

# On The Knowledge Representation Within Software Process Modelling

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# Agenda

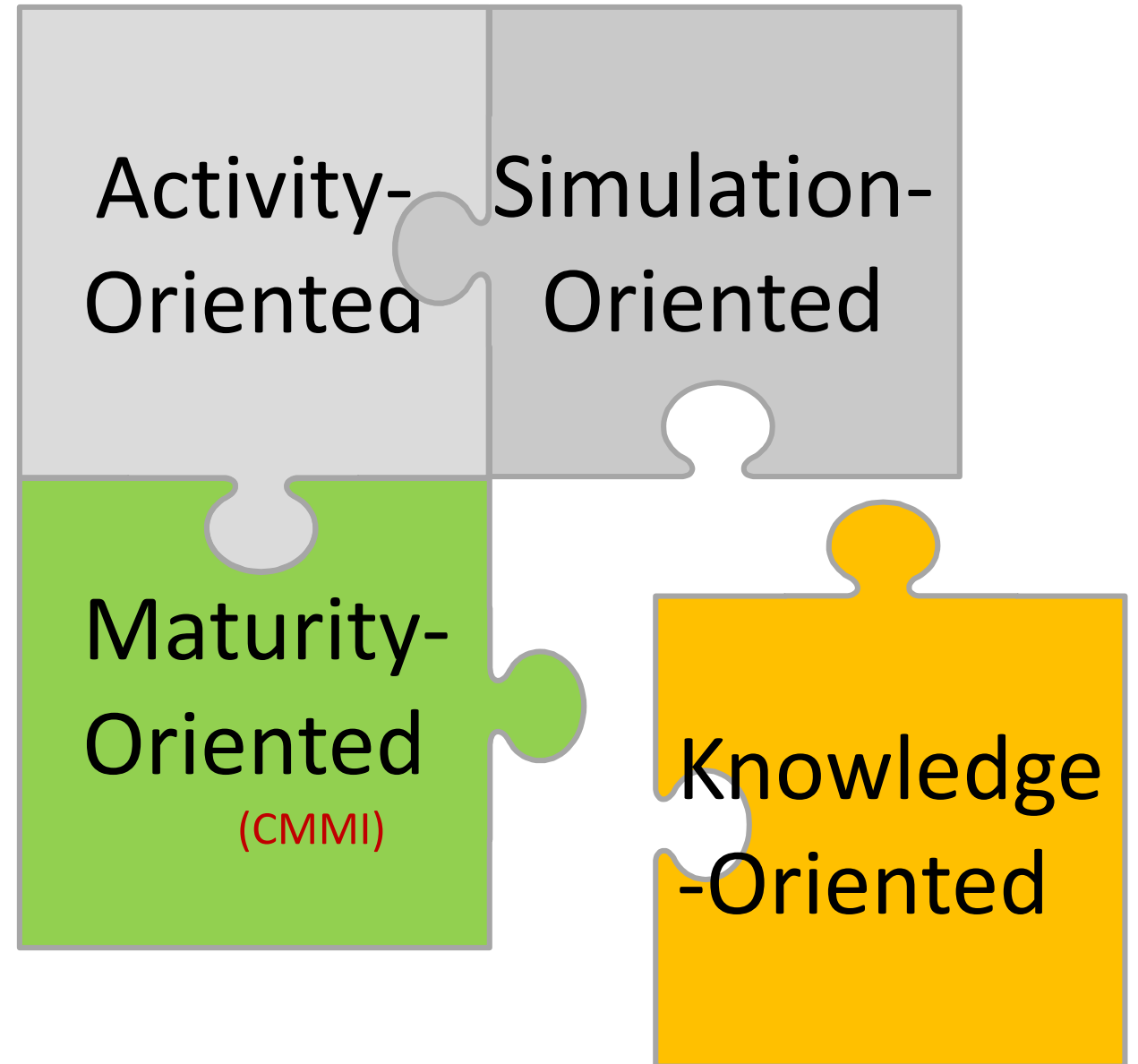
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- Context
- Why do we care?
- What does it do?
  - Does more than it says
- How the Knowledge Representation works
  - Demo
- Case Studies (two)
- The Next Step

# Software Process Modelling (DSL4SPM)

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- We have designed a framework for software process modelling
  - Compliant with SPEM
  - Four modelling perspectives have been implemented
  - Workflow of activities
  - Alignment with a body of best practices
  - Stochastic Simulation (What-if)
  - **Knowledge flow**



# Why do we care?

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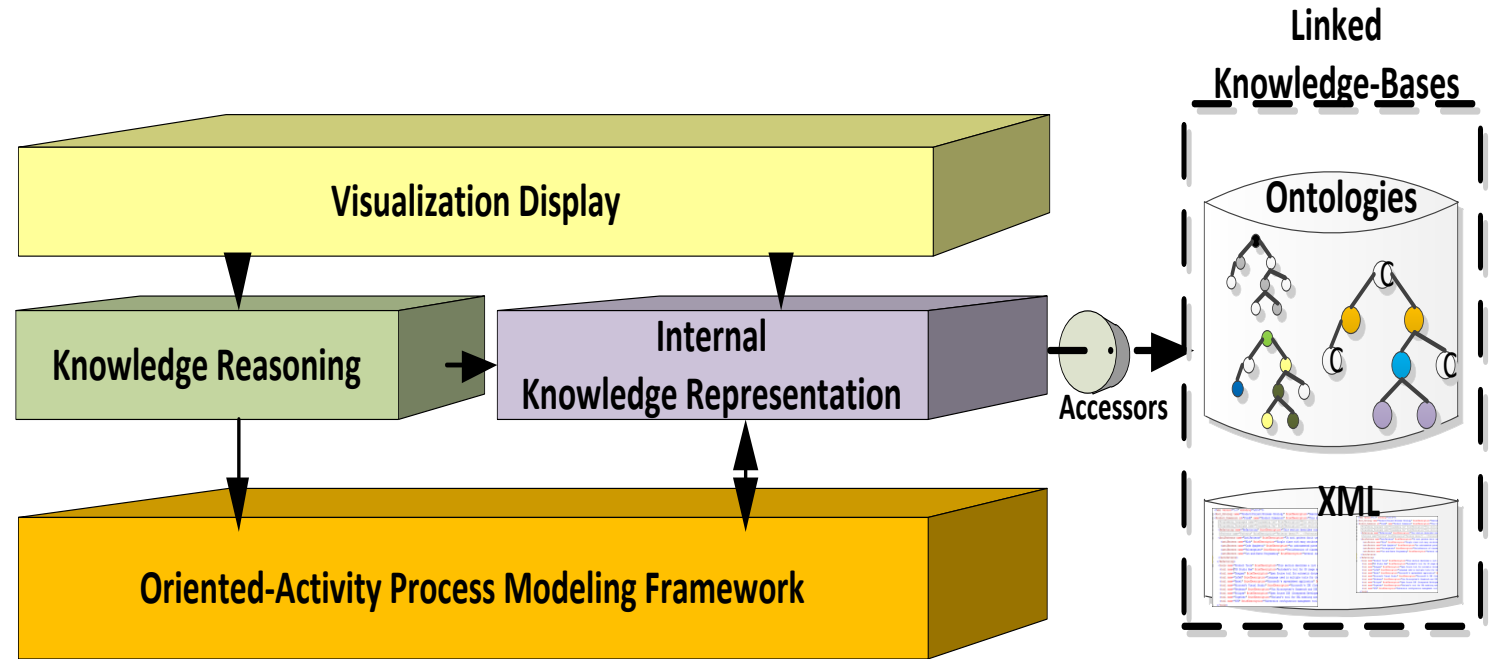
- Software Projects are knowledge-intensive
  - Software development is a learning process from the requirements elicitation to the Tests
  - Representing knowledge can enhance explicit coordination, identify knowledge-based risks, and increase the productivity
  - Representing knowledge allows **analysis of knowledge flows**

# What does it do?

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- Does more than it says

# Architectural View of Knowledge Perspective Modeling



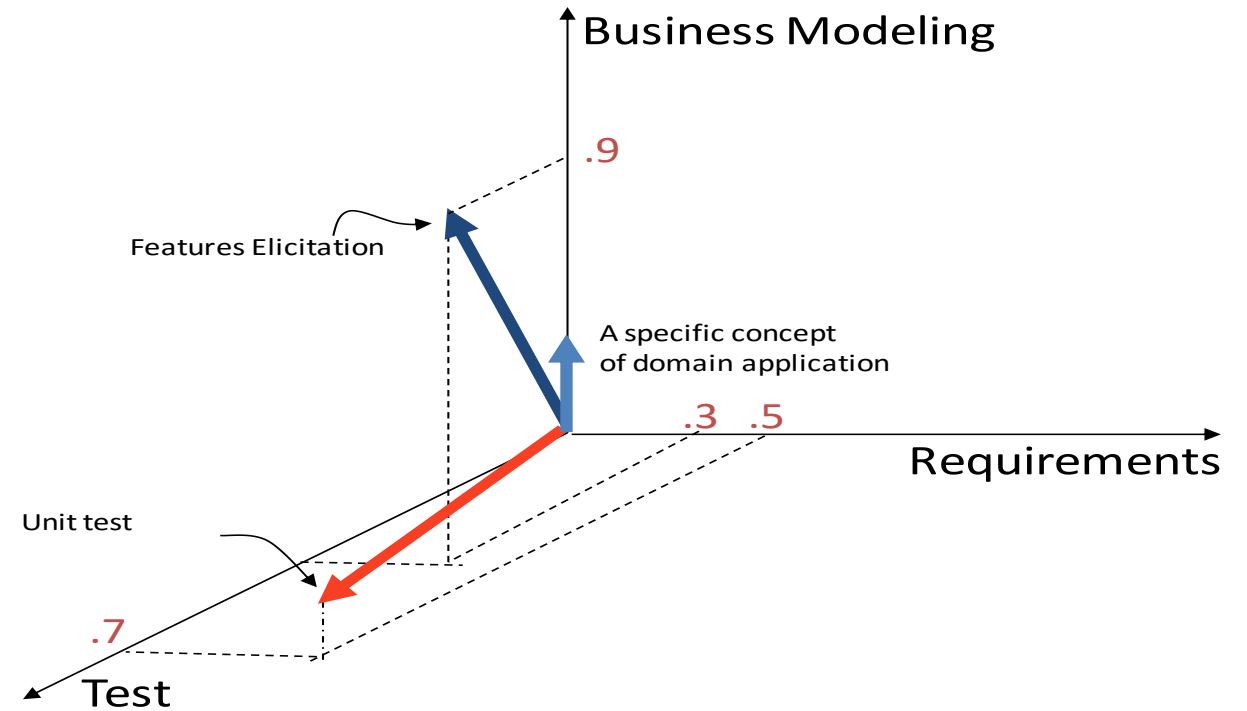
- Software Components underpinning our implementation of knowledge modelling

# Research Questions

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- **RQ1:** *How to represent the knowledge required to carry out software development tasks?*
- **RQ2:** *To what extent the identified knowledge concepts (both required and provided) match to each other? How to quantify the discordance by visualizing a simple indicator?*
- **RQ3:** *How to represent indicators for knowledge concepts discrepancies to help team managers to make informed decisions?*

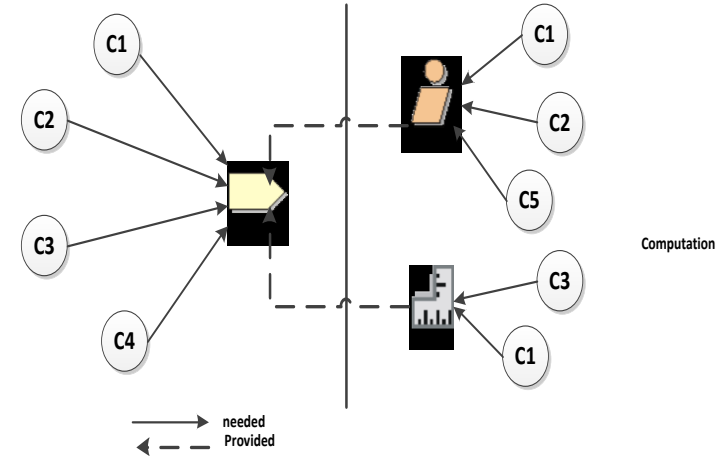
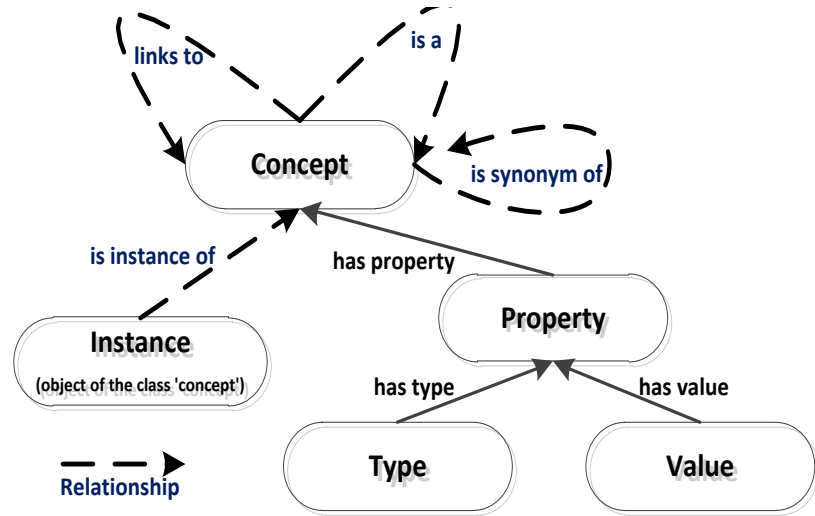
# Spatial representation of Knowledge



- Based on n-dimensional vector space

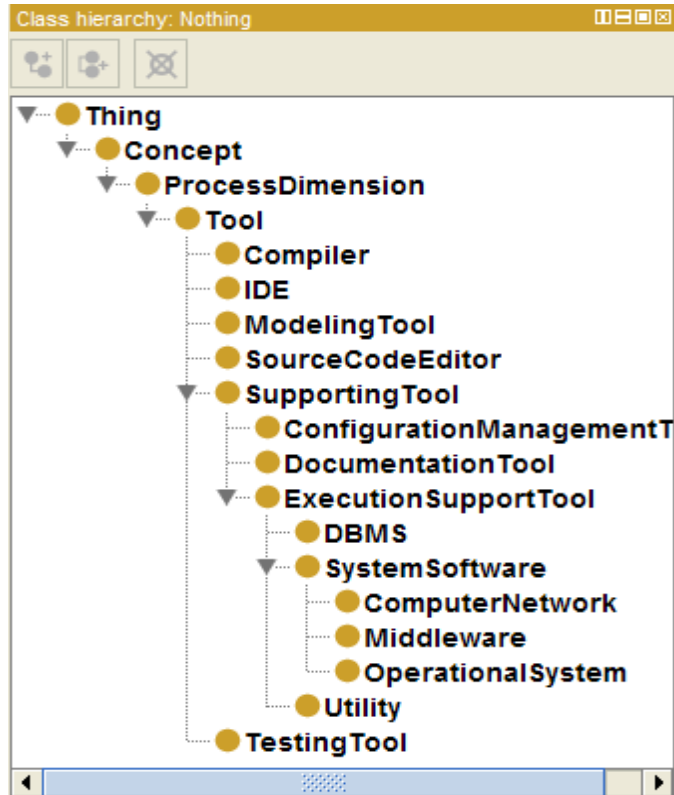


# Knowledge Representation



- Cognitive perspective to represent knowledge based on concepts
  - A concept has properties and values;
  - Can be linked to other concepts;

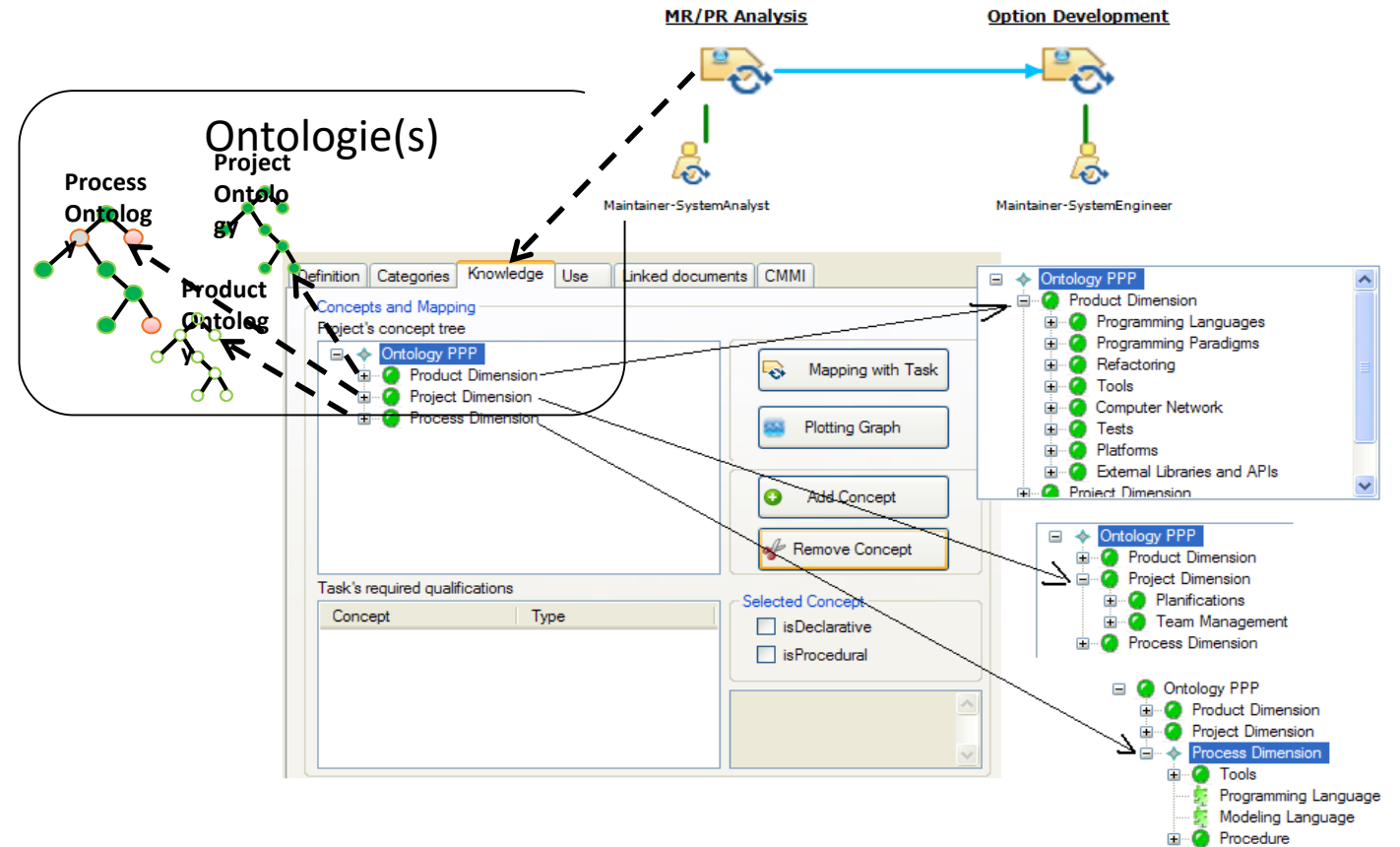
# Define an ontology related to the process in place



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    <tool name="Excel" BriefDescription="Microsoft's spreadsheet application" D
    <tool name="Microsoft Visual Studio" BriefDescription="Microsoft's IDE (Inte
    <tool name="Netbeans" BriefDescription="Sun Microsystem's framework and IDE
    <tool name="Eclipse" BriefDescription="Open Source IDE (Integrated Developme
    <tool name="Together" BriefDescription="Borland's tool for UML modeling and
    <tool name="SVN" BriefDescription="Subversion configuration management tool
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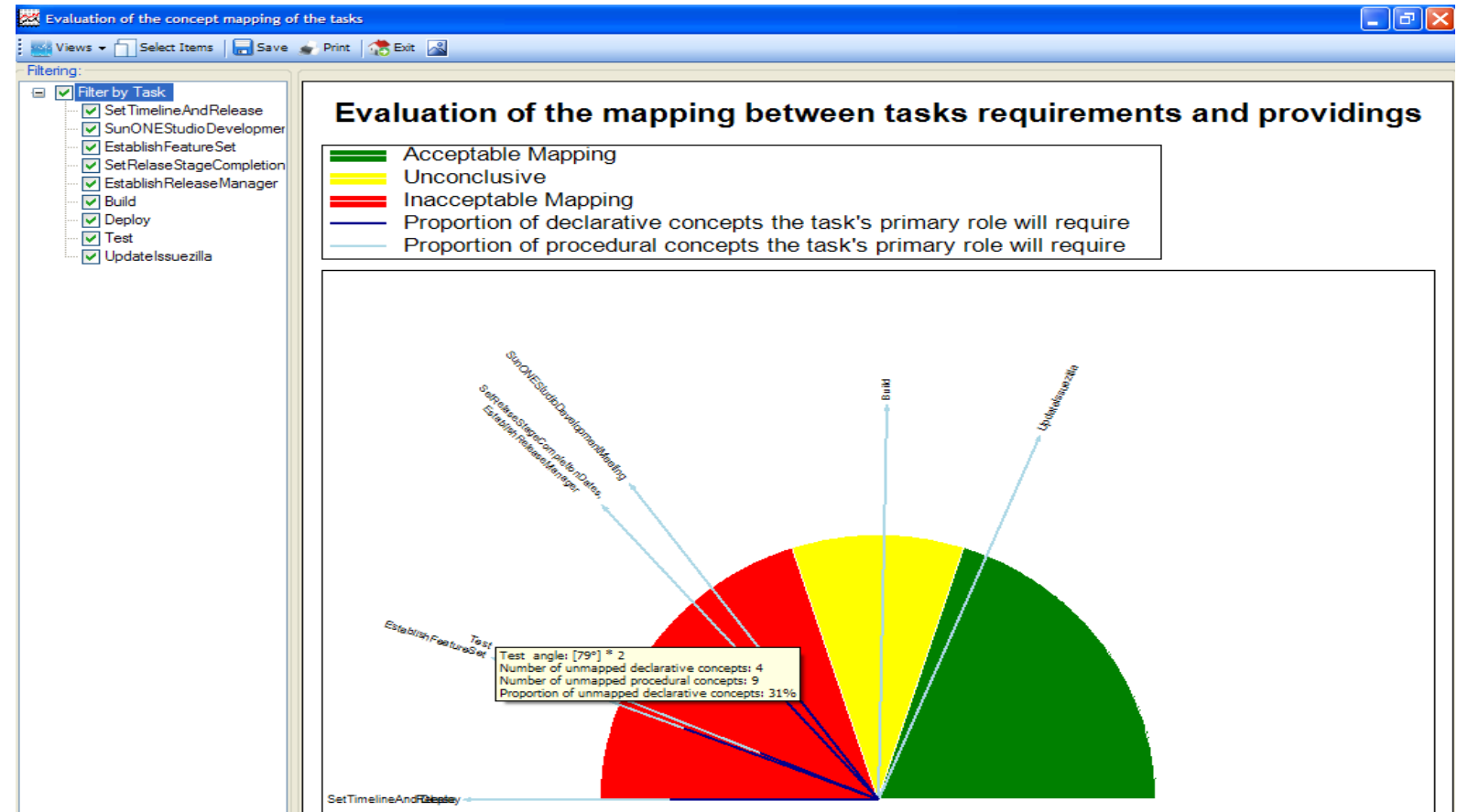
- For example, what to look for, in terms of skills, when designing an academic project for students.

# How it works



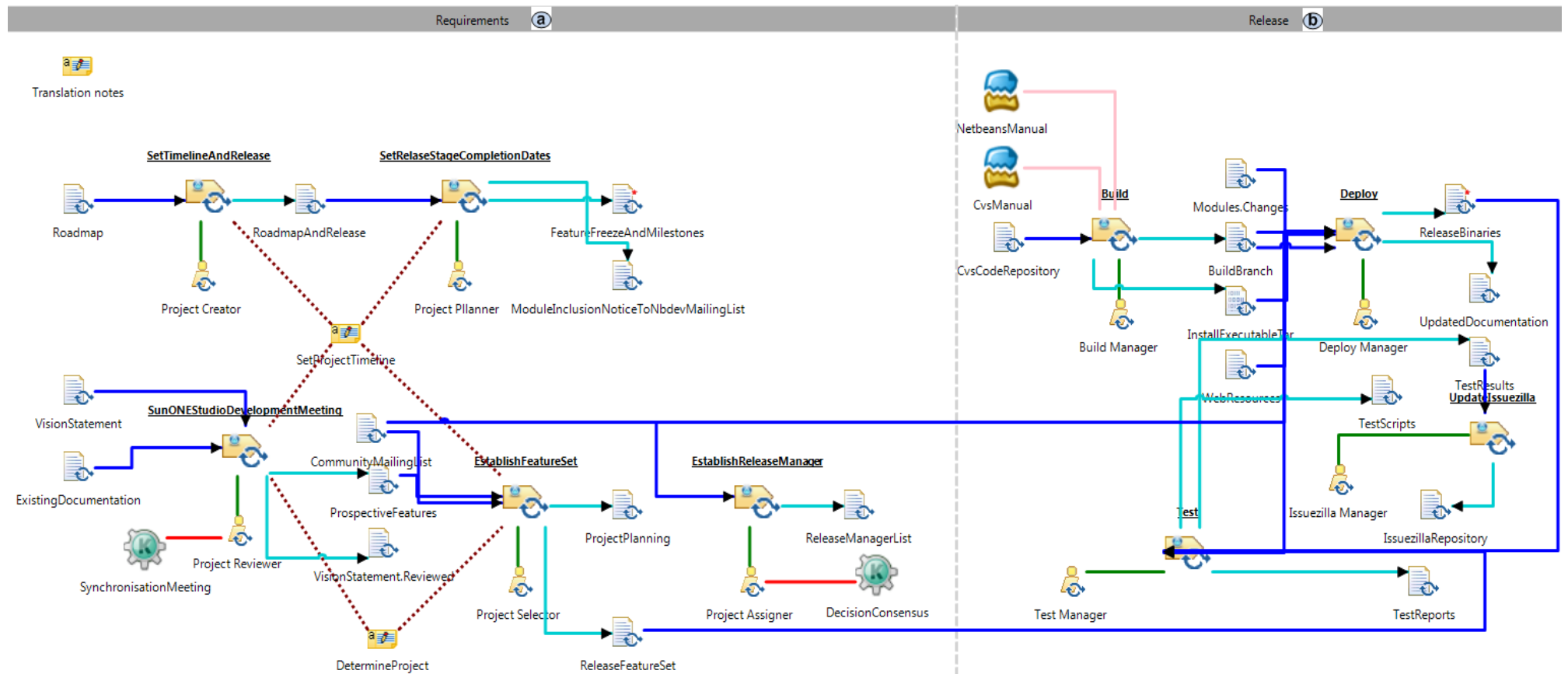
- Connecting the process model to a knowledge base (let say ontology)
- For each activity, identify concepts to carry out adequately the work (in)
- For each process element linked to an activity, identify knowledge provided (out)

# Identifying Knowledge Risks



- Visualization of the Knowledge representation

# First case study



- Modelling and analysis of the Process "NetBeans Requirements and Release Process"

# Results

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- Four categories of inconsistencies have been examined:

## **Overloaded Activities & Roles-**

Process activities that require a heavier set of knowledge concepts to be performed.

## **Complexes Activities & Roles -**

The lack of knowledge concepts required to carry out a given process activity

## **Bottleneck Risk Activity –**

Identify checkpoints of decision-making and look for missing knowledge.

## **Translation Activity-**

Knowledge translation, which transform inputs of knowledge concepts from an **abstraction** level to a **less abstract** one.

# The Next Step

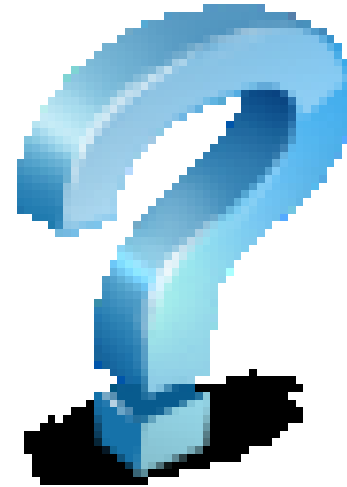
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- Integrate a recommendation system allowing more interactions with the reasoning component;
- Dynamic analysis of knowledge flows;
- Simulate a “What-if” analysis in order to identify potential risks related to knowledge propagation;

# Questions

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What do you think



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