

# CiML: A Consolidated Intentional Modeling Language

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July 2, 2013

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- Focuses on motivations rather than behaviours of a System.

## Uses of IM

- Requirements Modelling, Analysis, Elaboration, and Specification.

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- Provides alternatives to choose from, during Systems design

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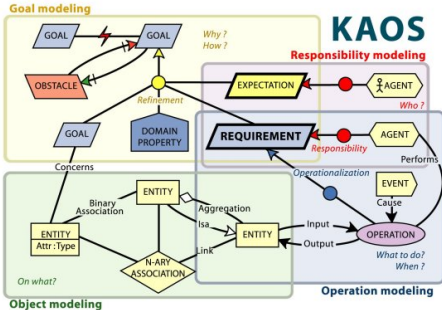
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- Provides traceability for business changes.

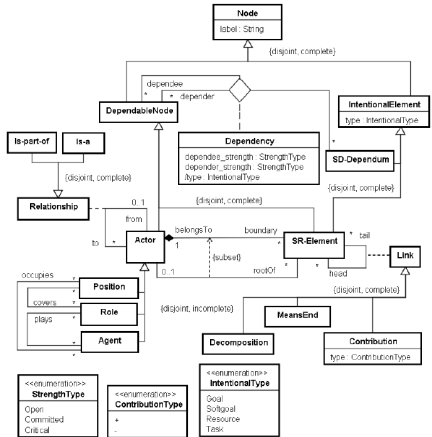
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# IM Approaches



(a) KAOS



(b) i\*

# Limitations with Current Approach

- Intentional Elements are fragmented across IML.

**Table 1: Comparison of IM Key Concepts with i\* and KAOS**

IM Key Concepts \ IM Approaches	i* [7]	KAOS [14]
Actor	✓	?
Goal	✓	✓
HardGoal	✓	✓
SoftGoal	✓	?
Task	✓	ab
Constraint	ab	?
Agent	✓	✓
Strategic Dependency	✓	ab
Conflict	ab	✓
Obstacle	ab	✓

**Legend:**

✓-included in the Language  
ab-Absent in the Language

?-Not explicitly defined in the language

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- Intentional Elements are fragmented across IML.
- Lack of support for detailed requirement analysis.

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- CIML

# Proposed Solution/Contribution

- CIML
- A richer but less cumbersome language

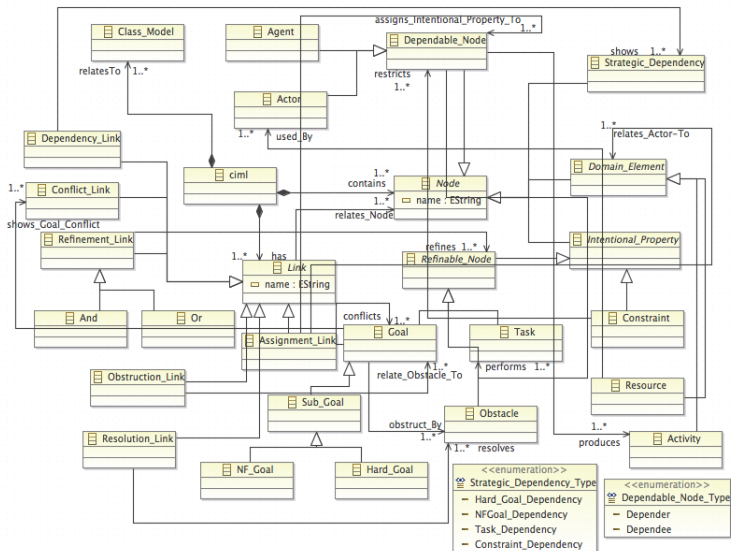
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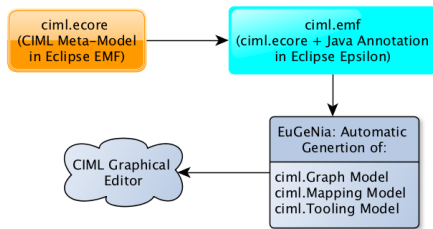
# Proposed Solution/Contribution

- CIML
- A richer but less cumbersome language
- Supports detailed requirement analysis
- Provide a means to check completeness with respect to Actors, Goals, and Obstacles.

# The CiML Abstract Syntax in EMF/Ecore



# Tooling Process



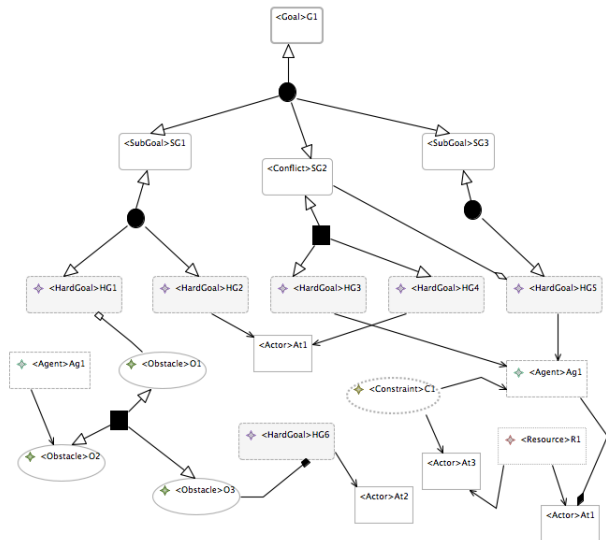
(a) Tooling

```
1 @namespace(uri="http://ciml/1.0", prefix="ciml")
2 package ciml;
3
4 @gmf.diagram(foo="bar")
5 class Ciml {
6     val Node[+] contains;
7     val Link[+] has;
8 }
9
10 @gmf.node(label="name")
11 abstract class Node {
12     attr String name;
13 }
14
15 @gmf.link(target.decoration="arrow",
16 source="froma", target="toa")
17 abstract class Link {
18     attr String name;
19     ref Node[+] froma;
20     ref Node[+] toa;
21 }
```

(b) ciml.emf + Java Annotation

Figure: Tooling

# Example of a Model Constructed with the CiML Tool



Palette

Objects

- Activity
- Actor
- Agent
- And
- Constraint
- Goal
- HardGoal
- NFGGoal
- Obstacle
- Or
- Resource
- SubGoal
- Task

Connections

- AssignmentLink
- ConflictLink
- DependencyLink
- ObstructionLink
- RefinementLink
- ResolutionLink

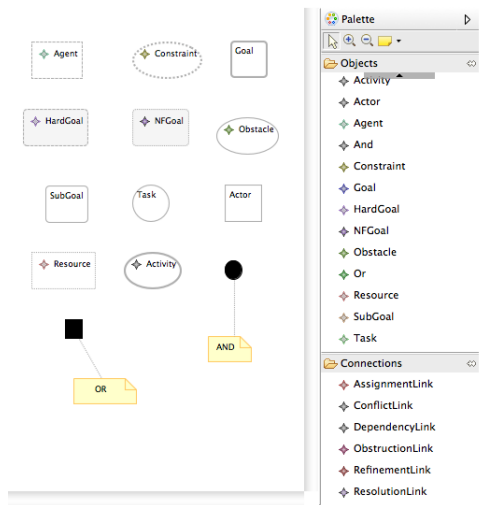
# Comparing CiML concepts with KAOS and i\* concepts

**Table 2: Mapping of key CIML concepts with i\*, and KAOS**

CiML Element/Symbol	Mapped Elements in i*	Mapped Elements in KAOS
<b>Actor</b> - a rectangle without an icon	Actor, Role, and Position	Environmental Agent
<b>Agent</b> - a rectangle with dashed border and Icon	Agent	Software agent
<b>Goal</b> -a rounded rectangle with no icon and thick border	Goal	Goal
<b>Resource</b> - a rectangle with no icon and dotted border	Resource	Entity
<b>HardGoal</b> - A dashed rounded rectangle without icon	HardGoal	Requirement
<b>NFGGoal</b> -A dotted rounded rectangle without icon	Softgoal	Expectation
<b>Task</b> -An ellipse without an icon	Task	Events
<b>Obstacle</b> -Ellipse with an Icon	none	Obstacle
<b>Conflict</b> -same symbol as Goal	none	Conflict
<b>Constraint</b> -Ellipse with icon, thick and dotted border	none	Pre, and post conditions
<b>Activity</b> - ellipse with icon and thick border	none	Operation
<b>RefinementLink</b> : <i>And</i> -closed arrow with solid ellipse. <i>Or</i> -closed arrow with solid rectangle	DecompositionLink, is-a, is-part-of	RefinementLink
<b>ObstructionLink</b> -square	Hurt	ObstructionLink
<b>DependencyLink</b> -filled rhomb	DependencyLink	none
<b>AssignmentLink</b> -arrow	none	Operationalization Link, Responsibility Link, and Assignment Link



# Graphical Notation for CIML



Model Driven Enterprise Architecture Alignment. Integrating Intentional Models with Systems Model using Model Driven Engineering (MDE) Techniques

# Appendix

- G1 Provide excellent POS Services.
- SG1 Successful Transaction.
- SG2 Secure Transaction.
- SG3 Happy Customer.
- HG1 Card Readable.
- HG2 Daily Transaction Uploaded.
- HG3 Smart Card Information Encrypted.
- HG4 Daily Transaction Uploaded with Secure Option.
- HG5 Process Customer's request on time.
- HG6 Replace Smart Card.
- Ag1 POS Terminal.
- At1 Vendor.
- At2 Repair Engineer.
- At3 Customer
- O1 Smart card Unreadable.
- O2 Faulty POS Terminal.
- O3 Faulty Smart Card.
- C1 Limit Daily Transaction to 500 pounds.
- R1 Smart Card

# The End