role_Goal04: Achieve[Participant info known]
	Role_Goal07: Achieve[Convenient Meeting held]
interacts	

Role01	
name	Scheduler Agent
takeCharge	Role_Goal00: Achieve[Participant info requested]
	Role_Goal04: Achieve[Participant info known]
	Role_Goal07: Achieve[Convenient Meeting held]
interacts	Role02: Participant Agent

Role02	
name	Participant Agent
takeCharge	Role_Goal01: Achieve[Requested Info provided]
	Role_Goal04: Achieve[Participant info known]
	Role_Goal07: Achieve[Convenient Meeting held]
	Role_Goal00: Achieve[Requested Info requested]
interacts	Role01: Scheduler Agent

Operation00	
name	Collect participant info
annotation	

Operation01	
name	Send info request
annotation	

Object00	
name	Meeting Entity
annotation	

Object01	
name	Participant Entity
annotation	

Role_Goal00	
name	Achieve[Participant info requested]
goal_type	Functional Goal
is_operational	yes
hasOperation	Operation00: Collect participant info Operation01: Send info request
hasObject	Object00: Meeting Entity Object01: Participant Entity
hasManner	

Role_Goal01	
name	Achieve[Requested info provided]
goal_type	Functional Goal
is_operational	
hasOperation	
hasObject	
hasManner	

Role_Goal02	
name	Maintain [Participant Agenda up to date]
goal_type	Functional Goal
is_operational	
hasOperation	
hasObject	
hasManner	

Role_Goal03	
name	Achieve[Participant info known from agenda]
goal_type	Functional Goal
is_operational	
hasOperation	
hasObject	
hasManner	

Role_Goal04	
name	Achieve[Participant info known]
goal_type	Functional Goal
is_operational	
hasOperation	
hasObject	
hasManner	

Role_Goal05	
name	Convenient meeting planned
goal_type	Functional Goal
is_operational	
hasOperation	
hasObject	
hasManner	

Role_Goal06	
name	Participants informed
goal_type	Functional Goal

is_operational	
hasOperation	
hasObject	
hasManner	

Role_Goal07	
name	Achieve[Convenient Meeting held]
goal_type	Functional Goal
is_operational	
hasOperation	
hasObject	
hasManner	

And00	
upper	Role_Goal04: Achieve[Participant info known]
lower	Role_Goal05: Convenient meeting planned

And01	
upper	Role_Goal04: Achieve[Participant info known]
lower	Role_Goal06: Participants informed

And02	
upper	Role_Goal05: Convenient meeting planned
lower	Role_Goal04: Achieve[Participant

	info known]
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And03	
upper	Role_Goal05: Convenient meeting planned
lower	Role_Goal06: Participants informed

And04	
upper	Role_Goal06: Participants informed
lower	Role_Goal04: Achieve[Participant info known]

And05	
upper	Role_Goal06: Participants informed
lower	Role_Goal05: Convenient meeting planned

And06	
upper	Role_Goal00: Achieve[Participant info requested]
lower	Role_Goal01: Achieve[Requested info provided]

And07	
upper	Role_Goal01: Achieve[Requested info provided]
lower	Role_Goal00: Achieve[Participant

	info requested]
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And08	
upper	Role_Goal02:Maintain[Participant Agenda up to date]
lower	Role_Goal03: Achieve[Participant info known from agenda]

And09	
upper	Role_Goal03: Achieve[Participant info known from agenda]
lower	Role_Goal02:Maintain[Participant Agenda up to date]

Or00	
upper	Role_Goal04: Achieve[Participant info known]
lower	Role_Goal00: Achieve[Participant info requested]

Or01	
upper	Role_Goal04: Achieve[Participant info known]
lower	Role_Goal01: Achieve[Requested info provided]

Or02	
upper	Role_Goal04: Achieve[Participant info known]
lower	Role_Goal02:Maintain[Participant Agenda up to date]

Or03	
upper	Role_Goal04: Achieve[Participant info known]
lower	Role_Goal03: Achieve[Participant info known from agenda]

Figure A.8 — Results of the registered model in KAOS

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