From Requirements to Architectural Design
--Using Goals and Scenarios

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STRAW’01 - May 14 2001, Toronto, Canada

Motivations

- Strengthen the connection between requirements and architectural design
- Overcome the limitations of goals and scenarios when used in isolation
- URN (User Requirements Notation) = GRL+UCM: a submission to ITU study group 10
- Use GRL and UCM together to:
  - visualize the refinement processes
  - elicit new requirements during design
  - explore new architecture alternatives
  - make tradeoffs among alternative architectures
Agenda

- GRL
- UCM
- An example modelling process with GRL+UCM
- Related works

GRL Introduction

*(Goal-Oriented Requirement Language)*

- Supports goal-orientation & agent-orientation
- Deals with non-functional requirements
- Concepts in GRL graphical notation:
  - intentional elements
    - goal, task, resource, softgoal, belief
  - intentional links
    - means-ends, decomposition, contribution, correlation, dependency
  - actors
GRL Example (1): Modelling POS Software Security

GRL Example (2): Modelling Rationales in Smart-Card System
UCM Introduction (Use Case Maps)

- Scenarios describing causal relationships between responsibilities
- UCM scenarios can be allocated to abstract components
- Useful to describe features visually

Example UCM Models
Modelling Process of GRL+UCM

**Goal Models**

**Scenario Models**

Related Works

- **RE**
  - Van Lamsweerde and Willemet’s work on using scenarios for requirement (goal) elicitation
  - Rolland’s CREWS-L’Ecritoire Approach

- **Architecture**
  - Kazman’s Software Architecture Analysis Method
  - Krutchen’s 4+1 model of software architecture
Conclusion and Future Works

- This preliminary effort shows that:
  - Goal-orientation and Scenario-orientation complement to each other in both RE and architecture design
  - NFRs are inevitably the criteria of architectures tradeoffs
- Future directions
  - Tighter coupling of goals and scenarios in notation level
  - Better guidance and tool support on the modelling process
  - Improve the flexibility of GRL: GRL+UML, GRL+X

More Information?

- GRL web site:
  http://www.cs.toronto.edu/km/GRL
- UCM web site:
  http://www.usecasemaps.org