



# **MBSE in Telescope Modeling**

Robert Karban representing the SE^2 challenge team







- What is it about?
- What have we achieved?
- Is there a future?
- What is next?
- Live demo of the model



### What is it about?





#### System case study

- The APE technology demonstrator for the future Extremely Large Telescope (ELT)
- High-Tech interdisciplinary optomechatronical system in operation at the Paranal observatory

#### Goals

- Create modeling guidelines and conventions for all system aspects, hierarchy levels, and views
- Create a fully fledged SysML model
- Documented at http://mbse.gfse.de

Team

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## What have we achieved?





onal Council on Systems Engineering



- APE Model, Guidelines, and FAQ
  - Model structure and overview
  - Objectives and Requirements
  - Context
  - System Structure
  - Behavior
  - Data
  - Verification
  - Model library and SE Profile
- Modeling challenges
  - Identified, solved, and presented (RTF input)
  - Notation (e.g. Connection of nested blocks)
  - Model (e.g. Grouping of interfaces)
  - Tool (e.g. Configuration and Quality Control)
  - Methodology (e.g. multi-layer allocation)
- Plugin for modeling tool

Presented to the INCOSE 2009 Symposium



- 20000 actuators, 8000 mirrors
- 60000 I/O points, 700Gflops/s, 17Gbyte/s
- Many distributed control loops
- Use SysML to model the control system

EELT\_ProductTree EELT\_Structure\_Conten



What is next?



- Update guidelines and FAQ
- Create a "Solving SysML problems in a nutshell"
- Elaborate APE model
- Explore parametrics



### INCOSE Live demo of the E-ELT model



Please standby - setting up the system...



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