

EXTENSION SPECIFICATION

TRiStar: An i^* extension for Teleo-Reactive systems (RECREATED)

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PRESENTATION OF THE ISTAR EXTENSION: TRiStar: An i* extension for Teleo-Reactive systems (RECREATED)

This document specifies the following iStar extension: TRiStar: An i* extension for Teleo-Reactive systems (RECREATED). The list of constructs included, their descriptions and representations are presented following. The metamodel is also presented.

A general description should be introduced here to present an overview of the iStar extension proposed. The iStar extension metamodel should be presented and described here.

We selected the iStar extension Morales, J. M., Navarro, E., Sánchez, P., Alonso, D. TRiStar: An i* extension for Teleo-Reactive systems requirements specifications. ACM Symposium on Applied Computing, Intelligent Robotics and Multi-Agent Systems Track, 2015. It was choice because it has incompleteness (Absence of a metamodel).

The number of problems in original and recreated versions is presented in the table following.

Evaluation criteria	Original	Recreated
PIM1	0	0
PIM2	1	0
PIN1	0	0
PIN2	0	0
PCO1	0	0
PCO2	0	0
PCO3	0	0
PCO4	0	0
PCO5	0	0

- PIM1: Non-definition of the meaning of the constructors introduced;
- PIM2: Non-representation of the extension in the abstract syntax;
- PIN1: Inconsistencies with iStar default syntax due absence of nodes and links;
- PIN2: Inconsistencies between the abstract syntax and concrete syntax;
- PCO1: One concept with two or more representations in concrete syntax;
- PCO2: Two or more concepts with only one construct in concrete syntax;
- PCO3: New Constructs in conflict with the iStar default syntax;
- PCO4: Wrong representation of iStar default syntax construct;
- PCO5: Representation of constructs that are not part of the extension.

1 Analyse The Need For Extension Proposal

1.1 Study a domain/application area

It was not necessary contact experts in domain/application area in this task. We just did a survey of the article references, which are probably what the author used to extract the concepts added by the extension. The following list of references follows:

ID_reference	Reference
REF_SPCP1	Morales, J. M. et al. 2012. A systematic literature review of the Teleo-Reactive paradigm. Artif. Intell. Rev., 2012, 1-20.

1.2 Identify the concepts to be introduced by the extension

We identified 6 concepts to be introduced by the extension, being 3 nodes and 3 links.

ID_concept	Name of the Concept	Reference
<i>Nodes</i>		
CON_TRI_01	Logical Resource	REF_SPCP1
<i>Links</i>		
CON_TRI_02	Prioritized decomposition	REF_SPCP1
CON_TRI_03	Dependent decomposition	REF_SPCP1

1.3 Contact experts and Model an example with the identified concepts using iStar

We did not have any doubts about the domain/application area, so we did not contact these experts. We also did not have any doubts about the domain concepts which is possible to represent with iStar without creating new representations and what is not possible to identify with iStar.

1.4 Search if there is an extensions related to the new proposal in iStar extensions catalogue

It was searched in the repository using context term. Five extensions were found but none of them is related to this extension. Thus, we can conclude that, excluding these articles, there is no extension proposed for this purpose.

For the next process gateways the flow is: To Is there an extension suitable for your need? - Is not the extension related to a domain / application area? - Y. Thus, activity 1.2. Study a domain / application area is started.

2 Conceptualise the iStar extension

2.1 Search and select constructs to be reused.

It was searched in the repository using reactive/teleo-reactive term. We did not find another extension. There is no another extension proposed for this purpose.

For the next process gateways the flow is: To Is there an extension suitable for your need? - Is not the extension related to a domain / application area? - Y. Thus, activity 1.2. Study a domain / application area is started.

2.2 Define extension's concepts

The definition of the extension's concepts is presented in following table.

ID_concept	Name of the Concept	Definition	Reference
<i>Nodes</i>			
CON_TRI_01	Logical Resource	A specialization of iStar resources that represents the logical combinations of percepts.	REF_SPCP1
<i>Links</i>			

CON_TRI_02	Prioritized decomposition	It is a representation to prioritize the decomposition	REF_SPCP1
CON_TRI_03	Dependent decomposition	Used to represent TR rules	REF_SPCP1

2.3 Analyse how the extension constructs can be integrated with the iStar constructs

We tried to relate the concepts to be introduced with the iStar standard concepts. So, we concluded that we could specialise two iStar constructs. Logical resource can be represented as a kind of resource. The prioritization was introduced to decomposition link as a property. The list of the relation between extension and iStar constructs is given in Table following.

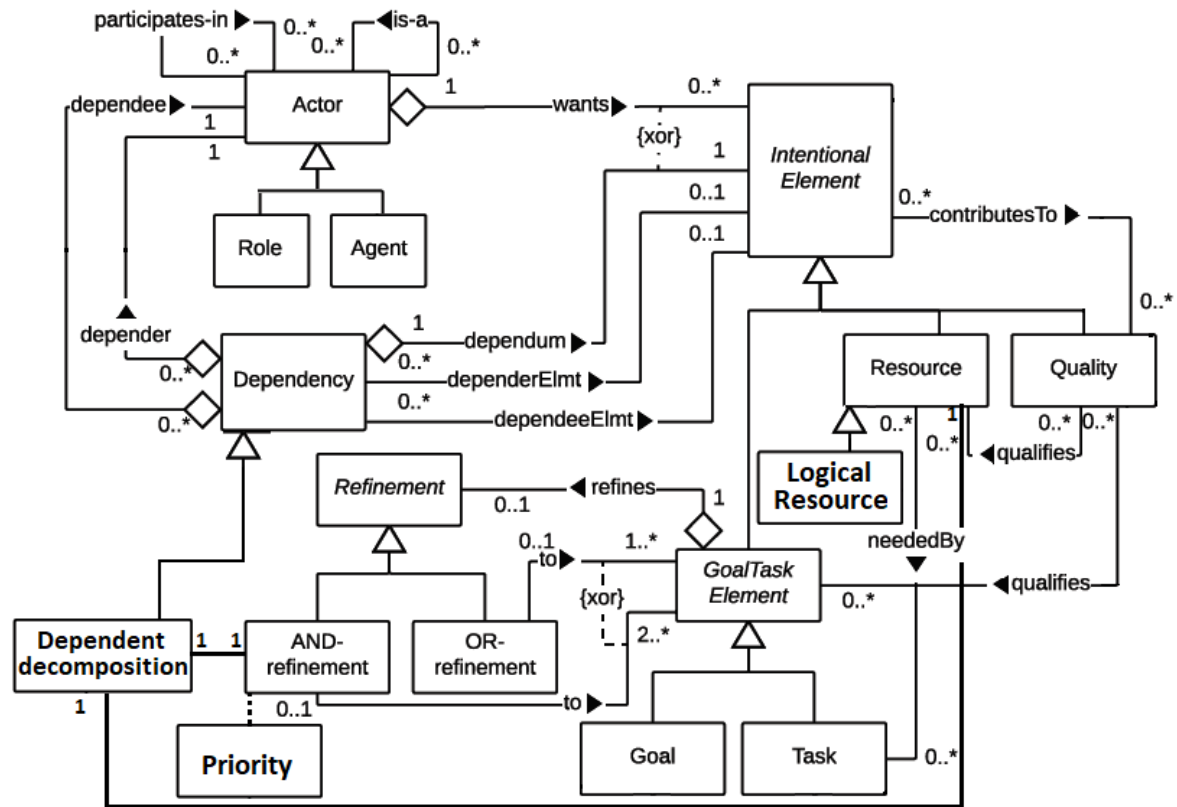
ID_concept	Name of the Concept	Relation with iStar constructs
Nodes		
CON_TRI_01	Logical Resource	<i>This construct can be represented by a specialization of the resource.</i>
Links		
CON_TRI_02	Prioritized decomposition	<i>It introduces a new property to decomposition link.</i>

3 DEVELOP ISTAR EXTENSION

3.1 Define metamodel of extension

We included the concepts identified in the List of concepts to be introduced in the iStar metamodel. We considered the logical resource is a new metaclass which specializes the dependency metaclass and is associated to resource and and-refinement. Logical resource is a new metaclass which specializes resource. Finally, priority is a property related to and-refinement. The result is presented in the figure below.

It was not necessary to add validation rules in this extension (task 3.2).



3.2 Define validation rules of extension

It was not necessary.

3.3 Define concrete syntax of extension

The representations of extension's constructs are presented in next table. We used the iStar extensions catalogue to identify the representation of reused constructs. We used the new graphical representations to Contextual resource, contextual goal and context-means introduced by the Murukannaiah, P., Singh, M. Xipho: Extending Tropos to Engineer Context-aware Personal Agents, International Conference on Autonomous Agents and Multi-Agent Systems, 2014. The results are presented in table following.

ID_concept	Name of the Concept	Representation	Explanation about the graphical representation	Reused?
<i>Nodes</i>				
CON_TRI_01	Logical Resource		An graphical marker added to resource and the usage of yellow colour.	No
<i>Links</i>				

CON_TRI_02	Prioritized decomposition		Markers to represent the priority of the decomposition.	No
CON_TRI_03	Dependent decomposition		A ternary link to represent a dependency of a decomposition.	No

3.4 Check completeness, consistency and conflicts

Completeness

Which level the iStar extension was applied

[X] Concepts definition [X] Metamodel ☐ Well-formedness rules (optional) [X] Concrete syntax

Consistency

List following the concepts in each level

Concept	Concept's definition	Metamodel	Concrete syntax
Logical Resource	[X]	[X]	[X]
Prioritized decomposition	[X]	[X]	[X]
Dependent decomposition	[X]	[X]	[X]

Presence of nodes and links of iStar default syntax

Construct		Metamodel	Concrete syntax
Goal		[X]	[X]
Quality		[X]	[X]
Resource		[X]	[X]
Task		[X]	[X]
Actor		[X]	[X]
Agent		[X]	[X]
Role		[X]	[X]
Refinement		[X]	[X]
Qualification		[X]	[X]
Contribution (make, help, break, hurt)		[X]	[X]
NeededBy		[X]	[X]
Dependency		[X]	[X]
Association links	is-a	[X]	[X]
	Participates-in	[X]	[X]

Conflicts

List the concepts and verify the occurrence of conflicts between the constructs of the extension

and the existing extensions.

Concept	Conflicts			
	One construct with two or more Symbols	Two of more constructs with only one Symbol	Wrong representation of iStar constructs	Construct which is not part of the extension
Logical Resource	[0]	[0]	[0]	[0]
Prioritized decomposition	[0]	[0]	[0]	[0]
Dependent decomposition	[0]	[0]	[0]	[0]
Details about the problem(s): Problems were not identified.				

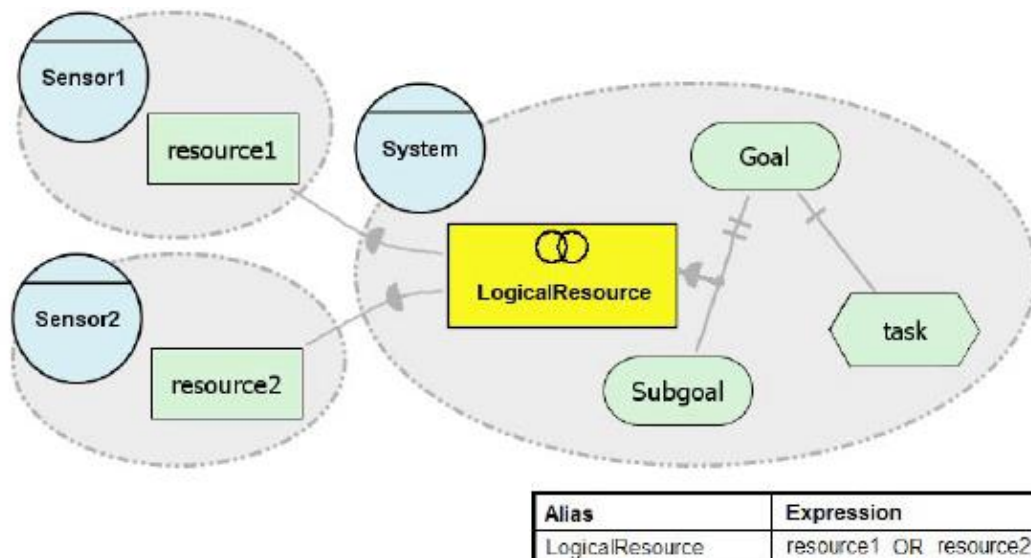
3.5 Apply the extension to a modelling tool

We did not propose a modelling tool. So, the flow goes to 4. Evaluate and validate iStar extension.

4 Evaluate and validate iStar extension

4.1 Use the iStar extension proposed to model a system

The prioritized decomposition is represented and the related dependency is linked following to a logical resource which has an external table to represent the related condition.



4.2 Evaluate the iStar extension

We did not perform the evaluation of the iStar extension because we are only revisiting one existing iStar extension. We will propose a new extension using all tasks of the PRISE.

