Making Explicit some Implicit *i** Language Decisions

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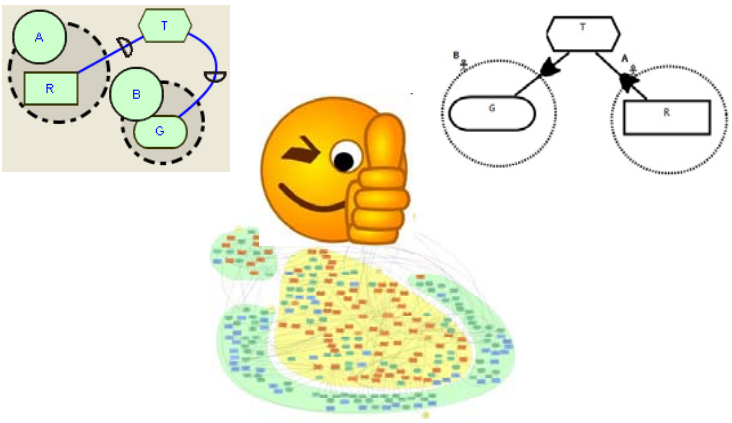
Outline

- Motivation. Research Questions
- Preliminaries
- Analysis of the *i** Language Core
  - Actors. Actor links
  - Intentional elements. Intentional element links
  - Dependencies
  - Additional features
- Proposal for the *i** Language Core
- Conclusions and Future Work

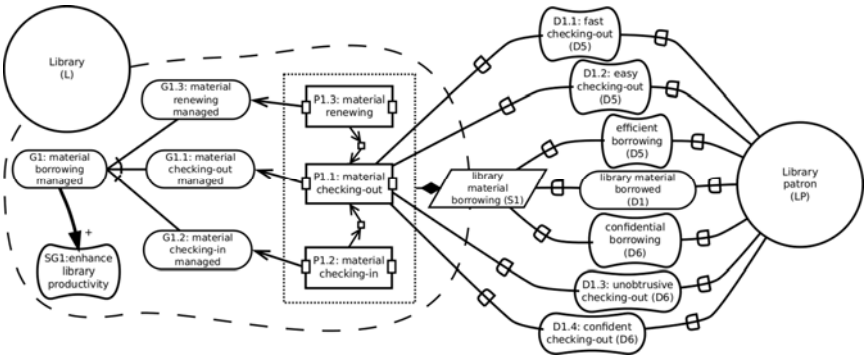
Introduction

- How is the *i** framework used by modellers?



Introduction

- Which are the usual variations?



Paradigm shifts

Introduction

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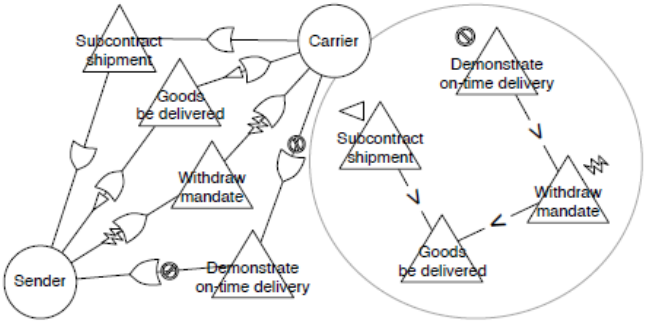
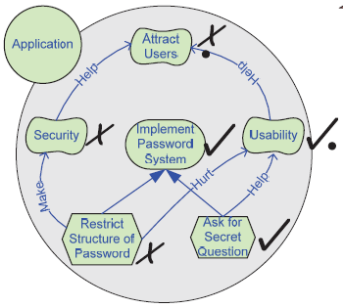
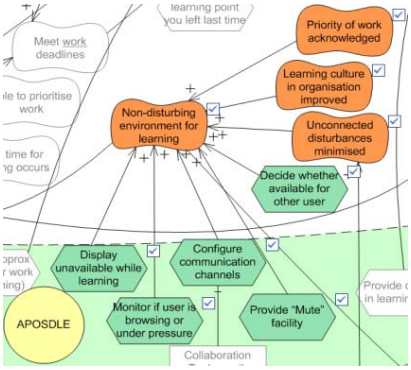


Extensions

Introduction

- Which are the usual variations?





Small variations on core constructs

Introduction

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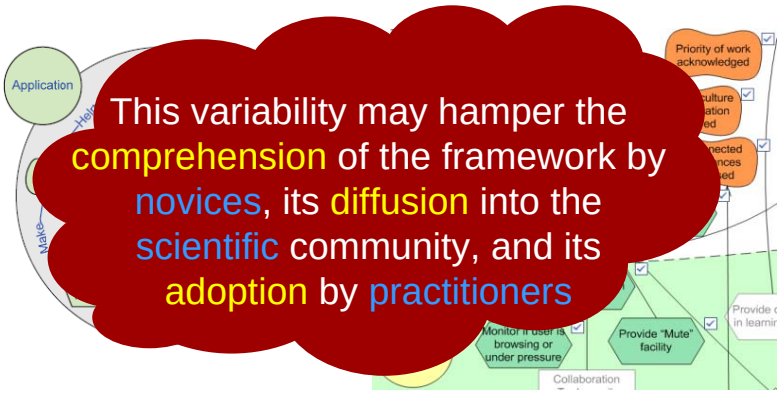


Small variations on core constructs

Research Questions

- RQ1. Which **ambiguities** and **silences** do exist in the current definition of the ***i**** **language core**?
  - RQ1.1 What constructs can be considered to form the ***i**** **language core**?

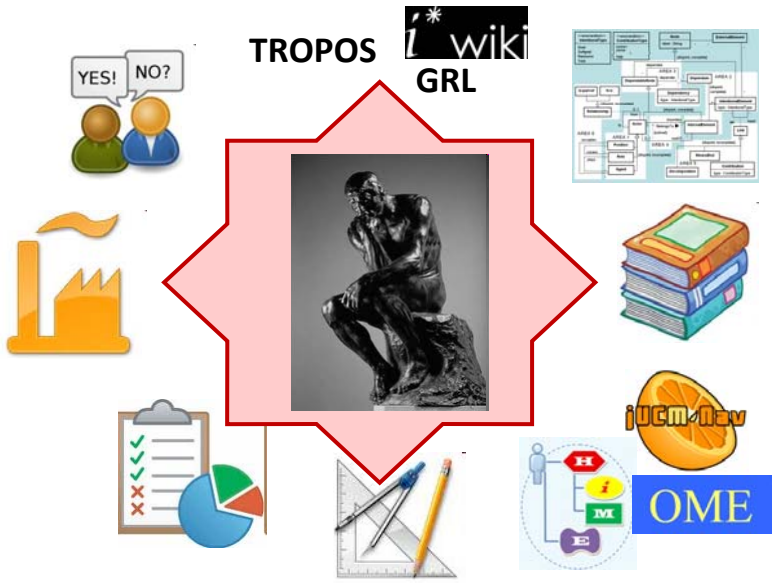
Research Questions

- RQ2. What **decisions** can be made to solve these ambiguities and silences?
  - RQ2.1. Is it necessary to include **additional features** in the *i** language core to implement these decisions?
  - RQ2.2. Are there **open issues** that deserve further research before an informed decision can be made?

Research Questions

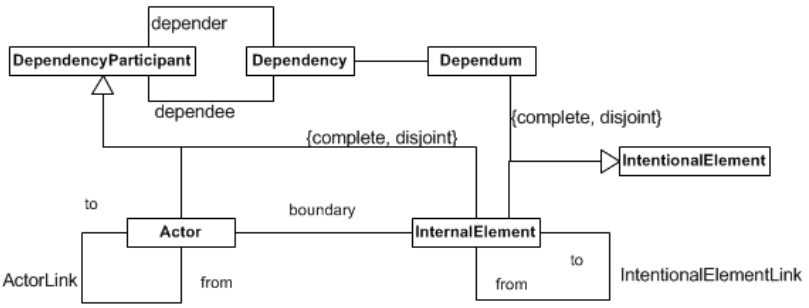
- RQ3. What is the **final form** that an ambiguity- and silence-free *i** language core definition should take?

Sources of our Work



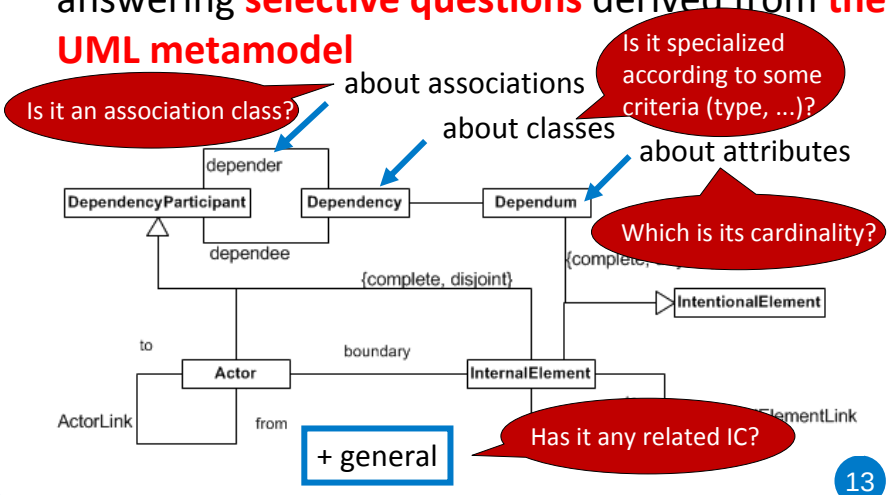
Starting Point

- We built a **preliminary metamodel** for the *i** language core
  - an element is included in the *i** language core if it is adopted or accepted by all the sources above

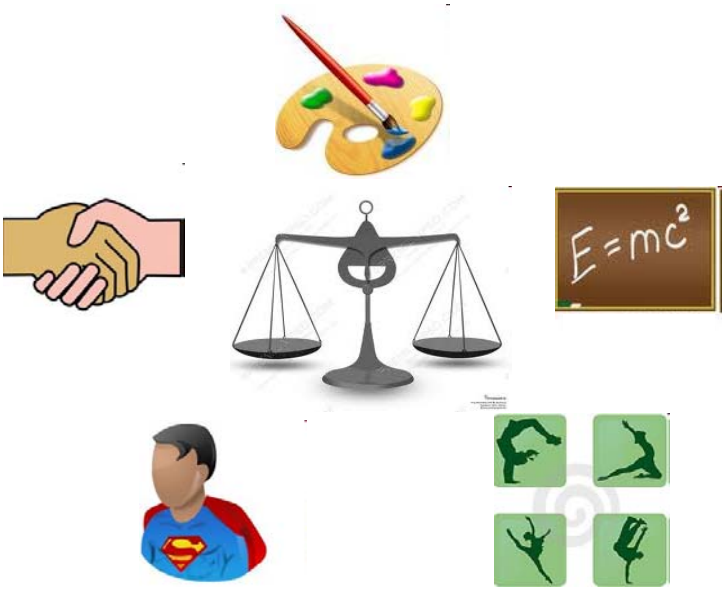


Systematic Metamodel Analysis

- Completing this preliminary metamodel by answering **selective questions** derived from **the UML metamodel**



Decision-making: Criteria to decide



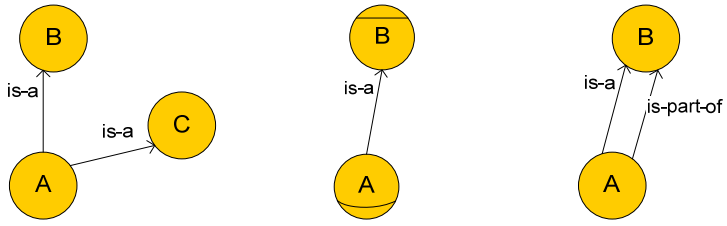
The *i** core: Actor and Actor Link

- Actor types: Role, Position, Agent (GRL)
  - General actors allowed to coexist
    - at least, to reflect the SE process
- Actor links types:
  - general: is-a, is-part-of
  - among actor types: plays, occupies, covers
  - instance link type (INS): unclear
    - difference with the classical metamodeling concept?
    - however, used often

OI1: Does the instance relationship belong to the *i** core?

The *i** core: Actor and Actor Link

- Actor link as association: lots of questions



- Result: several integrity constraints to add to the metamodel

The *i** core: Actor and Actor Link

- Actor link as association: lots of questions

- Result: several integrity constraints to add to the metamodel

The *i** core: Internal Elements

- Internal element types
  - goals, softgoals, tasks, resources: of course, but…
  - beliefs?
    - inconsistent use in the literature
    - but capture a relevant intentional concept:

"a condition about the world that the actor holds to be true"

but with caution…

OI2: Does the *belief* element type belong to the *i** core?

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OI2: Does the *belief* element type belong to the *i** core?

The *i** core: Internal Elements Links

- Internal element link types
  - task decompositions, means-end links, contributions to softgoals
  - still some problems to solve
    - OR decomposition?
    - element types for means and for ends?
    - contribution values?
    - multiple decomposition?
    - cycles?
    - number of roots?

The *i** core: Internal Elements Links

- Internal element link types
  - task decomposition
    - other types of root → decomposition
  - means-end
    - OR-decomposition
  - contribution to softgoals
    - URN/GRL view (similar to NFR framework)
  - the core does not restrict unnecessarily
    - just for beliefs → wiki-compliant

The *i** core: Dependencies

- Dependums
  - consensus: goal, softgoal, task, resource
- Dependencies
  - unrestricted source and target → DependableElem
    - relationship with actor links?

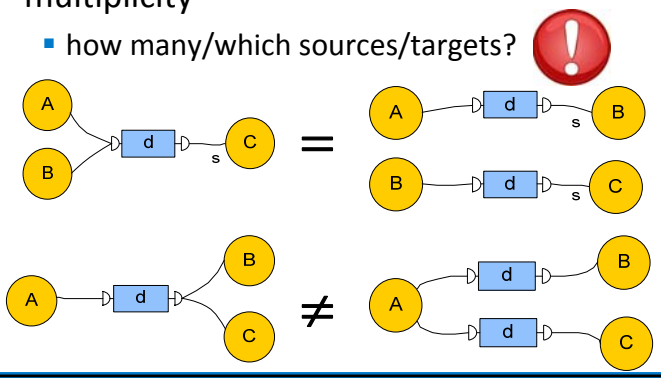
OI4: Which are the relationships between dependencies and actor links?

  - strengths: not much used

    - but still provide a value

The *i** core: Dependencies

- Dependums
  - consensus: goal, softgoal, task, resource
- Dependencies
  - multiplicity
    - how many/which sources/targets?

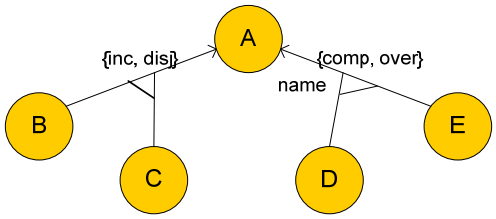


The *i** core: What else?

- Some ambiguities/silences cannot be managed without adding further information
  - are they important?
  - if so, how can be modelled and…
  - …how can be made compliant with standard models?
  - how are they represented graphically?

The *i** core: Generalization sets

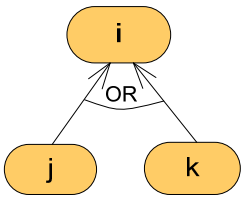
- The is-a construct misses information about
  - more than one specialization concept
  - completeness and disjointness
  - decision: borrow from UML the widespread concept of generalization set



  - default: one concept, complete, disjoint

The *i** core: Decomposition

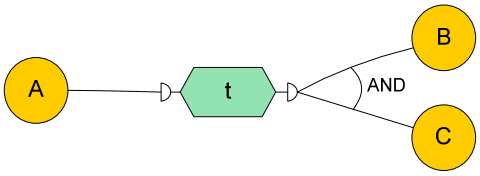
- Interpretation of intentional element links
  - task decomposition, AND; means-end, OR
  - consider just a decomposition link with logical qualification (cf. GRL, Tropos)



  - default: AND-decomposition interpreted as decomposition; (X)OR-decomposition as means-end

The *i** core: Dependencies

- Interpretation of multiple dependees
  - similar than before
  - some dependencies cannot be easily expressed



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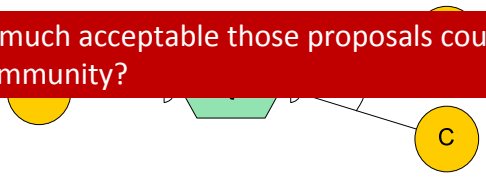
Making Explicit some Implicit *i** Language Decisions

The *i** core: Dependencies

- Interpretation of multiple dependees
  - similar than before
  - some dependencies cannot be easily expressed

OI5: How much acceptable those proposals could be for the *i** community?

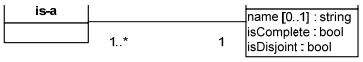


  - default: AND-decomposition interpreted one dependency; (X)OR-decomposition as two dependencies

The *i** core: Final Representation

«enumeration» ActorLinkType | «enumeration» ActorType | «enumeration» StrengthType | «enumeration» IEType | «enumeration» LogicalType | «enumeration» ContType

Id.	Concept	Integrity Constraint
IC1	name attribute	There cannot be two model elements with the same name except for:
IC1.1	InternalElement	internal elements: name restriction applies inside actors' boundary
IC2	ActorLink	Cycles are not allowed regardless of the type of ActorLink
IC3		The links is-a and is-part-of must connect actors of the same type
IC4		The is-a and is-part-of links cannot be applied to the same pair of Actors
IC5		The link occupies must connect an Agent with a Position
IC6		The link covers must connect an Position with a Role
IC7		The link plays must connect an Agent with a Role
IC8		An Actor cannot be a subtype of more than one Actor
IC9	Dependum	Dependums cannot have Belief as type
IC10	InternalElement Link	Beliefs can be decomposed only into beliefs
IC11		Contributions can only have softgoals as to
IC12		The only cycles allowed are those that involve only contribution links
IC13		An internal element can be decomposed using one type of decomposition
IC14	Dependency	A dependum cannot appear twice among the same pair of Actors
IC15		Depender and dependee actors must be different
IC16		Beliefs cannot be neither depender nor dependee



Summary

Answers to 3 research questions:

- Analysis of *i** from 8 types of sources
- Resolution of ambiguities and silences according to 5 criteria
- Proposal of some minor additional constructs
- Identification of open issues
- Final proposal of an UML metamodel

Future work

- Presenting to the *i** community
- Is there just "one" *i** core?
- Consideration of ontological aspects
- Reformulation of existing techniques over the core

Comments and Questions?