

Griffin and CommonKADS

Leo Hermans (Everest)
Viktor Clerc (DNV-CIBIT)



Summary

- Overview of two domains
 - Griffin, research project to support architectural knowledge management
 - CommonKADS
Methodology for knowledge engineering
- Provide insight in, and future outlook (call for research) for automation and generation of architectural rules and decisions



Outline

- Griffin
 - Introduction into Architectural Knowledge
 - Research Results
- CommonKADS (CK)
 - Methodology for Knowledge Engineering
 - CommonKADS and Griffin
 - Validation of the Core Model
 - Construction of a CK Task-model for Architecture Design
 - Knowledge-based Automation of Architecture Design



Griffin

- A Jacquard-funded research project
 - Five industrial partners, two Dutch universities
 - Started in April, 2005



Objectives Griffin

- Identify the important Architectural Knowledge (AK)
 - AK is the set of architectural decisions, their rationale, including the architectural design
- Determine which AK can be made explicit
- Develop means to manage AK



Research Results

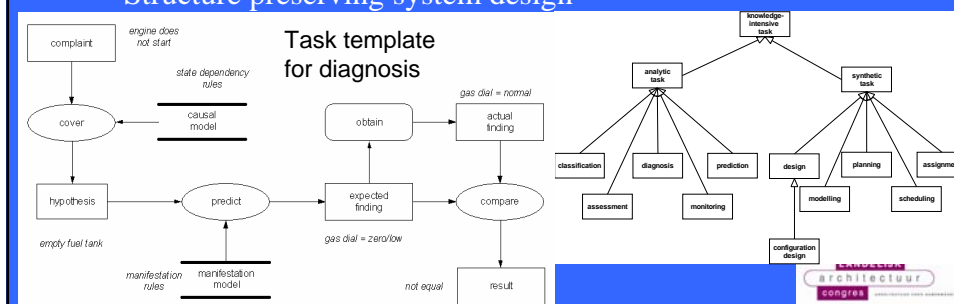
- A domain model for architectural knowledge
 - Initial version validation at four industrial partners led to a 'core model' for architectural knowledge
- A set of use cases for architectural knowledge
- Insights in architectural knowledge sharing, architecture knowledge discovery, architectural rules, architectural knowledge in global software development, and traceability between requirements and architecture



CommonKADS

Methodology for Knowledge Engineering

- Analysis of knowledge-intensive tasks on a conceptual level
- Knowledge analysis framework
 - Task templates (analysis patterns) for different kinds of tasks
- Structure preserving system design



CommonKADS and Griffin

- Griffin has only compared its model construction process with the CK process for knowledge
- What about using CK for the construction of specific architectural designs?
 - Validation of the decision taking part of the core model;
 - Construction of a knowledge-based conceptual task-model for architecture design, using the Core Model

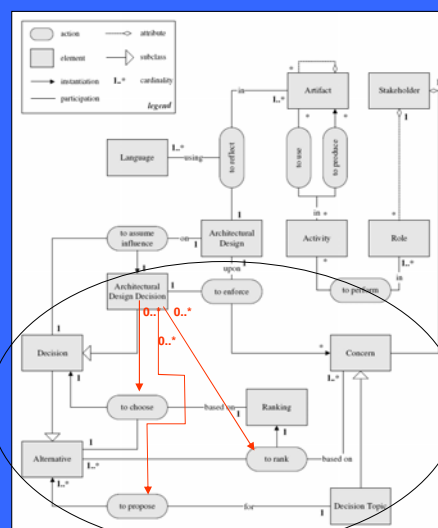
CommonKADS and Griffin (2)

- What about using CK for the construction of specific architectural designs?
 - Automation of the conceptual task-model in a structure preserving manner with knowledge-based technology;
 - Just-in-time (agile) construction of architecture design, taking into account the actual context and design rules & constraints
 - Automatic explanation of how the design is derived
 - Actual design decisions + why they have been chosen
 - Automation versus support
 - Manual decisions can be prepared and supported by the system
 - Degree of automation can be increased if manual decisions are well registered and analyzed



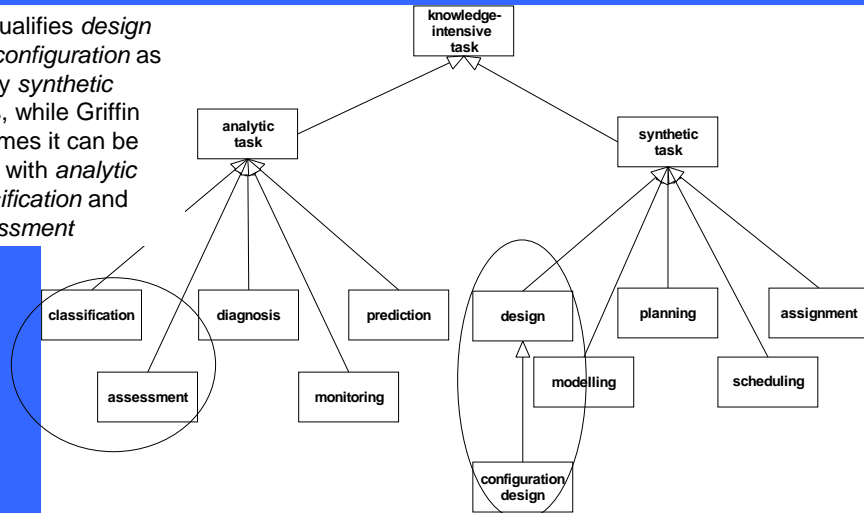
CommonKADS and Griffin Validation of the Core Model

- Griffin assumes an *analytic* task
 - Taking design decisions is *choosing* from a list of *ranked alternatives* = combination of CK *classification* and *assessment*
 - The mutual interdependency between design decisions is not taken into account
 - Affects “to choose”, “to rank” and “to propose”
 - A new decision could affect earlier decisions
 - This is a clear sign that (at least part of) the task is *synthetic*



CommonKADS and Griffin Validation of the Core Model

CK qualifies *design* and *configuration* as purely *synthetic* tasks, while Griffin assumes it can be done with *analytic classification* and *assessment*



CommonKADS and Griffin Validation of the Core Model

- Analytic Tasks
 - Reason about an existing object or subject
 - Input: some facts about the object or subject
 - Output: Some characterization (new facts) about the object or subject
- Synthetic Tasks
 - Create or construct a new object or subject
 - Input: requirements about the object to be constructed
 - Output: description of constructed object or subject

Construction of a CK Task-model for Architecture Design

- Using the relevant CommonKADS task templates
 - CK classification/assessment templates for taking independent design decisions
 - CK design/configuration templates for taking interdependent design decisions and for design construction
- Using the Core Model as much as possible and documenting the link with the task-model



Knowledge-based Automation of Architecture Design

- Design considerations for structure preserving knowledge-based automation of the new CK template using the following reasoning paradigms
 - Backward chaining with rules, decision trees and decision tables
 - Choose and ranking of individual design decisions
 - Forward chaining with rules, decision trees and decision tables
 - Finding interdependencies between design decisions
 - Evaluation of the impact of changes in context
 - Fuzzy matching
 - Choose and ranking of individual design decisions
 - Finding and ranking interdependencies between design decisions
 - Finding and ranking other similar architecture design cases or architectural patterns
 - Constraint resolution and propagation
 - Taking design decisions
 - Managing interdependencies between design decisions
 - [Architecture design construction from design decisions](#)

Architects should eat their own dog food

