



Using i* Meta Modeling for Verifying i* Models

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Motivation: Intentionality in the i* Framework

We modeled i* in i* using the same perspective adopted by the i* Framework: "the intentionality perspective".

- ➡ Intentionality means to represent motivations and desires of actors - Yu [2]

"Goals are states of affairs that an actor plans to achieve" [2].

- ↪ They are not activities or functions.
- ↪ Standardization used by You [3]
 - goal → object + BE + verb in passive voice;
 - softgoal → quality attribute + [object or task as topic];
 - task → verb in infinitive + object;
 - resource → name of the object.

Models from i* Framework Meta-Modeling

Oliveira et al. [4]

- ◆ SD model as the organization
 - ◆ and therefore actors (agents occupying positions and playing roles) are the elements (the actors and the four kinds of dependencies)

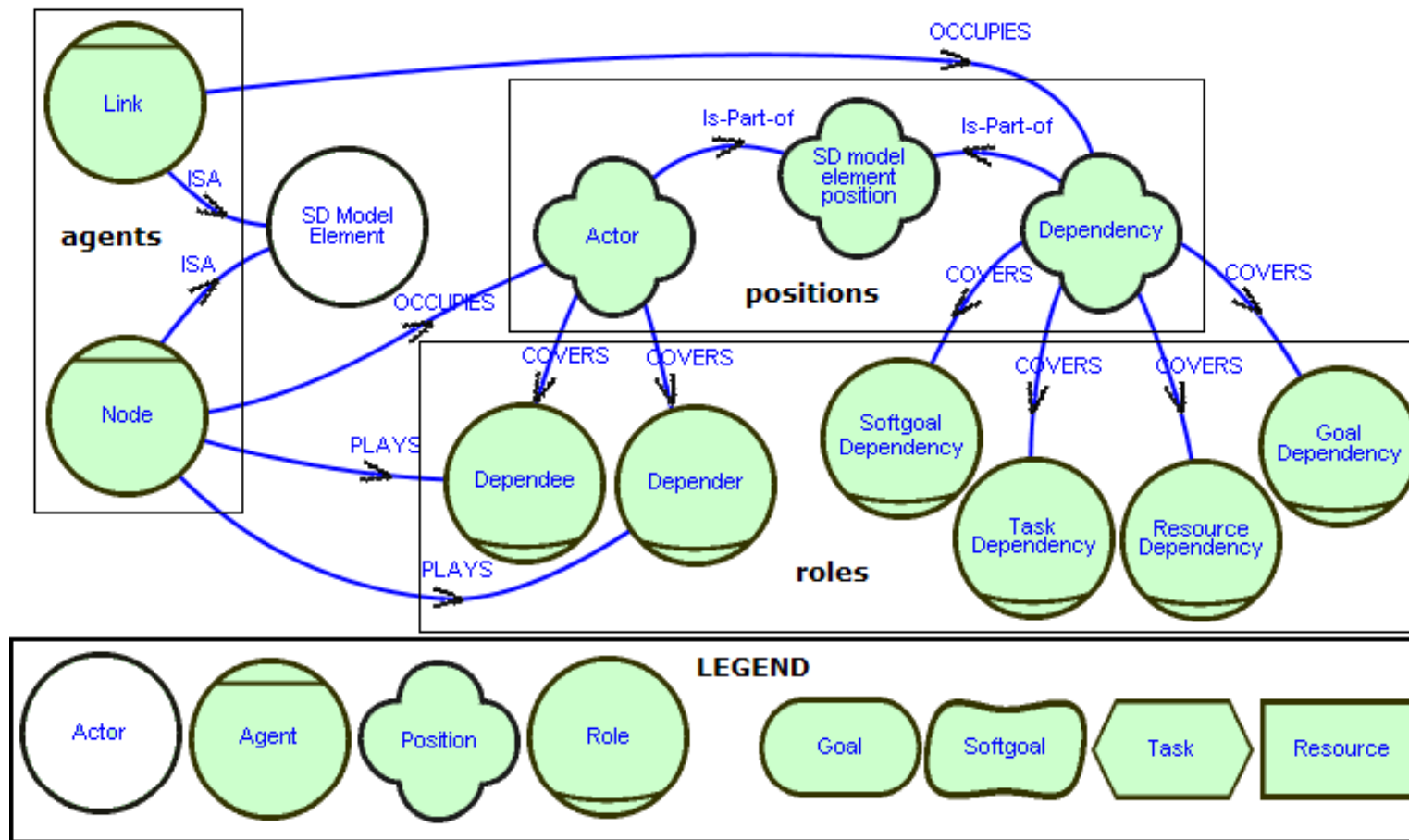
- ◆ SR model as the organization
 - ◆ and i* elements were considered the actors (dependencies, all kinds of means-ends links and task-decomposition)

- ◆ i* Framework as the organization
 - ◆ and i* models were considered the actors (SD model and SR model)

Strategic Actors (SA) Diagram: SD model's actors

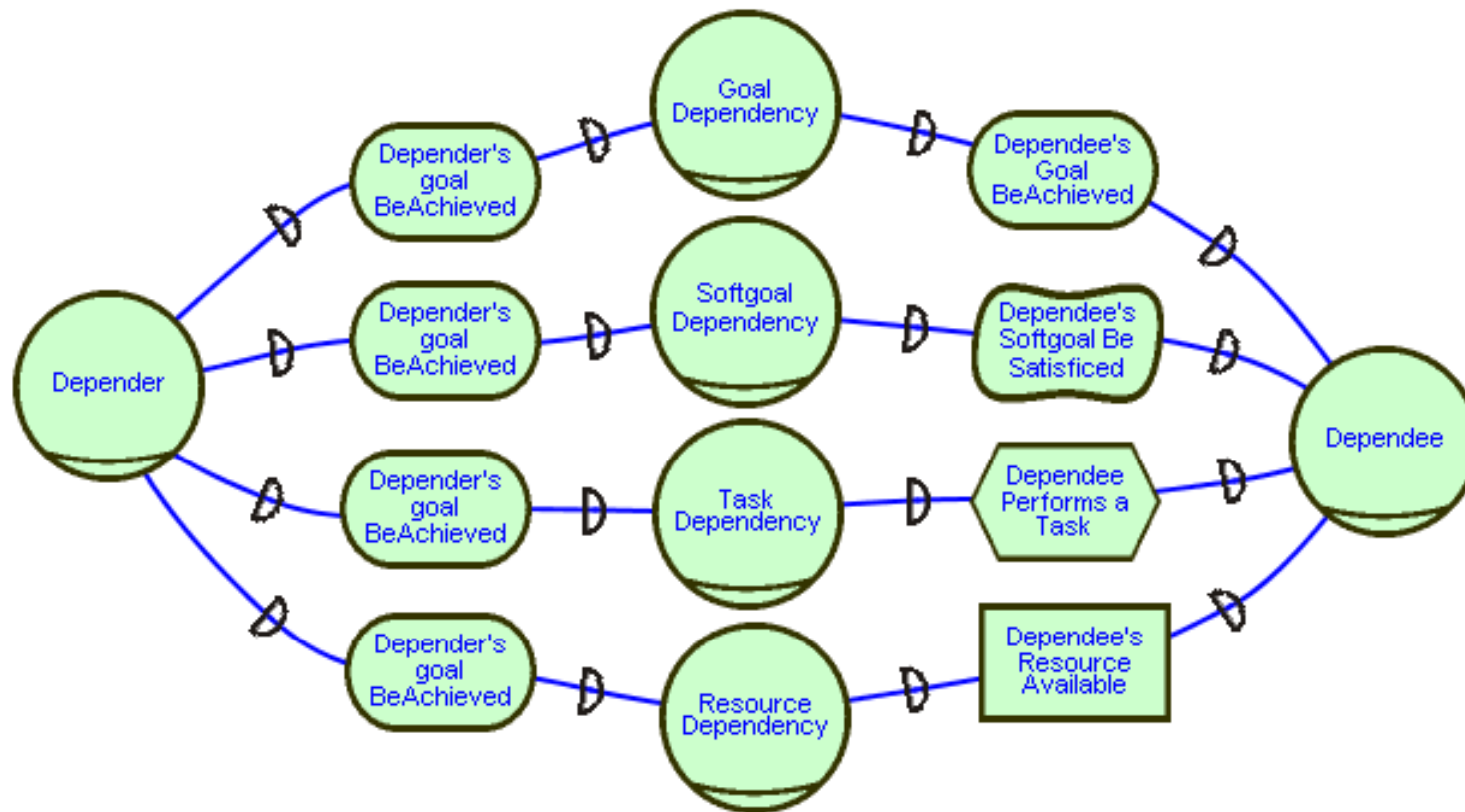
Abstraction:

We consider "actors" in SD model as being agents, which occupy positions and play roles



SA Diagram - Leite et al. [1]

Building an SD Model for the SD Model



Key points:

- (1) Strategic dependency means that there is always a depender's goal to be achieved,
- (2) dependee has a commitment with a depender - Yu's thesis p. 12 [2],
- (3) depender believes that dependee is able to carry out the commitment.

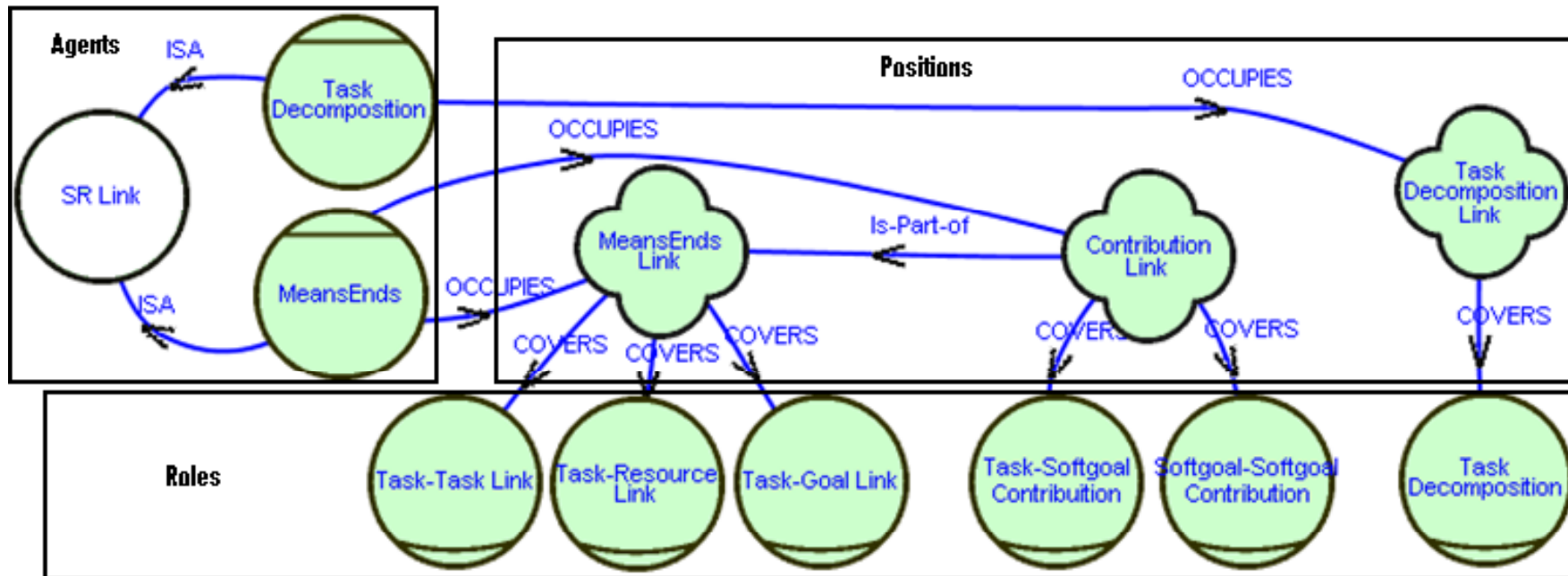
SD model Check List - QUESTIONS

- Is each element in the SD model either **actor** or **dependency**?
- For each dependency: Is one actor the depender and the other the dependee?
- For each goal dependency:
 - Does goal dependency obey the goal standardization?
 - Can the dependee achieve the goal the depender wants to?
 - Why the dependee is going to achieve the goal the depender wants to?
- For each softgoal dependency:
 - Does softgoal dependency obey the standardization?
 - Can the dependee achieve the softgoal the depender wants to?
 - Why the dependee is going to achieve the softgoal depender wants to?
- For each task dependency:
 - Does task dependency obey the goal standardization?
 - Can the dependee perform the task the depender wants to?
 - Why the dependee is going to perform the task the depender wants to?
- For each resource dependency:
 - Does resource dependency obey the standardization?
 - Can the dependee provide the resource the depender wants to?
 - Why the dependee is going to provide the resource depender wants to?

Strategic Actors (SA) Diagram: SR model's actors

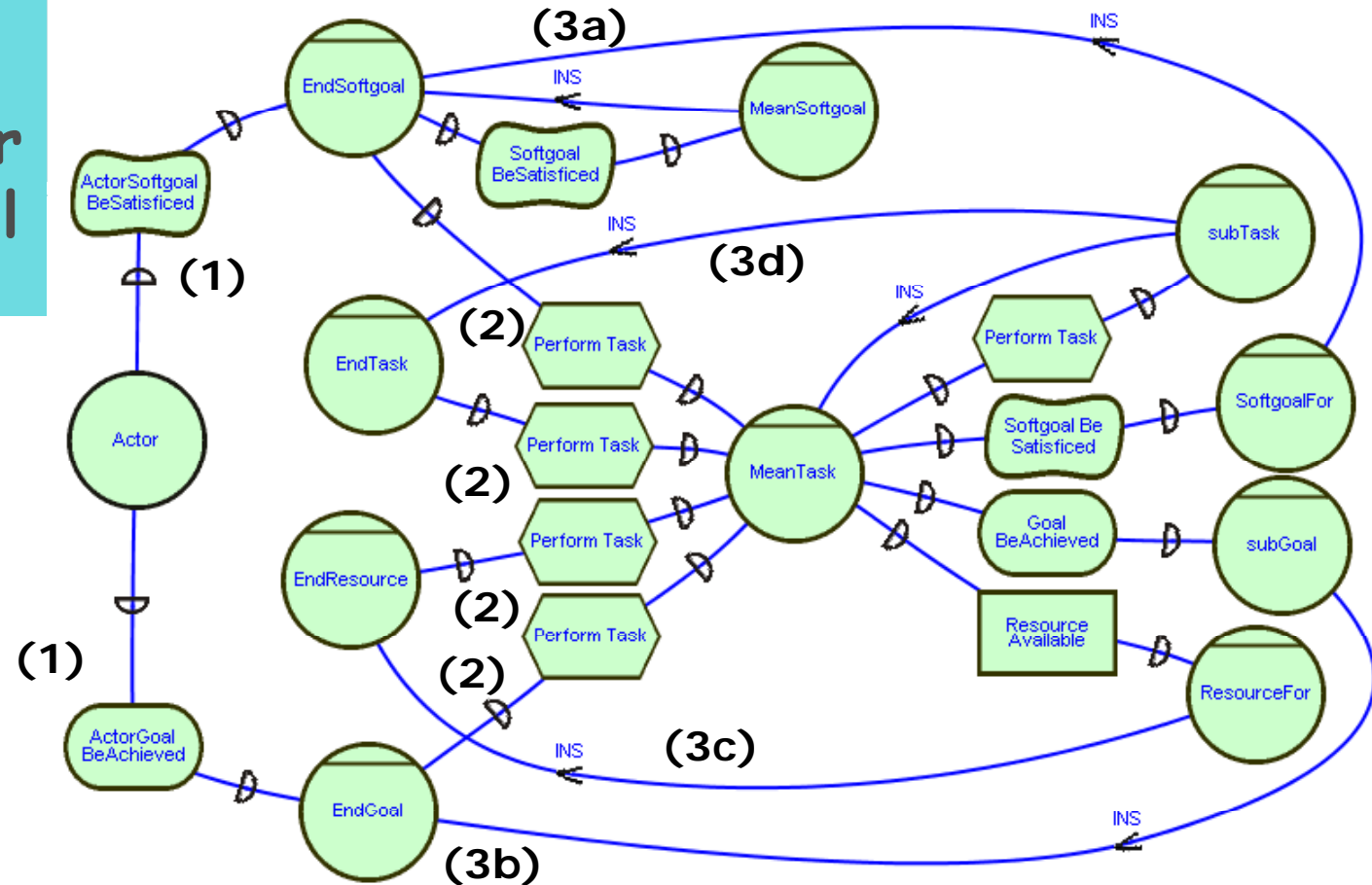
Abstraction:

We consider "actors" in SR model as being agents, which occupy positions and play roles



SA Diagram - Leite et al. [1]

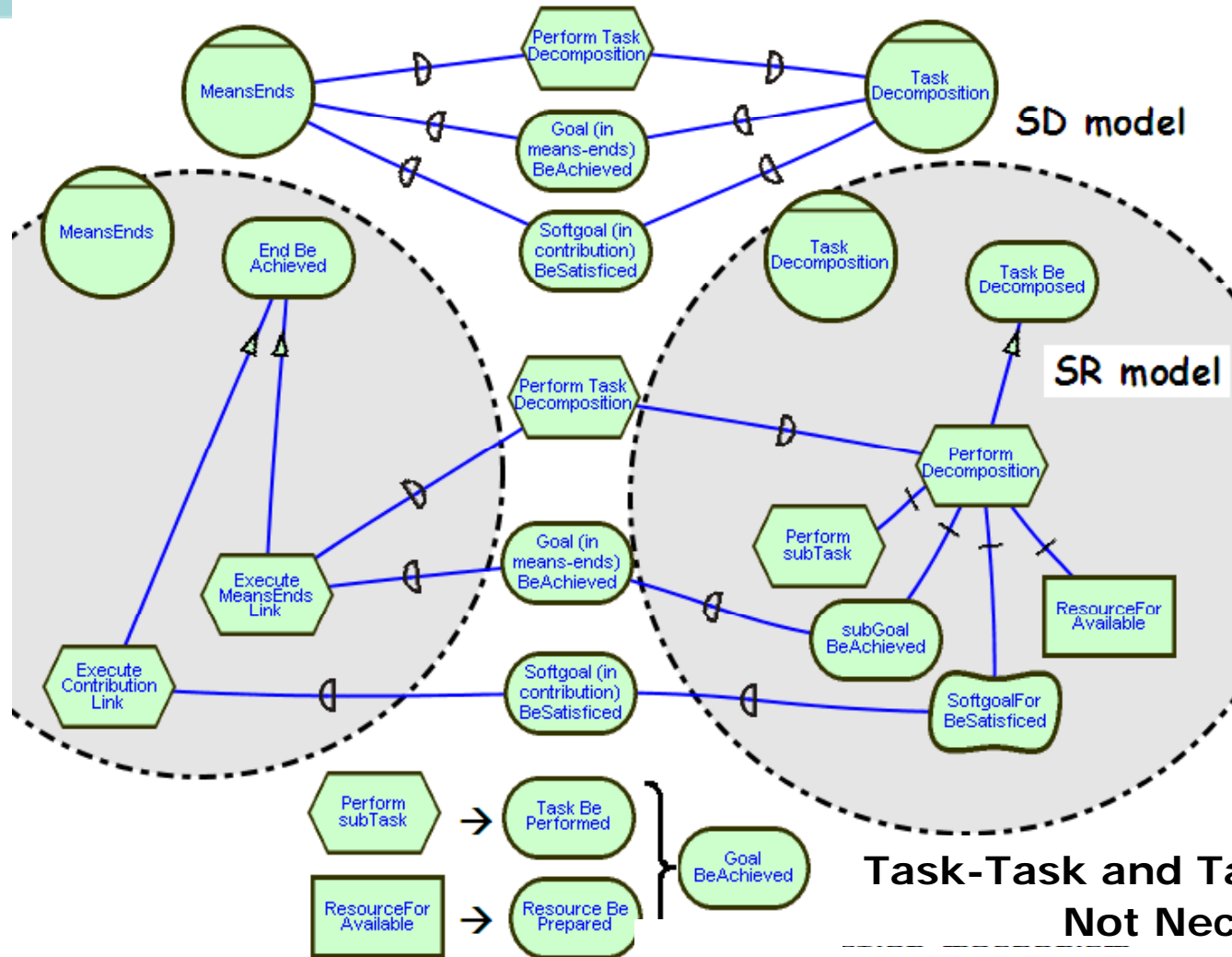
Building an SD Model For the SR Model



Key points (derived from [4]):

- (1) intentionality is represented in an SR model by goals and softgoals,
- (2) there are two ways to represent the rationale inside actor's boundary: using a means-ends or a task-decomposition links,
- (3) there are five situations of instances:
 - (3a) a meanSoftgoal may be a an endSoftgoal,
 - (3b) a meanGoal may be a subGoal,
 - (3c) a resourceFor may be an endResource,
 - (3d) a subTask may be a meanTask, and (3e) a meanTask may be a endTask.

Building an SR Model for the SR Model



Task-Task and Task-Resource are Not Necessary.

Could be considered a Task-Goal Link

SR model Check List - QUESTIONS

I. - For each **actor**:

- ◆ Are **goals** and **softgoals** the roots in the highest level?
- ◆ Is each element a Contribution Link, a Task Decomposition Link or a MeansEnds Link?
- ◆ Is each MeansEnds Link, a Task-Goal Link, a Task-Task Link or a Task-Resource Link?

II. - For each **softgoal**:

- ◆ Does the softgoal obey the standardization?
- ◆ In case of a single softgoal: Is there a NFR catalog for that softgoal?
- ◆ In case of a contribution: Is the contribution, a Task-Softgoal Contribution or a Softgoal-Softgoal Contribution?

III. - For each **goal**:

- ◆ Does the goal obey the goal standardization?
- ◆ Can the actor achieve the goal by him(her)self? Why not?
- ◆ Is the task good enough to achieve the goal? Why?

SR model Check List - QUESTIONS

IV. - In case of Task Decomposition:

- ◆ For each softgoalFor: Has the softgoal answered the questions in II?
- ◆ For each subGoal: Has the goal answered the questions in III?
- ◆ For each subTask: Does subTask obey the standardization?
 - Can the actor perform the task? Why not?
 - Is the task necessary for the main task?
- ◆ For each resourceFor: Does it obey the standardization?
 - Is the resourceFor already prepared?
 - Is the resourceFor necessary for the main task?

SR model Check List - QUESTIONS

V - For each **goal dependency**:

- ◆ Does dependency obey the standardization?
- ◆ Can dependee achieve the goal depender wants to?
- ◆ Why dependee is going to achieve the goal depender wants to?

VI - For each **softgoal dependency**:

- ◆ Does it obey the standardization?
- ◆ Can dependee achieve the softgoal depender wants to?
- ◆ Why dependee is going to achieve the softgoal depender wants to?

VII - For each **task dependency**:

- ◆ Does dependency obey the standardization?
- ◆ Can dependee perform the task depender wants to?
- ◆ Why dependee is going to perform the task depender wants to?

VIII - For each **resource dependency**:

- ◆ Does dependency obey the standardization?
- ◆ Can dependee provide the resource depender wants to?
- ◆ Why dependee is going to provide the resource depender wants to?

Conclusion:

1. The main goal of this work is to improve the understanding of the i^* framework so that requirements engineers can fully explore i^* strengths.
2. The work reminds the orthogonal role of each element, gives emphasis over what should be modeled and also shows the possibilities of i^* modeling as a meta-modeling representation.

We have applied the i^* Check Lists asking graduated students for verifying classmate's diagrams for simple modeling exercises.

- ⊕ We need to apply the strategy in different situations.
- ⊕ We will also evaluate how well the approach scales to more complex models.

References:

1. Leite, Julio; Werneck, Vera; Oliveira, A. Padua A.; Capelli, Claudia; Cerqueira, Ana Luiza; Cunha, Herbert; Baixauli, Bruno; "Understanding the Strategic Actor Diagram: An Exercise of Meta Modeling", The X Workshop on Requirements Engineering; Toronto, Canada - May/2007.
2. Yu, E. Modelling Strategic Relationships for Process Reengineering. PhD Thesis, Graduate Department of Computer Science, University of Toronto, Toronto, Canada - 1995.
3. Zheng You, Using meta-model-driven views to address scalability in i* models, Master of Science thesis, Graduate Department of Computer Science, University of Toronto, 2004, pp. 231.
4. Oliveira, A. Padua A.; Leite, J. C. S. P; Cysneiros, L. M.; "An exercise of Meta-Modeling: the Case of i*", In Monografias em Ciência da Computação, DI/PUC-Rio - 2010.