ModelCVS

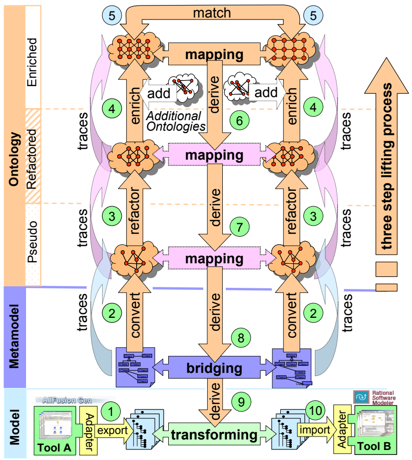
A Semantic Infrastructure for Model-based Tool Integration >>

Motivation

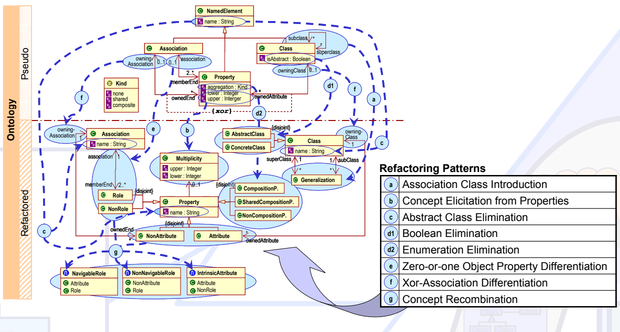
- The shift from code-centric to model-centric software development places **models** as **first class entities** in model driven development processes
- A **wide variety of modeling tools** is available, supporting **different development tasks** (e.g. model checking, simulation, code generation) and often advocating **different** (possibly domain-specific) **modeling languages**
- To use tools in combination and thus to fully exploit the potential of model-driven software development, **seamless exchange of models is vital**

Problem

- **Heterogeneity** exists in textual representation, syntax, semantics, scope of modeling languages and exchange formats used by different tools
- **Integration** is a **cumbersome**, **error-prone** and **highly repetitive** task not least when, e.g., new versions of modeling languages emerge
- **Inconsistencies** are likely **when concurrent development** of models on basis of different tools takes place



Conceptual Architecture of ModelCVS



Ontology Refactoring Example and Refactoring Editor

Hypothesis

- **Ontologies** can be used to resolve heterogeneity at a **higher level of abstraction** forming the basis for semi-automatically deriving model transformations
- A **knowledge base** can capture tool integration experience leading to reusable and qualitative solutions thus turning integration into an **engineering discipline**
- **Model versioning techniques** can be developed based on semantically enriched descriptions of modeling languages

Goal

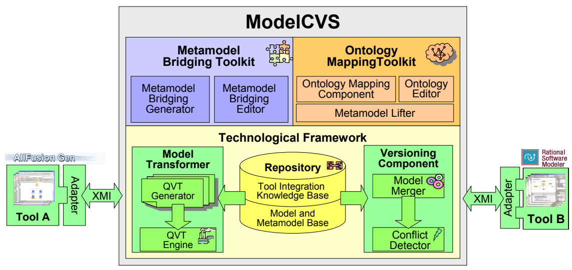
- Development of **concepts and techniques** for establishing a semantic infrastructure supporting model-based tool integration
- **Prototypical implementation** using state of the art technologies and standards, e.g. Eclipse's Modeling Framework (EMF) and Ecore, Inria's AMMA platform, and OMG'S Ontology Definition Metamodel (ODM)
- **Evaluation on basis of an industrial case study** focusing on integrating Computer Associate's AllFusionGen modeling language and OMG's Unified Modeling Language

Approach

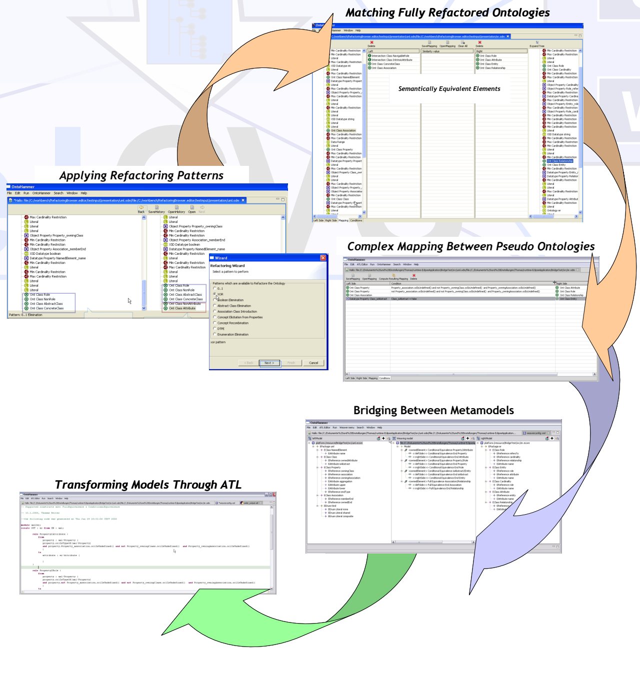
- Development of **tool specific adapters** providing a common technical space
- Creation of **ontologies** capturing semantically enriched descriptions of modeling tools' metamodels through a **three step lifting process**
- Employment of **existing ontology matching tools** for resolving heterogeneity by proposing mappings in terms of semantically equivalent modeling concepts
- **Semi-automatic derivation** of specific **metamodel integration operators** on basis of ontology mappings and derivation of **executable model transformations**

Innovation

- **High-level metamodel bridging languages** going beyond existing low-level model transformation approaches
- **Refactoring Patterns** explicitly reifying hidden concepts for enhanced ontology matching capabilities
- **Model-based versioning mechanism** based upon conventional concurrent versioning systems



Technical Architecture of ModelCVS



Matching between Pseudo and Refactored Ontologies and Derivation of Metamodel Bridgings

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Project Facts

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