

KAOS Conflict Management

Conflict Management with Goal Oriented Requirements Engineering
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Overview

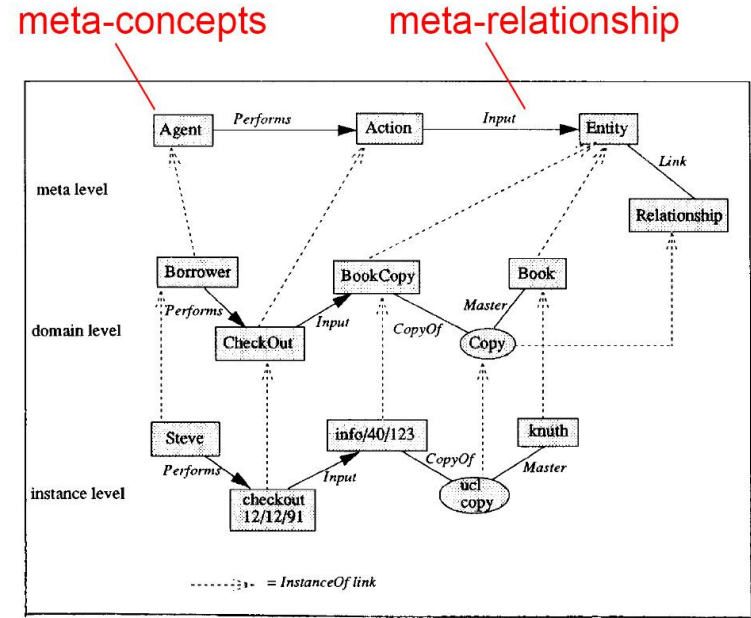
1. What is KAOS?
2. How Can Goal Models Help Managing Conflicts?
3. Questions, Remarks and Discussion Topics

1. What is KAOS?

- ***K**nowledge **A**cquisition in aut**O**ated **S**pecification*
- KAOS presents a structured approach to requirements acquisition.
- KAOS as meta-model is a model for build domain specific models.
- KAOS consists of:
 - a conceptual model for acquiring and structuring requirements models (together with an associated, formal acquisition language),
 - a set of strategies for approaching/elaborating requirements and
 - an automated assistant to provide guidance in the acquisition process (by virtue of formalized description).

1.1 KAOS as Meta-Model

- Meta model for building models requires:
 - meta level, domain level and instance level
 - using instances of meta-concepts/relationships
- KAOS as meta-model
 - emphasizes formal description (visual representation varies),
 - tackles the scope problem (by unifying all requirement types)
 - and acquisition problem (incorporating all stakeholder perspectives).



1.2 Knowledge Acquisition Using KAOS

- KAOS enables knowledge acquisition by offering:
 - a systematic approach to discover and structure requirements,
 - decomposition and refinement of complex requirements/stakeholder inputs and
 - goal development, object/operation identification, responsibilities assignment etc.
- Ontological neutrality of KAOS' description of the problem domain
 - integrates all functional as well as non-functional requirements alike and
 - allows for multiple dimensions of problem description/analysis.

Statecharts

Action CheckOut

Input BookCopy {**Arg**: bc},
Library {**Arg**: lib}, Borrower {**Arg**: bor}
Output Library {**Res**: lib}, Borrowing
PreCondition $bc \in \text{lib.available}$
PostCondition $\neg(bc \in \text{lib.available}) \wedge bc \in \text{lib.checkedOut} \wedge$
Borrowing (bor, bc)

Use-Cases

Agent Staff

Has competenceArea, ...
% declaration of domain-specific attributes %
Invariant $(\forall st: \text{Staff}) (\text{InstanceOf}(st, \text{ResearchStaff}) \vee$
 $\text{InstanceOf}(st, \text{SecretaryStaff}))$
Load ...
CapableOf AddCopy, RemoveCopy, BiblioQuery,
CheckOut, Return, IssueReminder, ...
Performs AddCopy, RemoveCopy, ...
Knows Borrowing {**Interface**: BorrowingSheet}, ...

Business Goals

SystemGoal Achieve [BookRequestSatisfied]

InstanceOf SatisfactionGoal
% declaration of goal category %
Concerns Borrower, Book, Borrowing, ...
FormalDef
 $(\forall bor: \text{Borrower}, b: \text{Book}, lib: \text{Library})$
 $\text{Requesting}(bor, b) \wedge b.subject \in lib.coverageArea \Rightarrow$
 $\Diamond(\exists bc: \text{BookCopy}) (\text{Copy}(bc, b) \wedge \text{Borrowing}(bor, bc))$

2.1 Source of Inconsistencies

- Multiple stakeholders
 - Elicitation of goals
 - Elicitation of requirements
 - Viewpoints
 - Independent documents
- OK to tolerate inconsistencies...
 - to get more relevant requirements
 - to achieve complete and adequate requirements
- Not only direct opposite conflicts, but also divergence.

2.2 Boundary Conditions

- Combination of circumstances making goals & requirements conflicting.
- Example:
 - Achieve [patient accompanied]
 - vs.
 - Avoid [service overcrowding]

2.3 Early detection

Detect divergence on the goal level.

➡ More freedom for resolvment.

2.4 Target: Model Checking on Goal Level

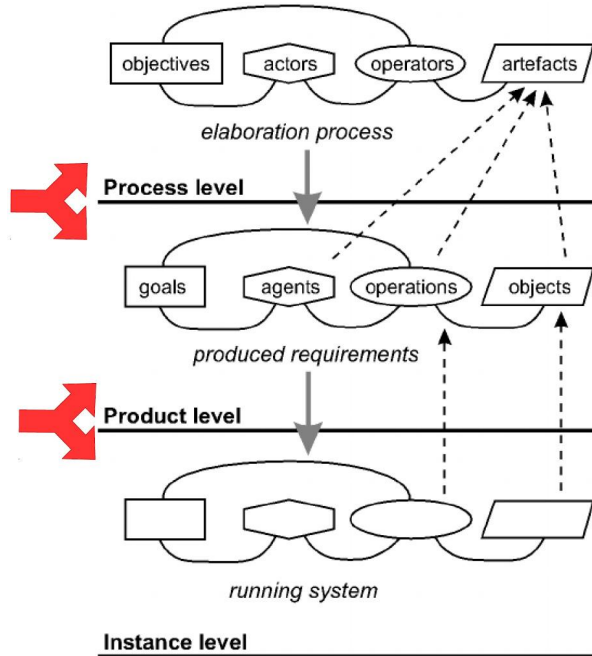
- Generate scenarios satisfying boundary conditions.
- Requires operational/relational description of the target system.
- Formal specification of the boundary condition needed.
- Derivation calculus on more abstract specifications.

2.5 Divergence Types

- Inconsistent goals/requirements:
 - Terminology clash
 - Designation clash
 - Structure clash
- Conflict
- Competition
- Obstruction

2.5 Divergence Types

- Process-Level Deviation



2.6 Appropriateness

- Domain knowledge needed!
 - Delimits the detectable space of boundary conditions.
 - Can be still elicited during divergence analysis.
- Depends on:
 - application in domain
 - kind of divergence
 - likelihood of boundary conditions
 - severity of consequences
 - cost of divergence resolution

3. Questions, Remarks and Discussion Topics

KAOS & REI case study: thoughts/experiences?

Goal of retailer: Achieve [1-hour-delivery] cost-reduction



Goal of company: Achieve [1 delivery/day]

- ➡ What is the boundary condition? Tip: Retailer has many customers.
- ➡ What solution would you propose? Tip: Incentives works better than regulation.
- ➡ Where comes the technique of van Lamsweerde et. al. into play?

2. How Can Goal Models Help Managing Conflicts?

- KAOS understood as a goal-directed acquisition strategy.
- Eliciting and refining goals progressively until goals assignable to individual agents are obtained.
- Identifying objects and operations progressively from goals.
- Deriving requirements on the object/operation to meet the goals.
- Assigning the requirements and operations to the agents.