Building a Reference Spacecraft Simulator Architecture

Nuno Sebastião (ESA), Vemund Reggestad (ESA), M. Spada (ESA), M. Pecchioli (ESA), A. Williams (ESA), N. Lindman (ESA), P. Fritzen (VEGA GmBh).

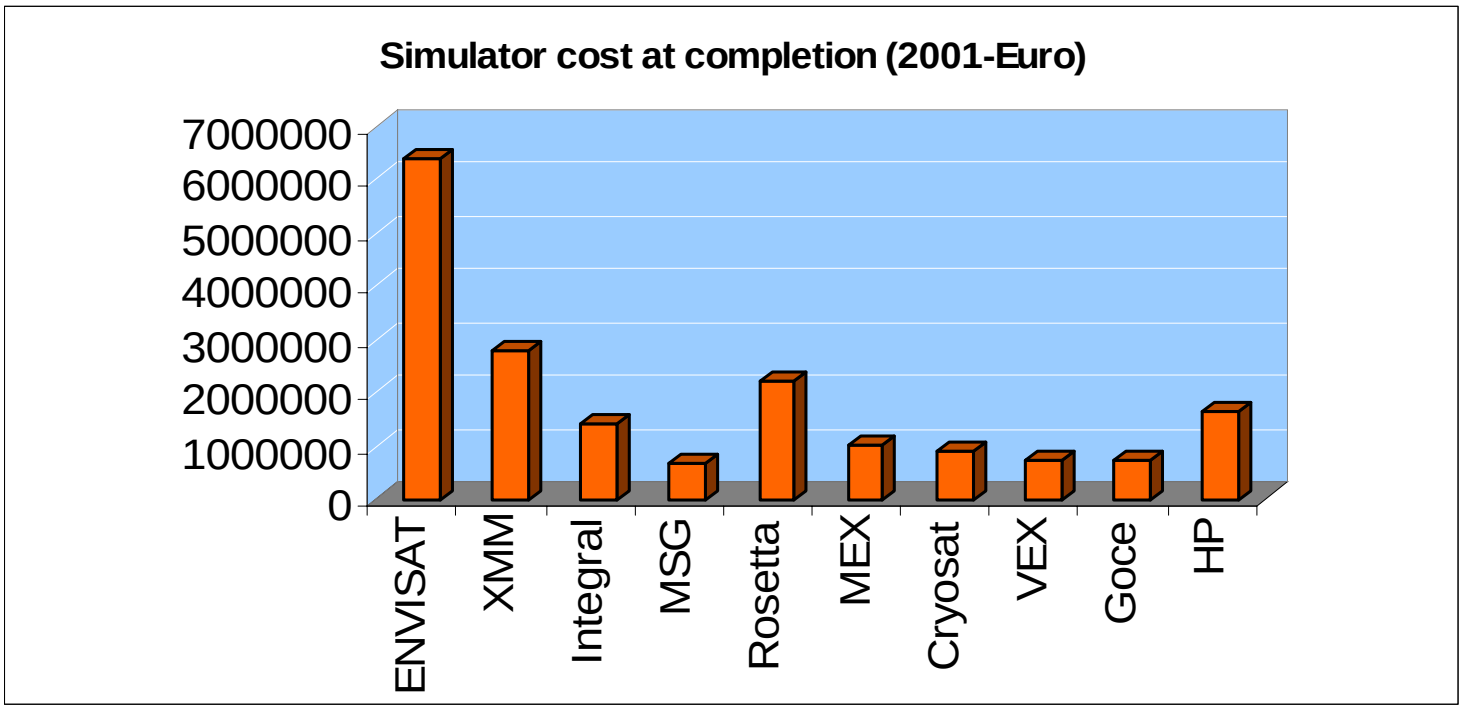
Reducing costs

Reducing costs and improving efficiency

- Simulation Standard for improved reusability and interoperability
- State of the Art Development Environment
- A reference Architecture for the development of Operational Spacecraft Simulators.

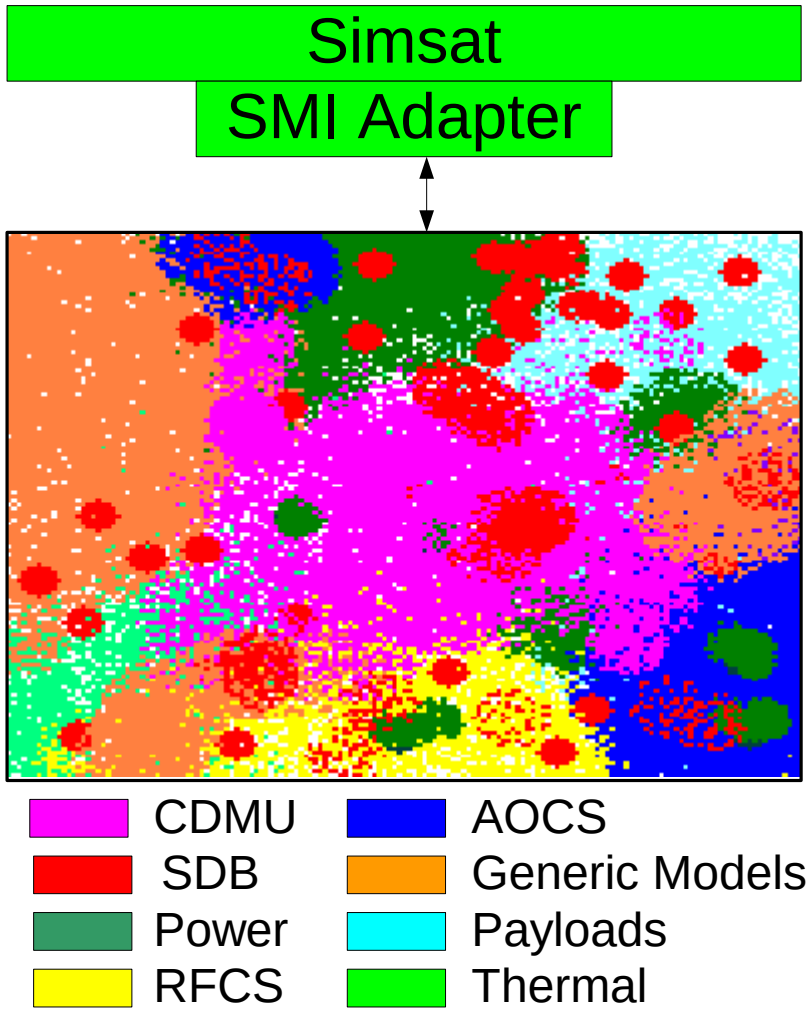
Operational Simulator Costs

- Previously Large cost overruns.
  - Up to 100%



A Spacecraft Simulator Reference Architecture

Reference Simulator Architecture. Why do we need one?



Current situation:

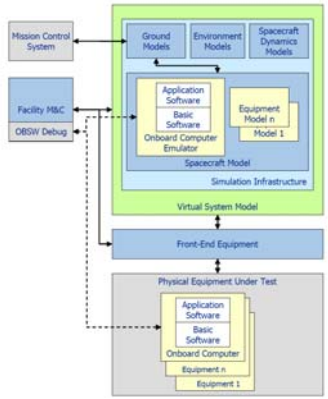
- No clear interface between models
- Difficult to isolate models for reuse
- Tight coupling SDB and models.
- Reuse by cut&paste.

Objectives:

- Definition of clear interfaces between the different elements in a Spacecraft.
- Improved reusability at model level. (towards plug&play)

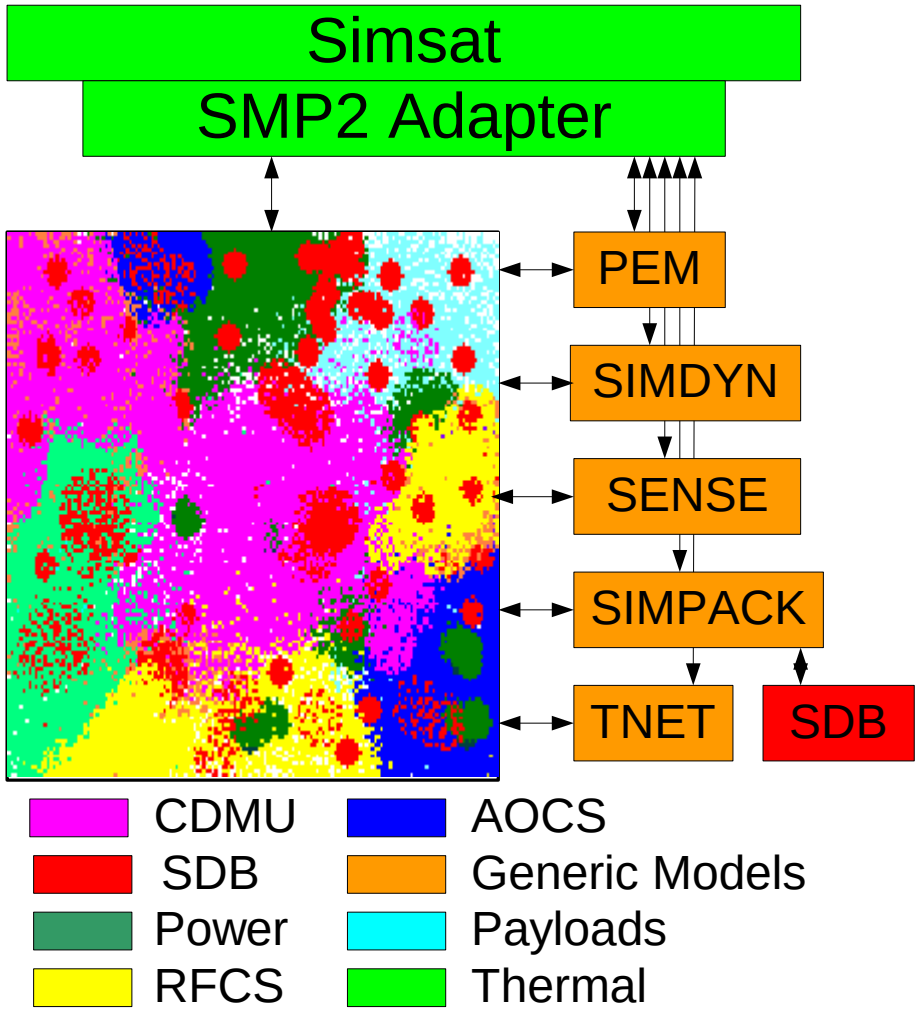
Two aspects of a Reference Architecture

- Identification and specification of interfaces between the various spacecraft simulator subsystems, between the spacecraft subsystems and ground equipment, etc.



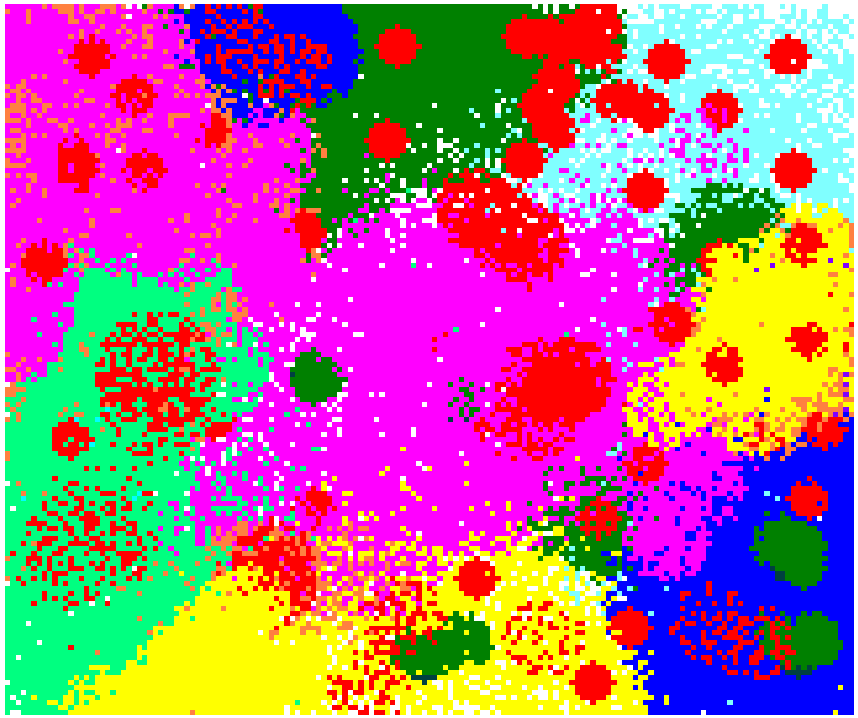
- Definition of a spacecraft simulator development process starting from the reference architecture.

Improvement Step 1: Generic Models



- Generic Models interfaces clearly defined
- Allow plug-and-play update of generic models.
- First part of infrastructure related to SDB handling added.

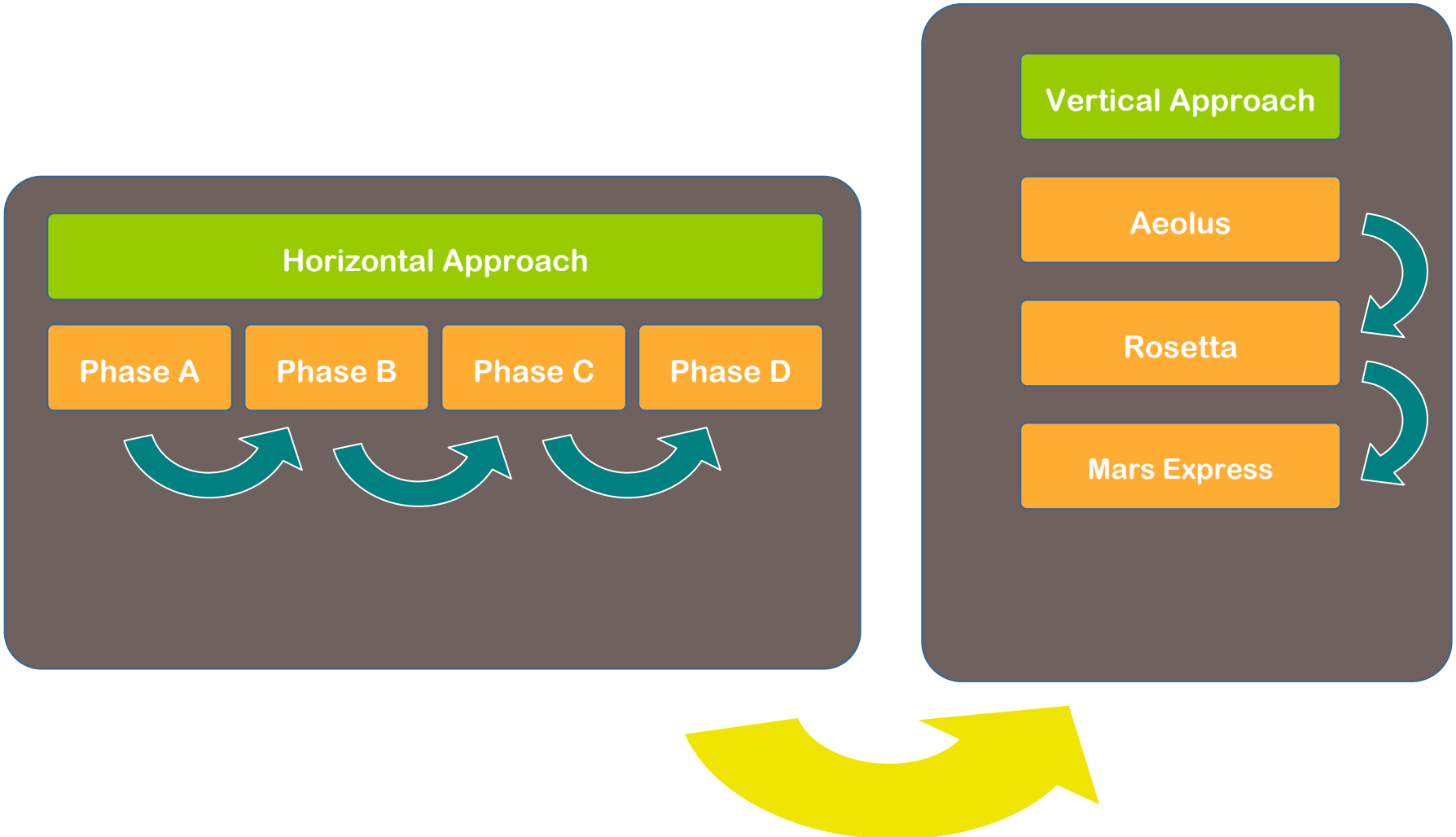
Improvement Step 2: Reference Simulator Architecture for Operational Simulators



CDMU
SDB
Power
RFCS
AOCS
Generic Models
Payloads
Thermal

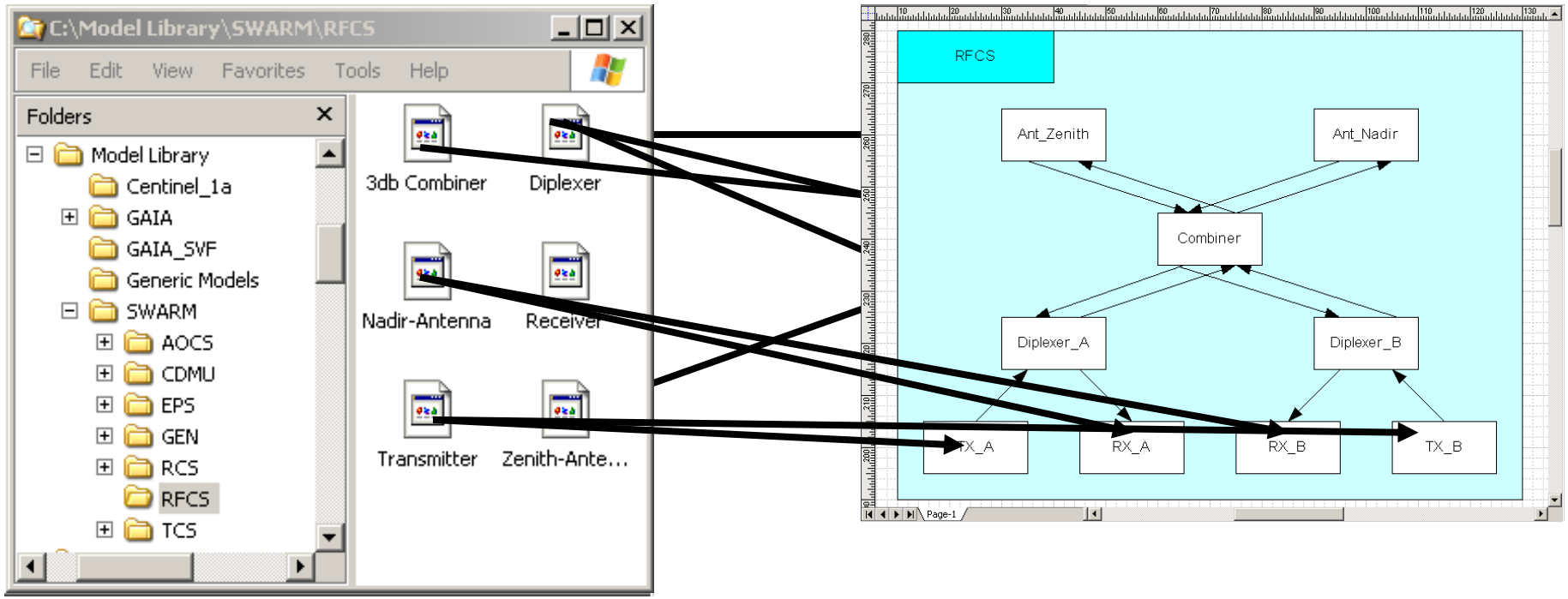
- Establish a suitable breakdown of simulators into models (generic ones, spacecraft specific ones, etc).
- Standardize on common generic interfaces between the models.
- Clear cut between TM/TC and engineering parameters
- Definition of a Spacecraft Simulator Development process.

The ultimate goal: Reference Simulator Architecture for an Entire Mission



Using a Reference Architecture

Simulator Assembly



If developed according to a Reference Architecture, this is feasible.

Thank you for your attention !

Let’s continue to build the future