A Methodology for Control Systems GUI Prototyping - a case study

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1. Introduction

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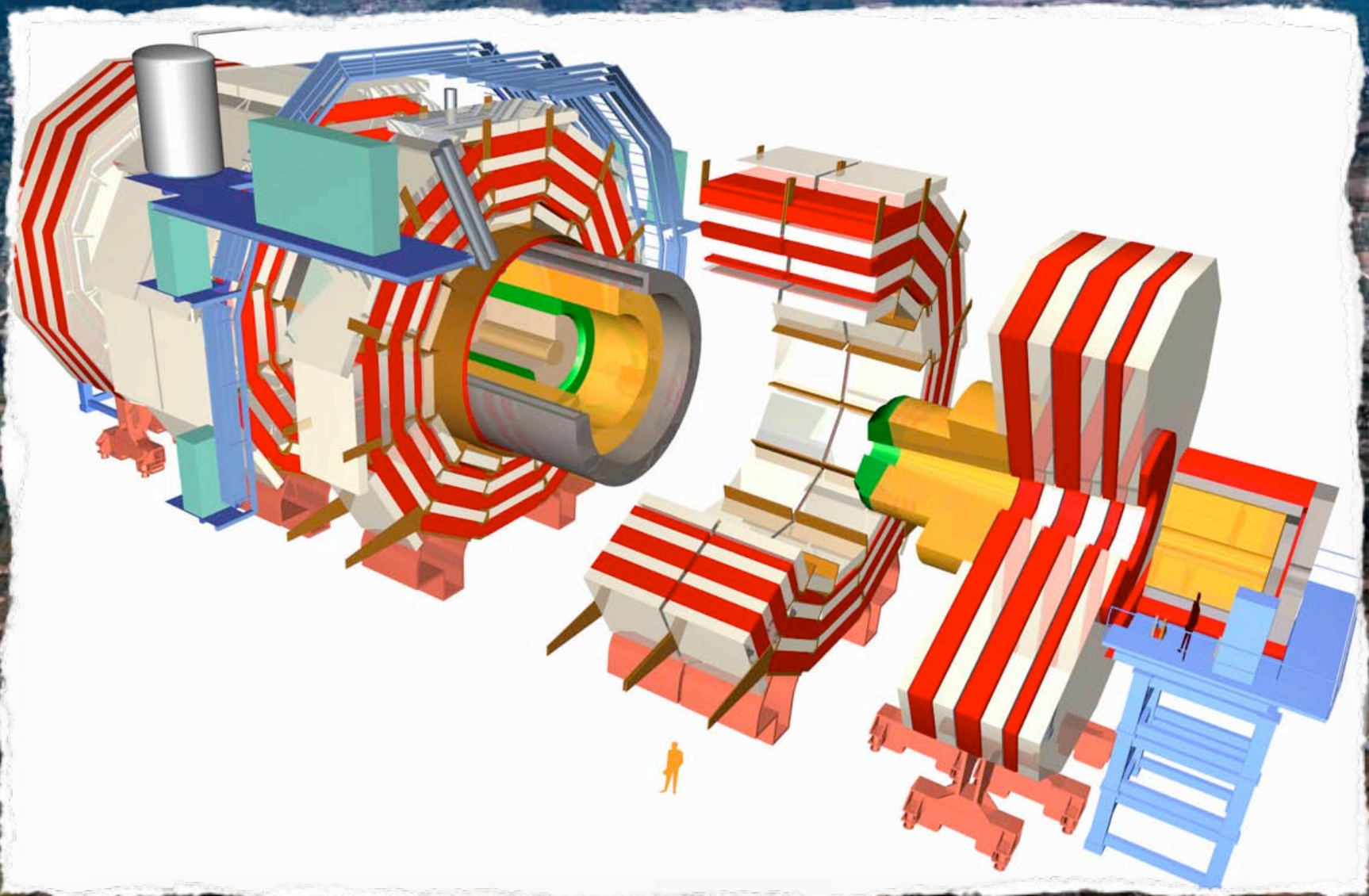
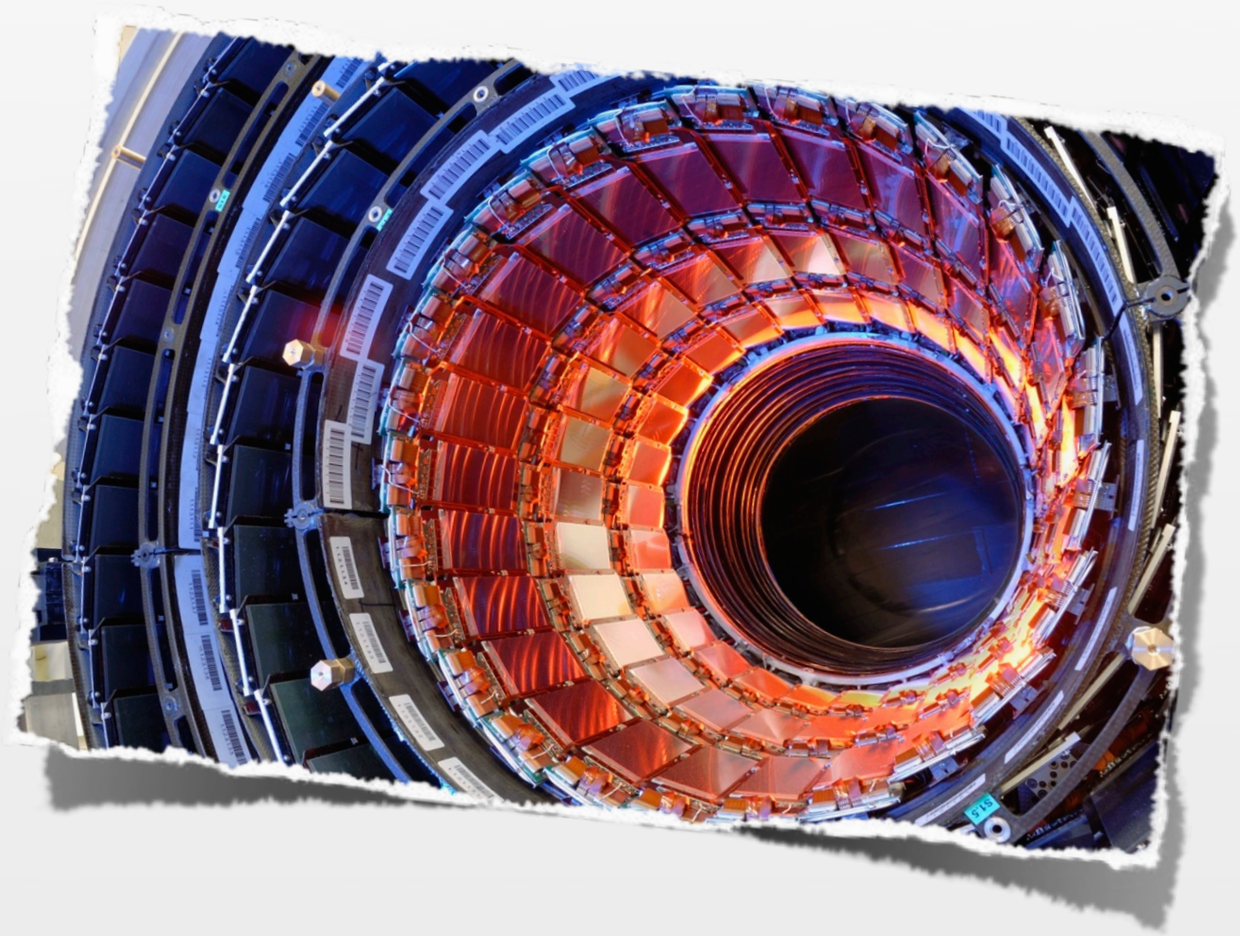
Language modeling
Language transformation
Rapid GUI prototyping

LHC and CMS



The CMS Tracker

15232 modules
1944 power groups
356 control groups



GUI for slow controls

- 3D visualization
- Monitoring
- Interaction
- Simulation

?

- Lots of components
- Lots of man hours
- Need to hire SW engineers

What is needed?

Geometry

Commands
Events

States

Hierarchy

Properties

What do already have?

Geometry ✓

Commands
Events ✓

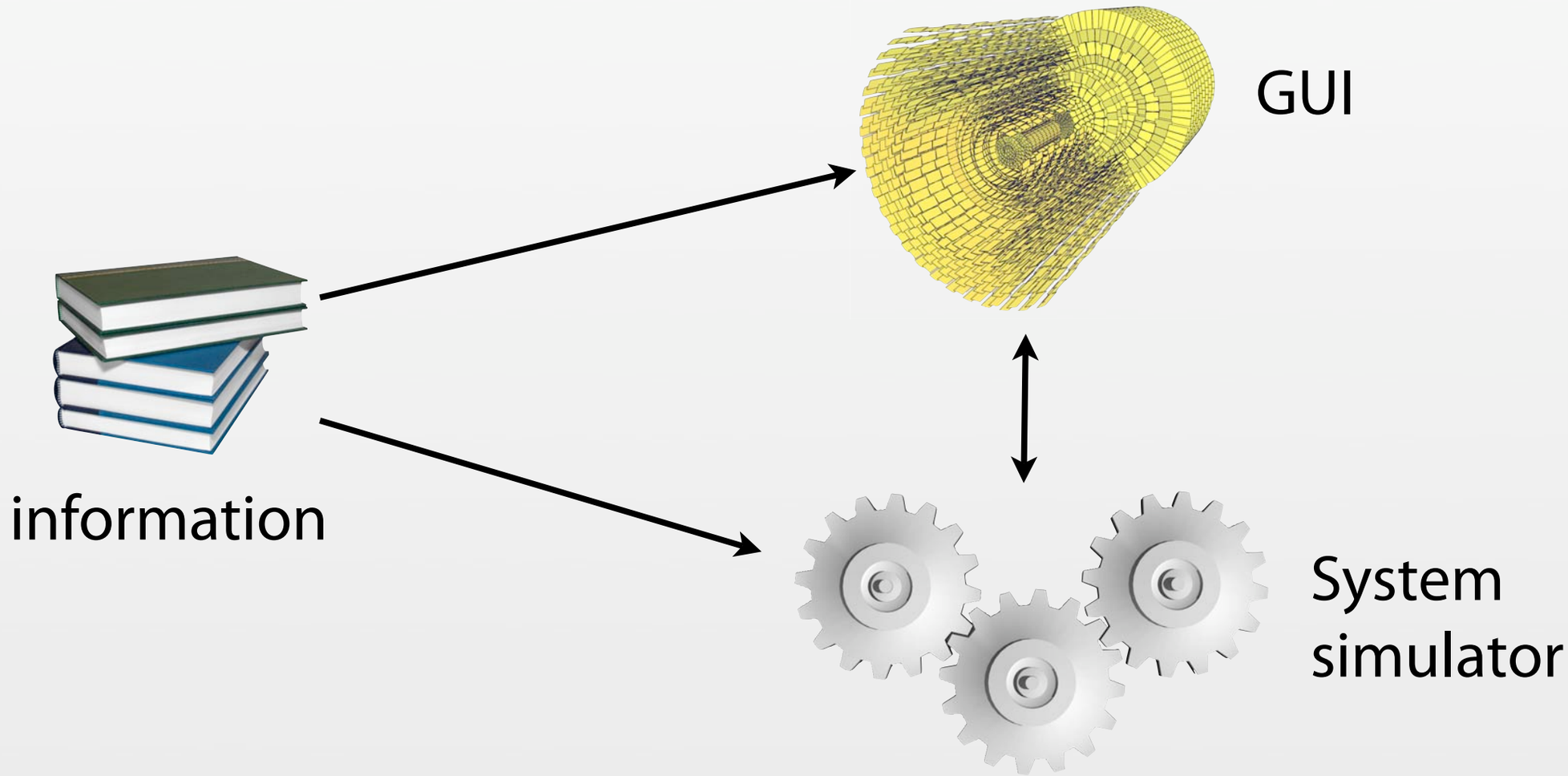
States ✓

Hierarchy ✓

Properties ✓

Idea

Generate a 3D GUI and system simulator from this information



2. Methodology

Language

Unify information formats
Domain specific
Support evolution
Machine- and human-readable

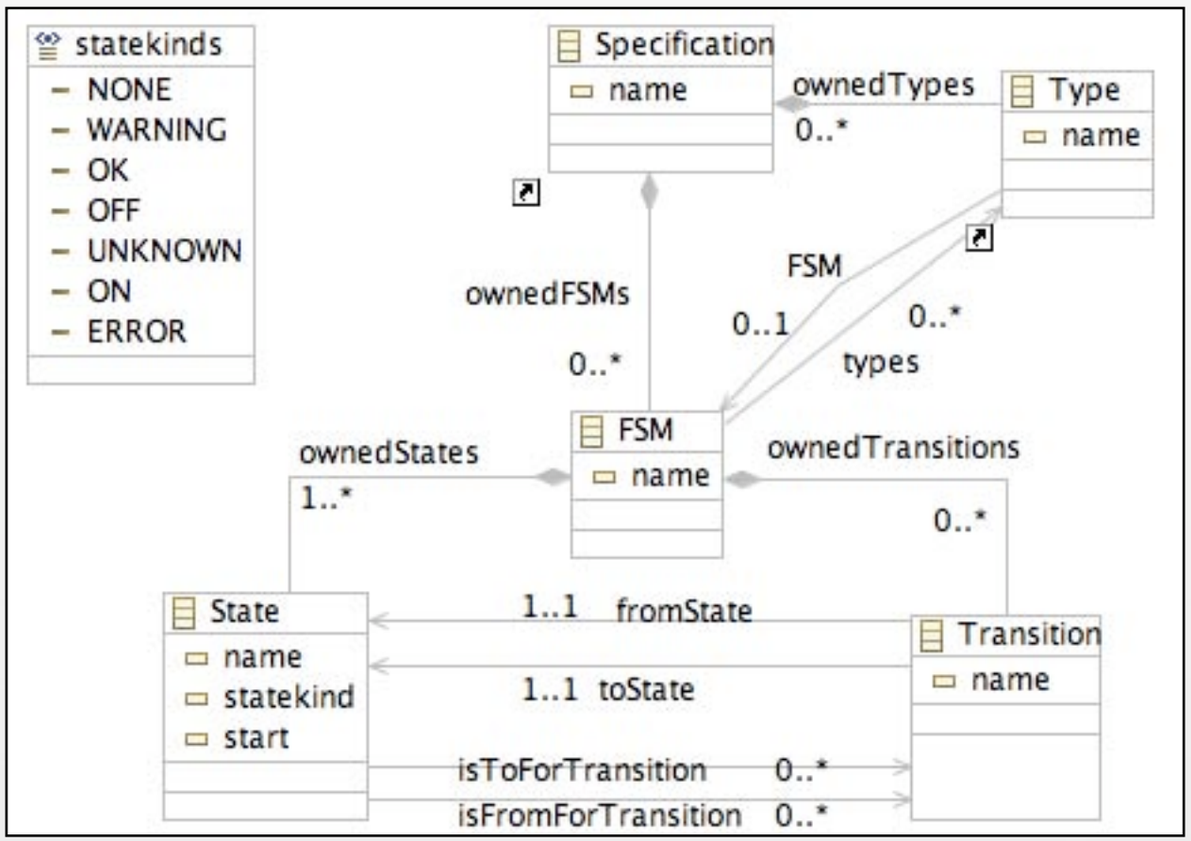
Language (cont.)

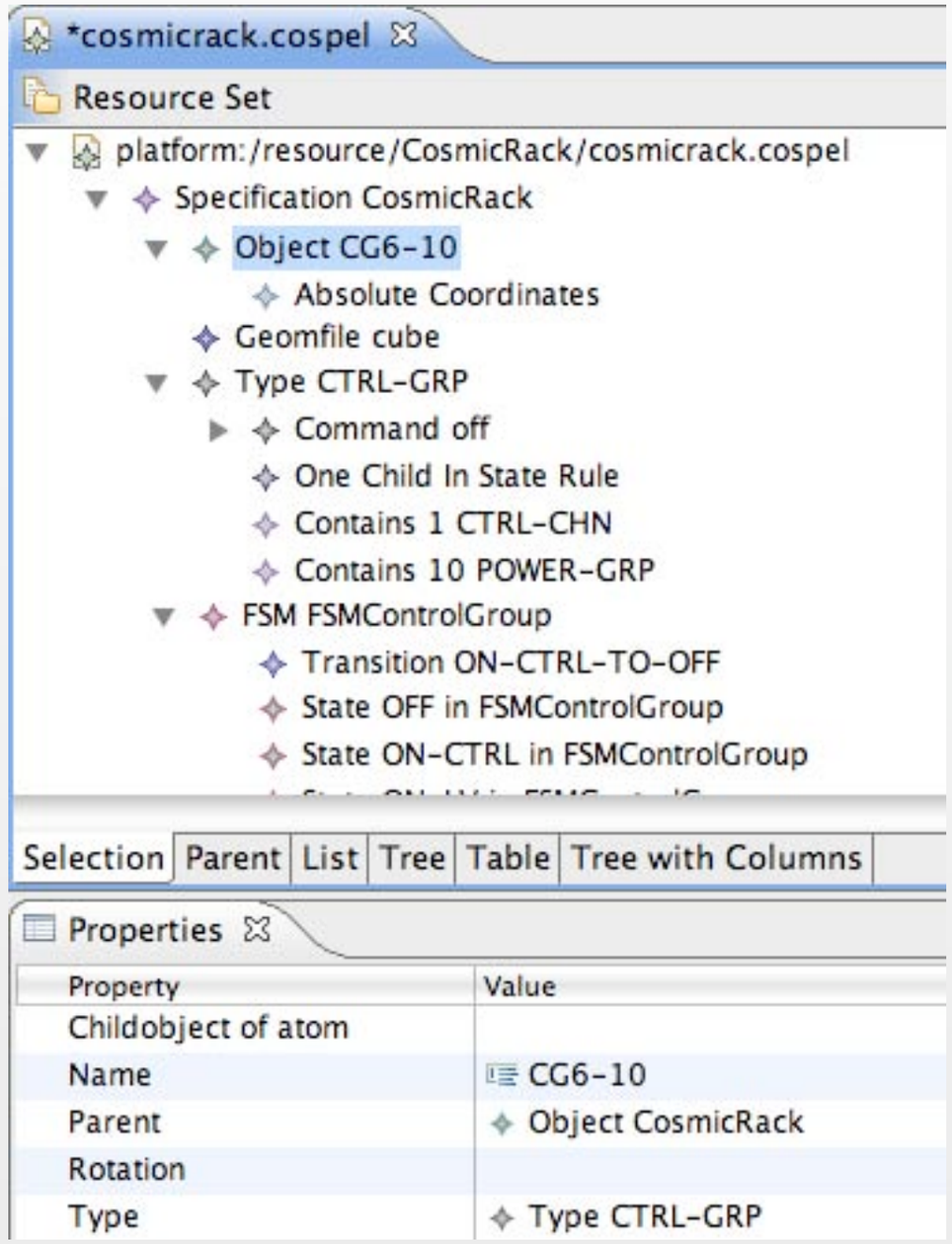
Object
Type
Hierarchy
FSM
Command
Event
Property
Rules
Geometry

Cospel

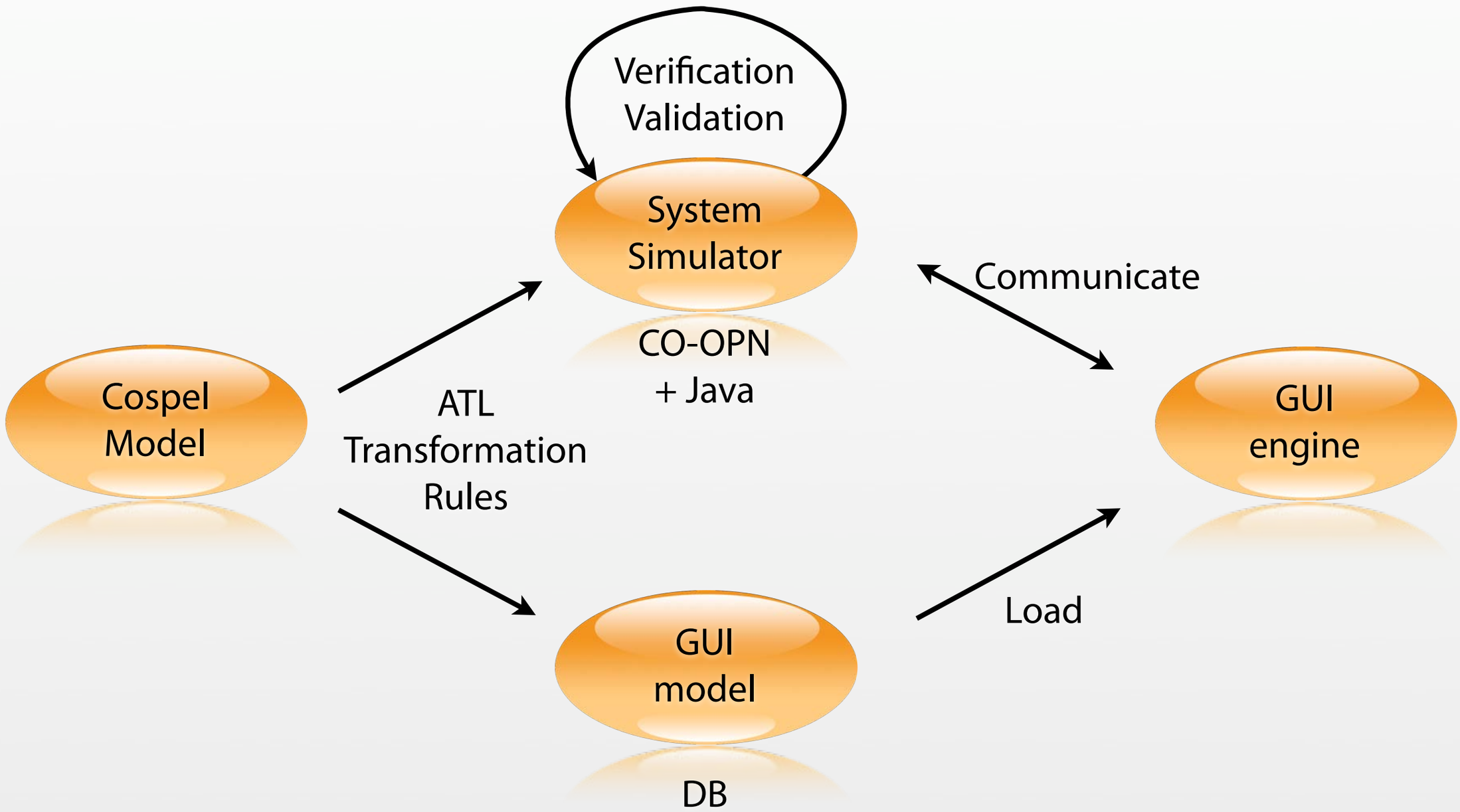
Cospel

emf
ECLIPSE MODELING FRAMEWORK

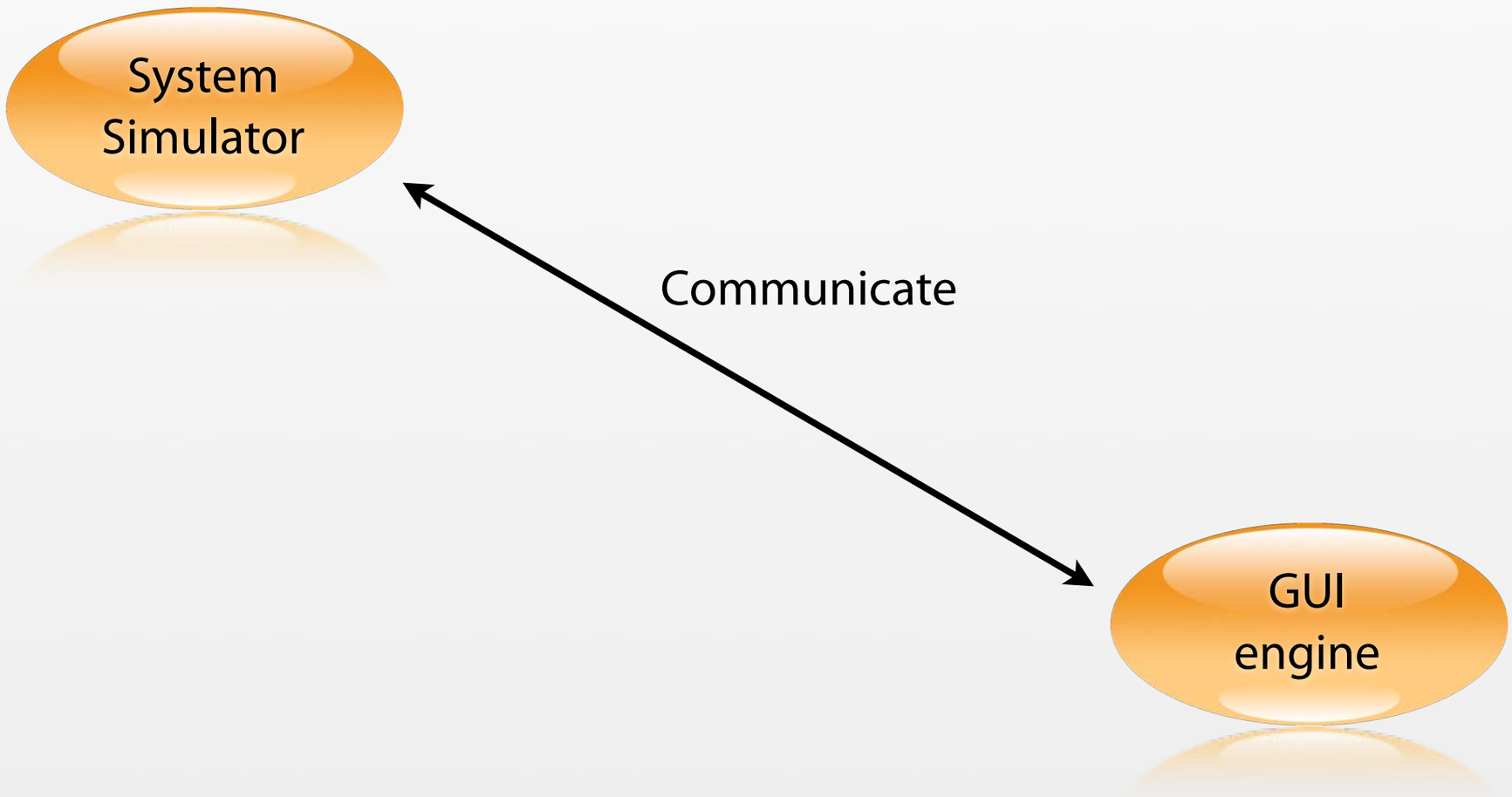




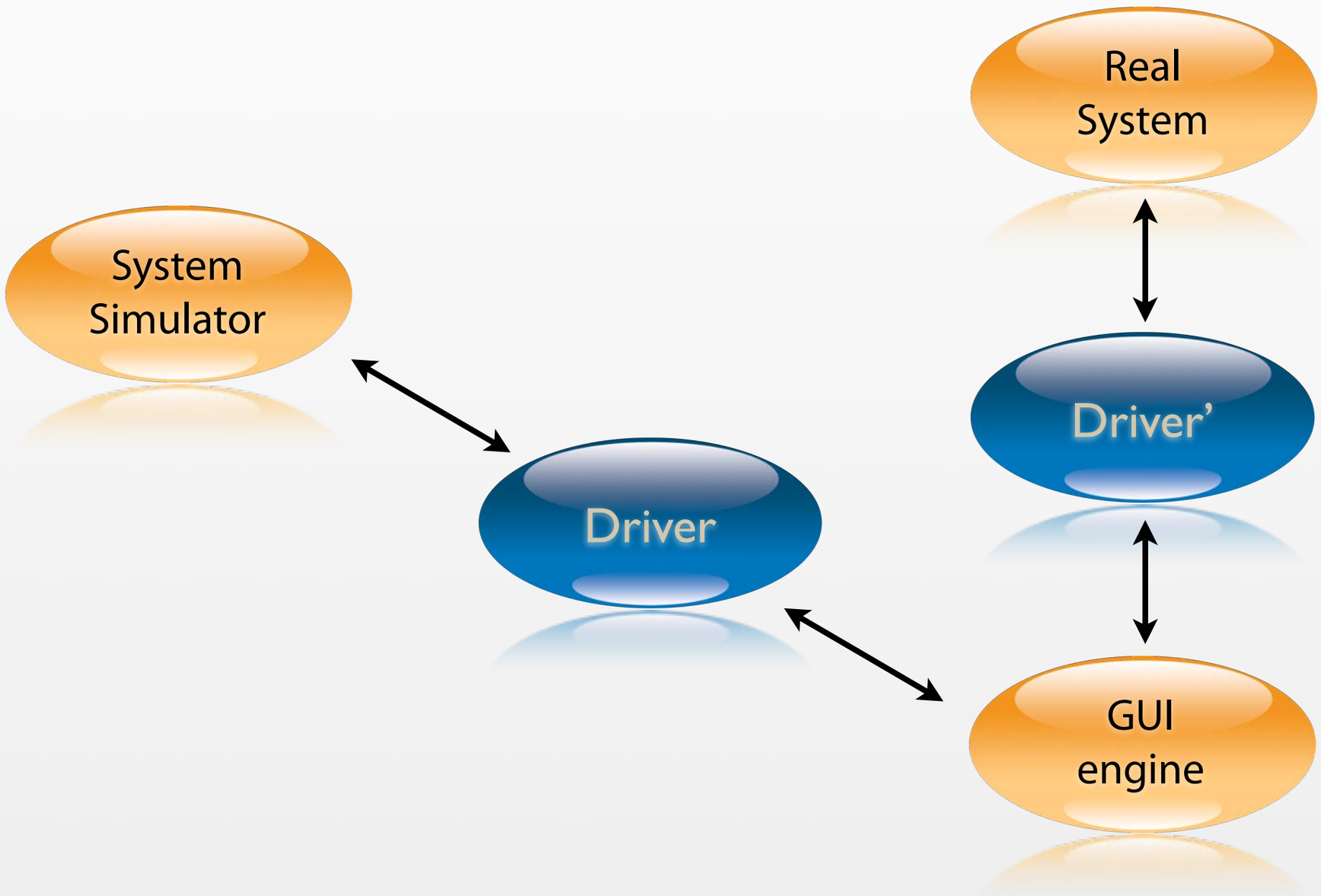
Generative approach



Communication



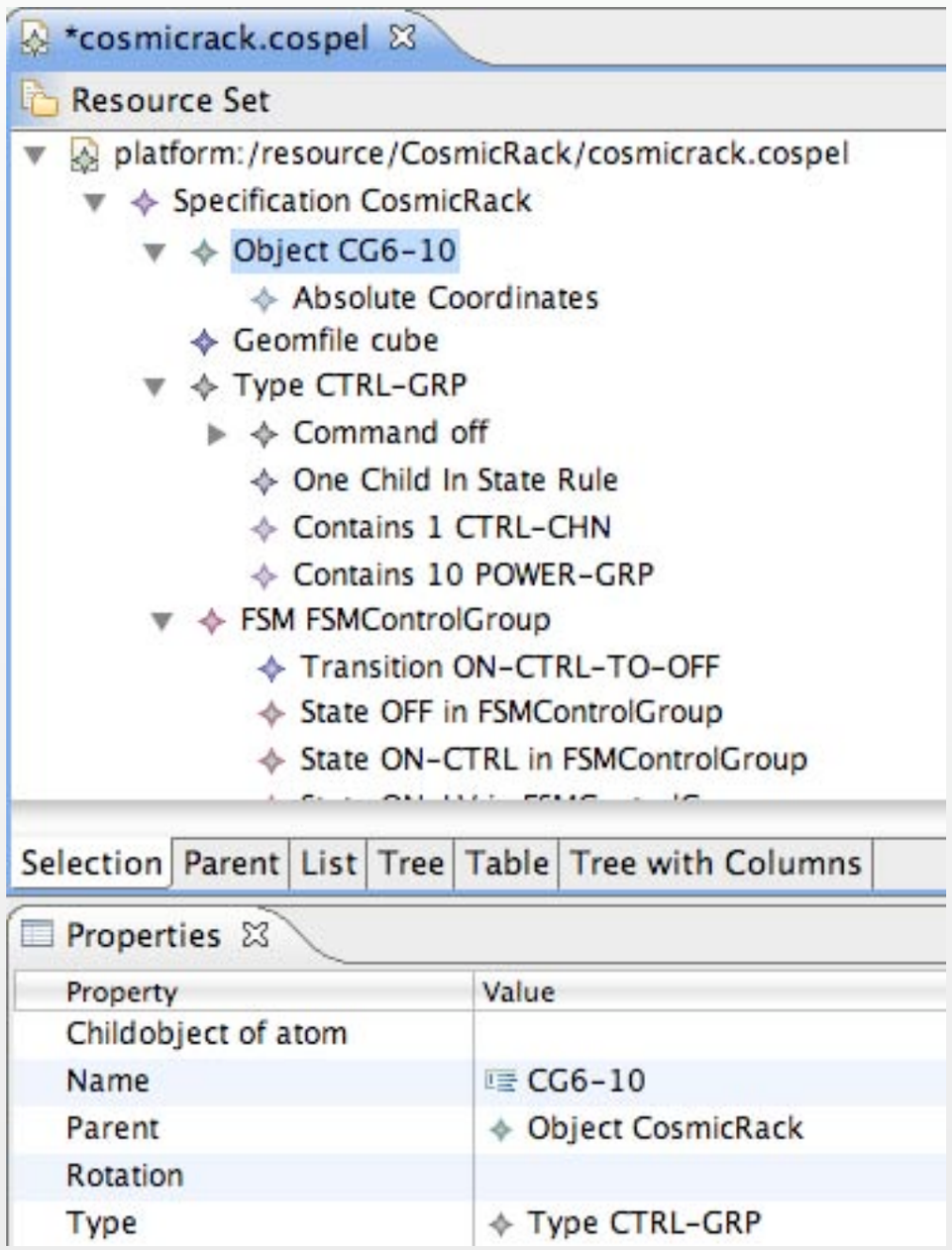
Communication



The CMS Tracker
Cosmic Rack

20 power groups
2 control groups

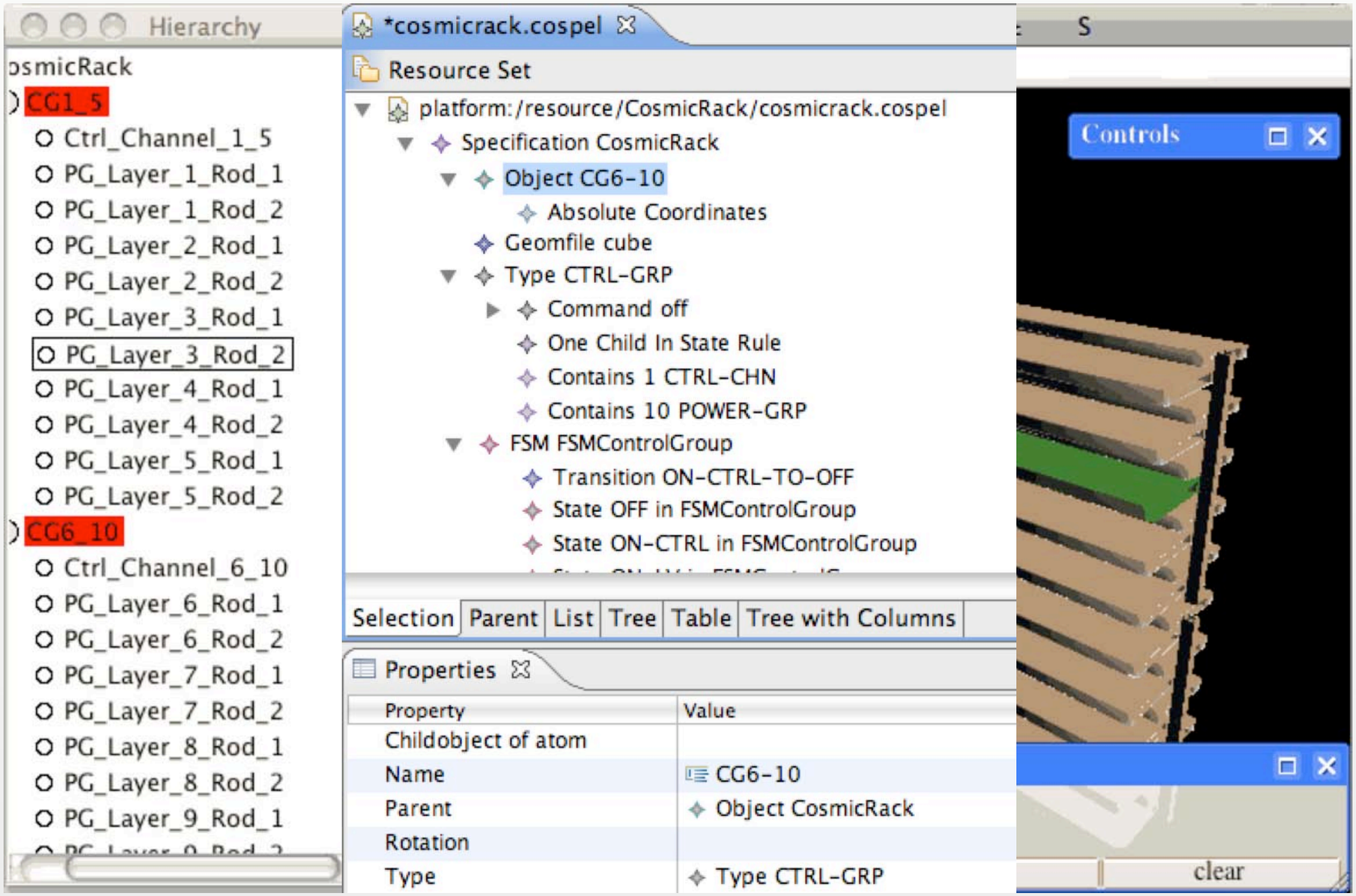
Specification



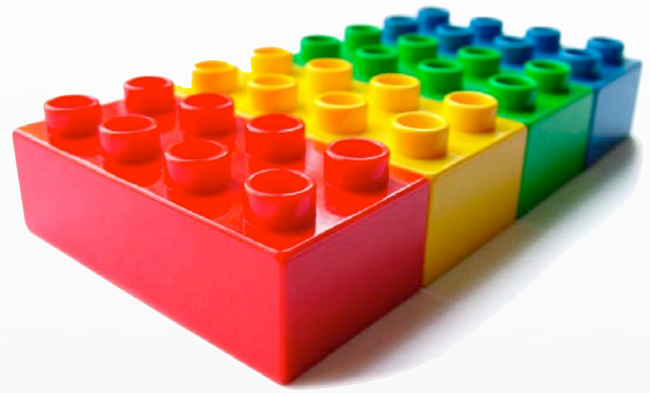
Made by hand

Could have been made automatically from information sources

Result after transformation



Remarks



1. Modular language

Easy to add/remove/refine features

Remarks

2. Flexible framework

Can easily make richer editors
(visual syntaxes, constraint checking,
design-time validation)

Remarks

3. Java-based from A to Z

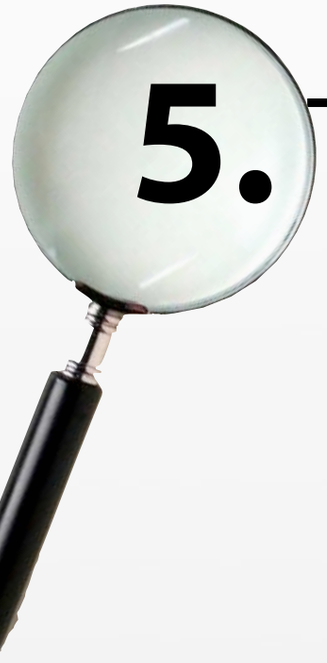
Cross-platform (with some limitations)

Remarks

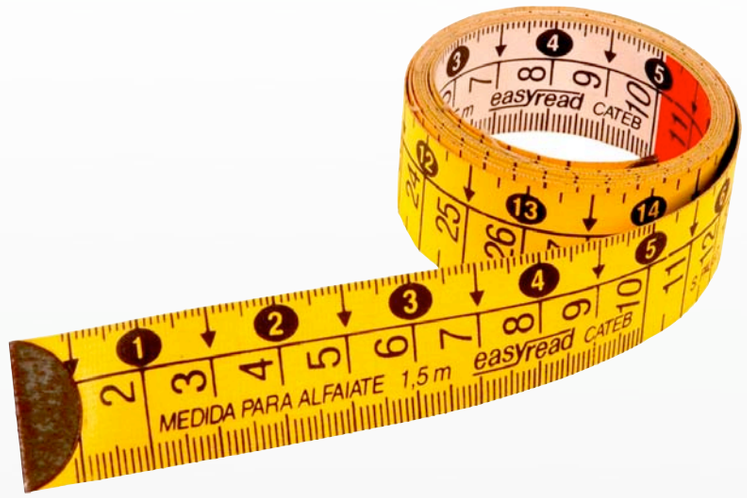
4. Stereoscopy supported

Evaluate the stereo-perception influence on system navigation

Remarks



5. Thin client



"Fatter" clients possible, but involves more GUI specification (language scope extension)

Present & Future

Full-scale CMS Tracker

Application to similar domains

Natural interaction

Thank you.

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