

# MBSSE workshop

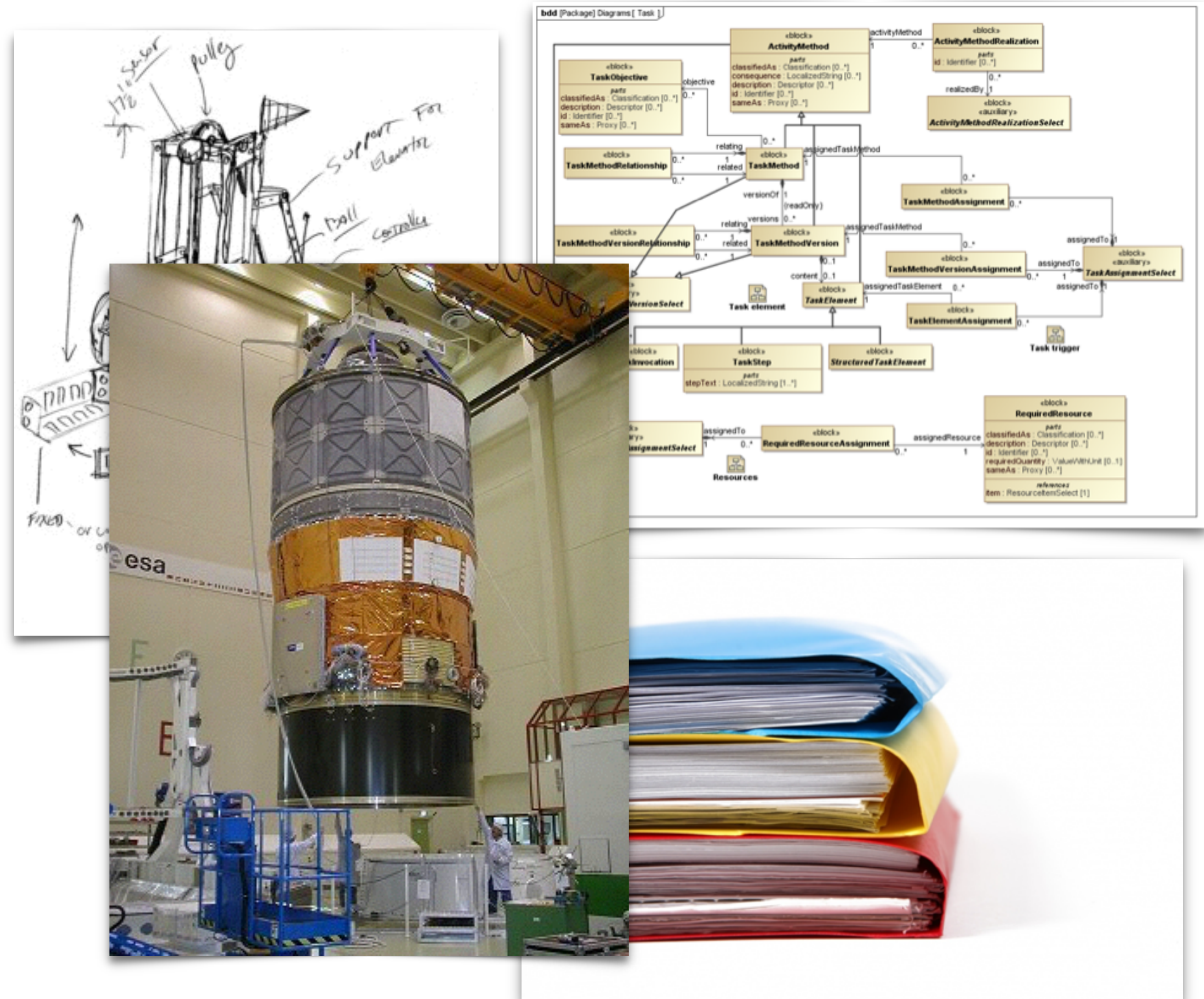
The link to the systems we are building

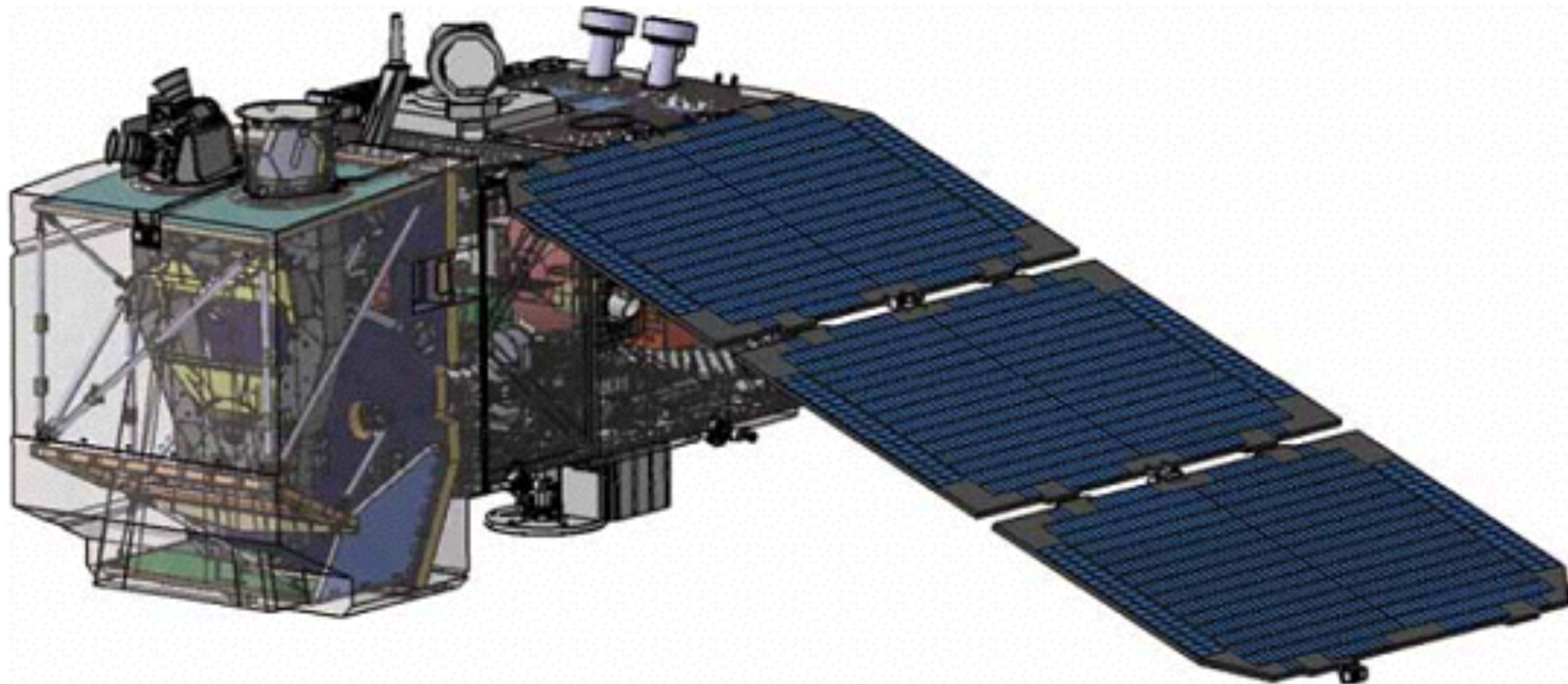
# SE is already model-based today

Models are representations of the system or product.

- They might be informal or formal
- It could be documents
- It might also be representative hardware

They have in common that “all models are wrong, only some might be useful” (George Box, statistician)





*Ceci n'est pas un satellite*

# Relevance of Models at System Level

Models are mostly generated from a “discipline” view to represent a specific aspect of a system, for the purpose of better understanding, particular analysis or better description.

- One of the main tasks of the system engineering function is
  - To establish and maintain the links (traces) between these models
  - Decide the adequate level of traceability, from a high abstraction level at macroscopic scale, down to the level of parameters where needed
- There are only few dedicated systems engineering models



# Some “SE Artefacts”



## The typical SE “models”

### Requirements

- User Requirements
- System Requirements
- System Specification
- Requirements Flowdown

### Verification

- Review
- Analyses
- Tests
- Inspection

### Budgets

- Mass budget
- Power and energy budget
- Data budget
- SW budget
- Performance

### Architecture

- Physical architecture
- Functional architecture
- Electrical architecture
- Thermal architecture

### Design documentation

- Detailed description of design choices
- Related analyses
- Discipline oriented information

### ICDs

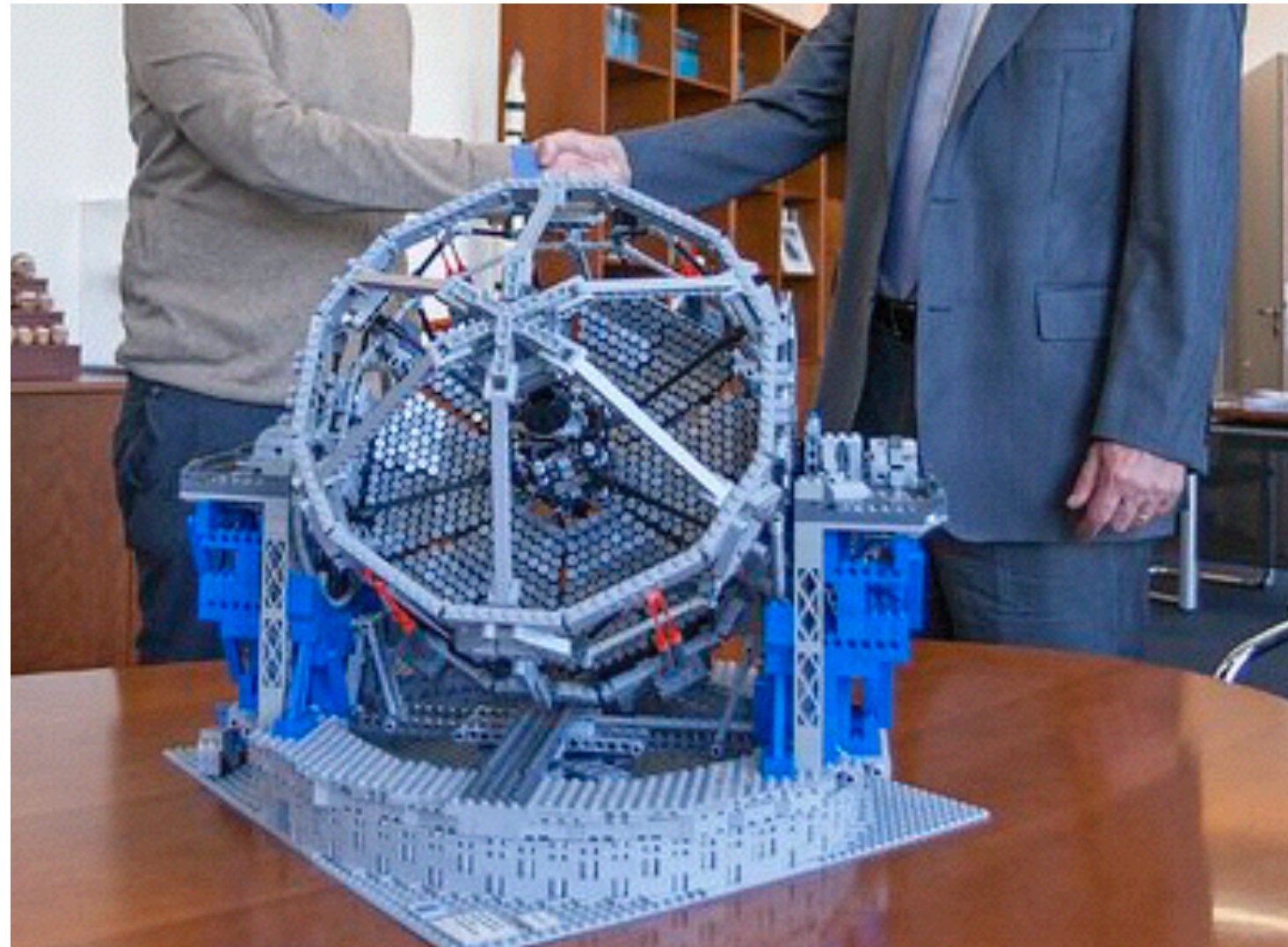
- Electrical
- Functional
- Mechanical
- Thermal

**Traceability and linking** is the key between all these models. With that perspective **Architectures and Interface** descriptions have a crucial role for the system engineer.

# Warning: Some Pitfalls

George Box again:

[...] following William of Occam [the engineer] should seek an economical description of natural phenomena. Just as the ability to devise simple but evocative models is the signature of the great scientist so overelaboration and overparameterization is often the mark of mediocrity.



Hiding over a model instead of a document does not per se add value - in both cases it is the quality of the story going with it which makes the difference.

