TM Forum Model

Intent Family Relation - Intent Extension Model

TR291F

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Notice

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Executive Summary

The intent family relation model is an intent extension model that introduces vocabulary needed to provide information about relationships between intent.

Introduction

This document describes a model in the suit of models for intent based operation.

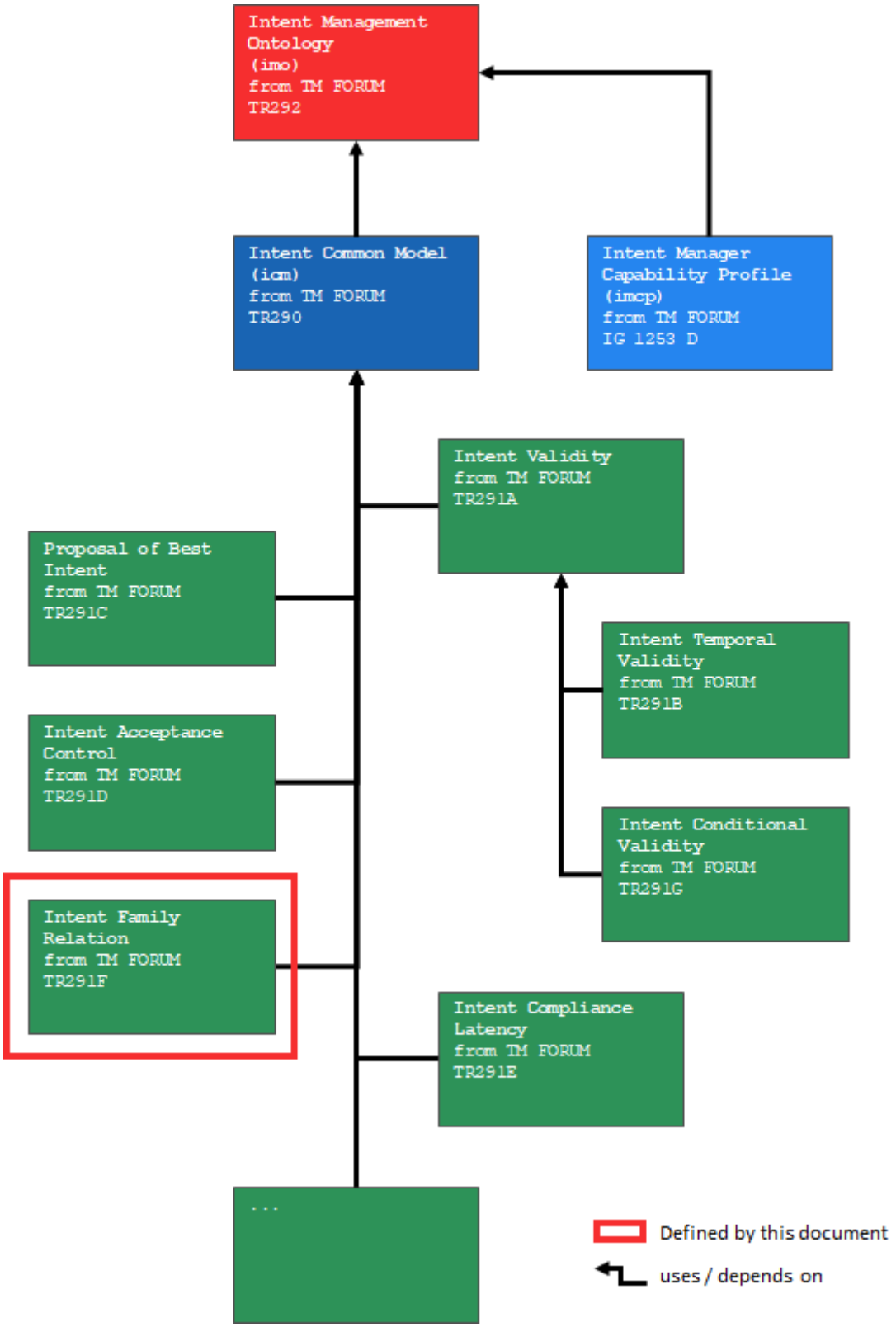

Figure 0.1: Intent model dependencies overview

1. Motivation and background

An intent is often used together with other intent to achieve a requirement. For example, a first intent might require a service to be delivered and the intent handler creates a second intent that requires the network functions needed for this service and a third intent requiring a slice. In the terminology introduced here, this set of inter-dependent intents is called an intent family. Intents are related and considered to be in the same family if they are part of the solution for a common requirement. The following relationships are recognized:

Parent and child intent
An intent is a child of another intent if it directly contributes to satisfy the requirements set by the other intent. This other intent is therefore the parent of the first. Intents can have multiple parents. In fact, every intent that has directly contributed to defining the requirements of another intent is considered to be one of its parents. In reverse, one intent can have multiple child intents. These are all the intents that set requirements in various subsequent intent handlers. This is a relationship of terminal and instrumental goals. The parent is trying to satisfy its terminal goals and its child intents are used to set and distribute the instrumental goals needed.

Ancestors
All intent above in the parent-child hierarchy are ancestors. This refers to parent intents and all parents of parents.

Root Intent
This is an intent without parents. It is usually the original intent coming directly from human interaction or ordering systems.

Sibling Intent
Two intents are siblings if they have the same parents and are used together to achieve the goals of the parents. In this scenario, the intent owner has created several intents and send them to multiple handlers. This handler and this intent are therefore one of a set used to achieve the owner's goals. The intents used in this operation and siblings.

This model allows communicating intent relationships. This information can be attached to an intent using a specialization of class icm:Information. Intent family relationships therefore do not carry requirements the system would need or even can be compliant to. It is only used for tracking and information purposes. This information can be valuable to human technicians when they monitor the autonomous system or try to debug its processes.

Family relationships can have multiple dimensions depending on what type of relationship is relevant. For example, two intents can be related because they both contribute to the delivery of the same service. Another example would be two intents that are related, because they are both serving users from the same user group. It is therefore possible that an intent is member of multiple families and these families do not necessarily share the same members. The intent family relationship model is therefore a tool that can be used differently depending on the use case and what type of relationship would be relevant to trace and document.

The current version of this model only has the vocabulary to attach intent family relation information to intents and not to intent reports. This might be useful, because child relationships need to be communicated upwards. A future version of this model can be extended accordingly.

2. Notation and namespaces

The proposals of the intent family relations model is defined in a namespace under the TM Forum domain. This intent extension model depends on the following models and uses the respective namespaces.

Table 2-1: Model references

Model	Prefix	Namespace	Published by
Intent Family Relation	ifr	http://tio.models.tmforum.org/tio/v1.0.0/IntentFamilyRelation/	TM Forum
W3C RDF version 1.1	rdf	http://www.w3.org/1999/02/22-rdf-syntax-ns#	W3C
W3C RDF Schema 1.1	rdfs	http://www.w3.org/2000/01/rdf-schema#	W3C
Intent Common Model	icm	http://tio.models.tmforum.org/tio/v2.0.0/IntentCommonModel/	TM Forum

The proposed prefix label for the intent family relation model is "ifr".

The model has a dependency to RDF and RDFS, because they are the chosen base standards for all intent and intent report models.

The intent family relation model specializes and extents the definitions of the intent common model (TR290).

3. Principles and vocabulary overview

Information about the family of an intent is expressed using an object of class `ifr:IntentFamily` . It is assigned to an intent using the `ifr:hasFamily` property.

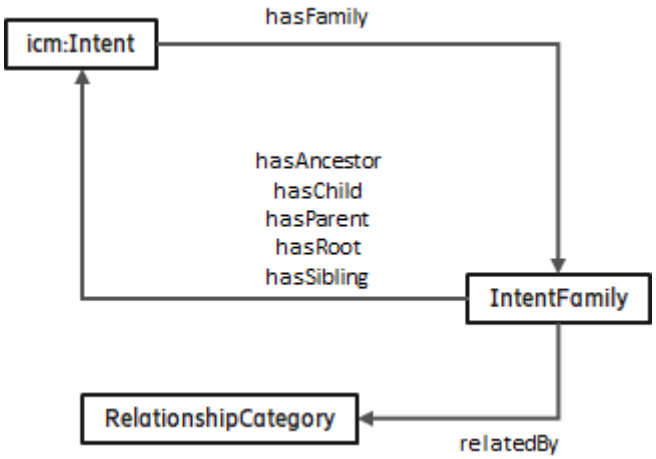

Figure 3.1: Vocabulary for expressing intent family relationships

Family relationships to other intents are specified with the `ifr:hasAncestor` , `ifr:hasChild` , `ifr:hasParent` , `ifr:hasRoot` and `ifr:hasSibling` properties. They refer to the intents that have the respective relationships to the intent the family is specified for.

Intents can be part of multiple families. These families are distinguished by relationship category. For example, intents might be related, because they all contribute to the delivery of a service. Or they all contribute to the same customer contract. This model defines as few examples of family relationship categories as individuals of class `ifr:RelationshipCategory` . However, this list is supposed to be extended depending on use cases that need the respective information.

4. Vocabulary specification

4.1. Classes

Class:	`ifr:IntentFamily`
Definition:	Instances of this class are ancestors of other intents
Instance of:	`rdfs:Class`
Subclass of:	`icm:Information`

Class:	`ifr:RelationshipCategory`
Definition:	Allows defining for which parameters in other expectations a proposal shall be made for
Instance of:	`rdfs:Class`

4.2. Instances

The following table defines individuals of class `ifr: RelationshipCategory`:

`ifr:RelationshipCategory` **individual**	**Description**
`ifr:SameCustomer`	All intents in the family have in common that they contribute to serving the same customer
`ifr:SameContract`	All intents in the family have in common that they contribute to fulfilling the same contract
`ifr:SameBusinessPolicy`	All intents in the family have in common that they contribute to satisfy the same business policy of the operator
`ifr:SameUserGroup`	All intents in the family have in common that they contribute to serving users from the same group
`...`	further proposals are welcome

4.3. Properties

Property:	`ifr:hasAncestor`
Definition:	Refers to an intent that is considered to be an ancestor of the intent the family is specified for
Instance of:	`rdf:property`
Domain:	`ifr:IntentFamily`
Range:	`icm:Intent`

Property:	ifr:hasChild
Definition:	Refers to an intent that is considered to be a child of the intent the family is specified for
Instance of:	rdf:property
Domain:	ifr:IntentFamily
Range:	icm:Intent

Property:	ifr:hasFamily
Definition:	Assigns a family specification to an intent
Instance of:	rdf:property
Domain:	icm:Intent
Range:	ifr:IntentFamily

Property:	ifr:hasParent
Definition:	Refers to an intent that is considered to be a parent of the intent the family is specified for
Instance of:	rdf:property
Domain:	ifr:IntentFamily
Range:	icm:Intent

Property:	ifr:hasRoot
Definition:	Refers to an intent that is considered to be a root of the intent the family is specified for
Instance of:	rdf:property
Domain:	ifr:IntentFamily
Range:	icm:Intent

Property:	ifr:hasSibling
Definition:	Refers to an intent that is considered to be a sibling of the intent the family is specified for
Instance of:	rdf:property
Domain:	ifr:IntentFamily
Range:	icm:Intent

Property:	ifr:relatedBy
Definition:	Refers to an intent that is considered to be a Child of the intent the family is specified for
Instance of:	rdf:property
Domain:	ifr:IntentFamily
Range:	ifr:RelationshipCategory

5. Model usage and examples

5.1. Communicating ancestor and sibling intents

This example demonstrates how an intent can contain information about family relationships.

Example 1: Family definition

```
@prefix rdfs: <http://www.w3.org/2000/01/rdf-schema#> .
@prefix ifr:
<http://tio.models.tmforum.org/tio/v1.0.0/IntentFamilyRelation/> .
@prefix icm:
<http://tio.models.tmforum.org/tio/v2.0.0/IntentCommonModel/> .
@prefix :
<http://www.operator.org/IntentNamespace/intent20220322_12345/> .

:ampleIntentXYZ
   a icm:Intent ;
   ifr:hasFamily [ a IntentFamily ;
                   ifr:relatedBy ifr:SameContract ;
                   ifr:hasRoot :Intent0001 ;
                   ifr:hasParent :Intent0005 ;
                   ifr:hasSibling :Intent0204 ;
                   ifr:hasSibling :Intent0333 ;
                 ] ;
   icm:hasExpectation :De1, :De1, :Pe1, :Pe1, :Re1 ;
.

...
```

This example intent contains information of a family it is part of. This family is defined by contributing to the same contract. In this family are one root intent, which was for example the one created by the order management system in business operation after the contract was approved and its fulfillment is needed. The family relation also refers to one direct parent and two sibling intents.

6. Administrative Appendix

6.1. Document History

6.1.1. Version History

Version Number	Date Modified	Modified by:	Description of changes
1.0.0	31-Mar-2022	Alan Pope	Initial Release
1.1.0	01-Jun-2022	Alan Pope	Updated to beta

6.1.2. Release History

Release Status	Date Modified	Modified by:	Description of changes
Pre-production	31-Mar-2022	Alan Pope	Initial Release
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6.2. Acknowledgments

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