

# SimTG: Successful Harmonization of Simulation Infrastructures

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Astrium Satellites

All the space you need



# Outline

- Background & History
- Development status
- Current applications
- Future work
- Conclusion



# Background & History

## - SimTG: Objectives & Goals -

- Following the ASTRIUM organization pooling all simulators within the same division of Central Engineering
- Simulation of Third Generation (SimTG) is the title of the project allowing a transnational simulators harmonization:
  - Share of the same infrastructure
  - Share of the same model library
  - Share of the same development process and tools
  - Share of expertise & resources

# Background & History

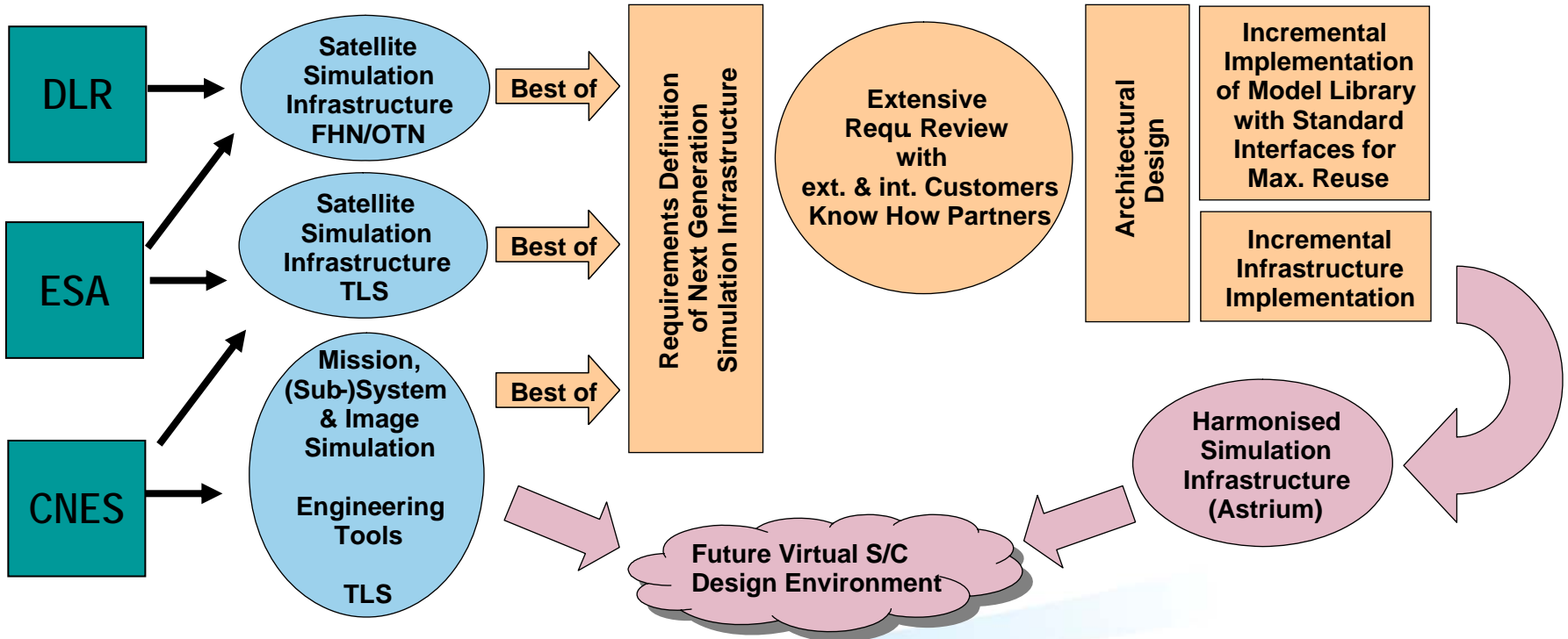
## - SimTG: Objectives & Goals -

- The mandatory features to consider are:
  - Compliance to “ASTRIUM user” needs
  - Compliance / Contribution to ESA simulation & modelling standardization efforts
  - Alignment with the overall ASTRIUM System Engineering process
  - Mastership of the tools by the Simulation division, for reactive user support
  - Ability to widen the scope of the simulation (i.e. Virtual S/C trends)
  - Incremental introduction of SimTG avoiding a program to manage all risks
- Forms the base for future technology improvements

# Background & History

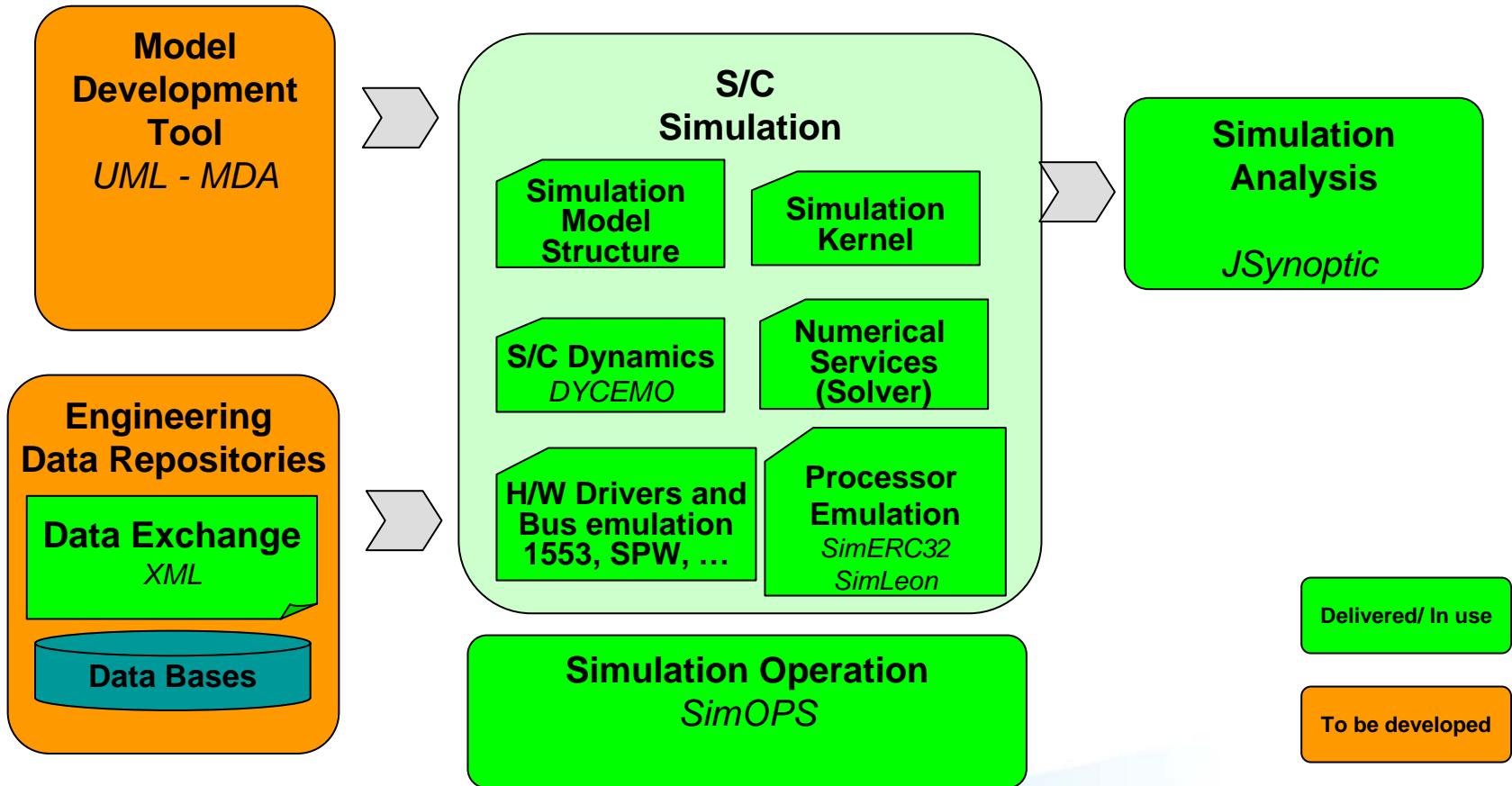
## - Approach & Process -

- Customer Processes
- Future Performance Requirements
- State of the Art
- Standards



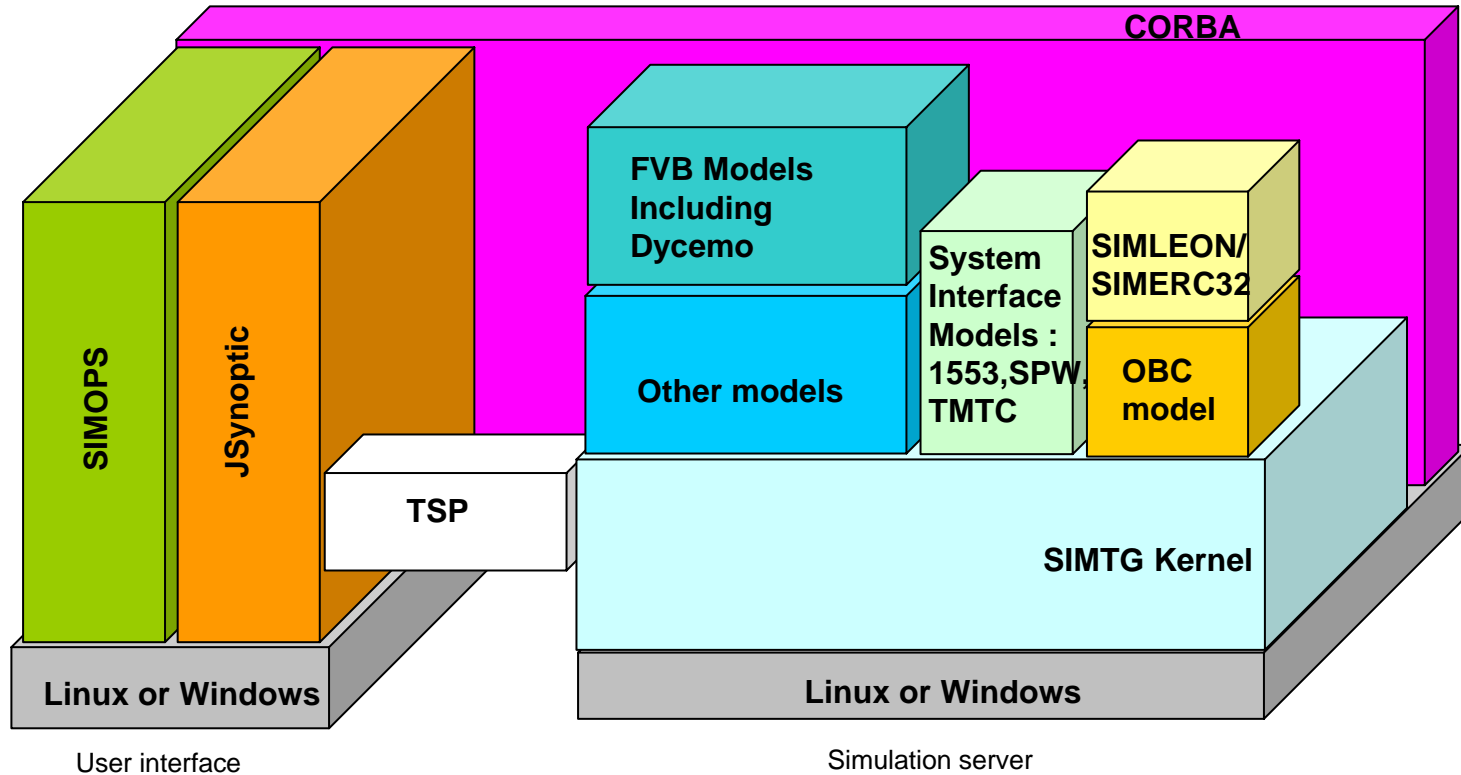
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# Development status - SimTG overview -



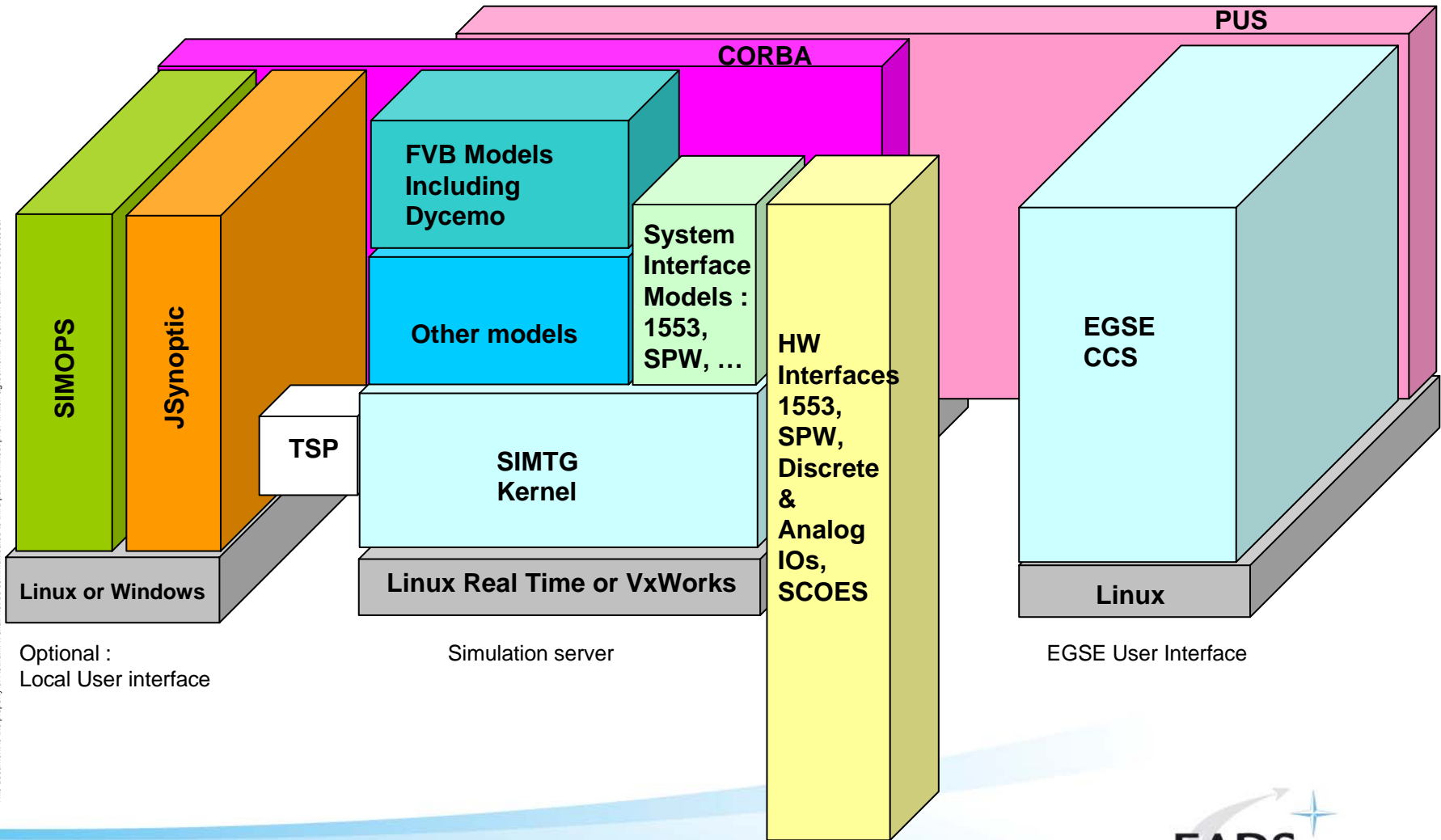
# Development status

## SVF use case example



# Development status

## ATB use case example



Optional :  
Local User interface

Simulation server

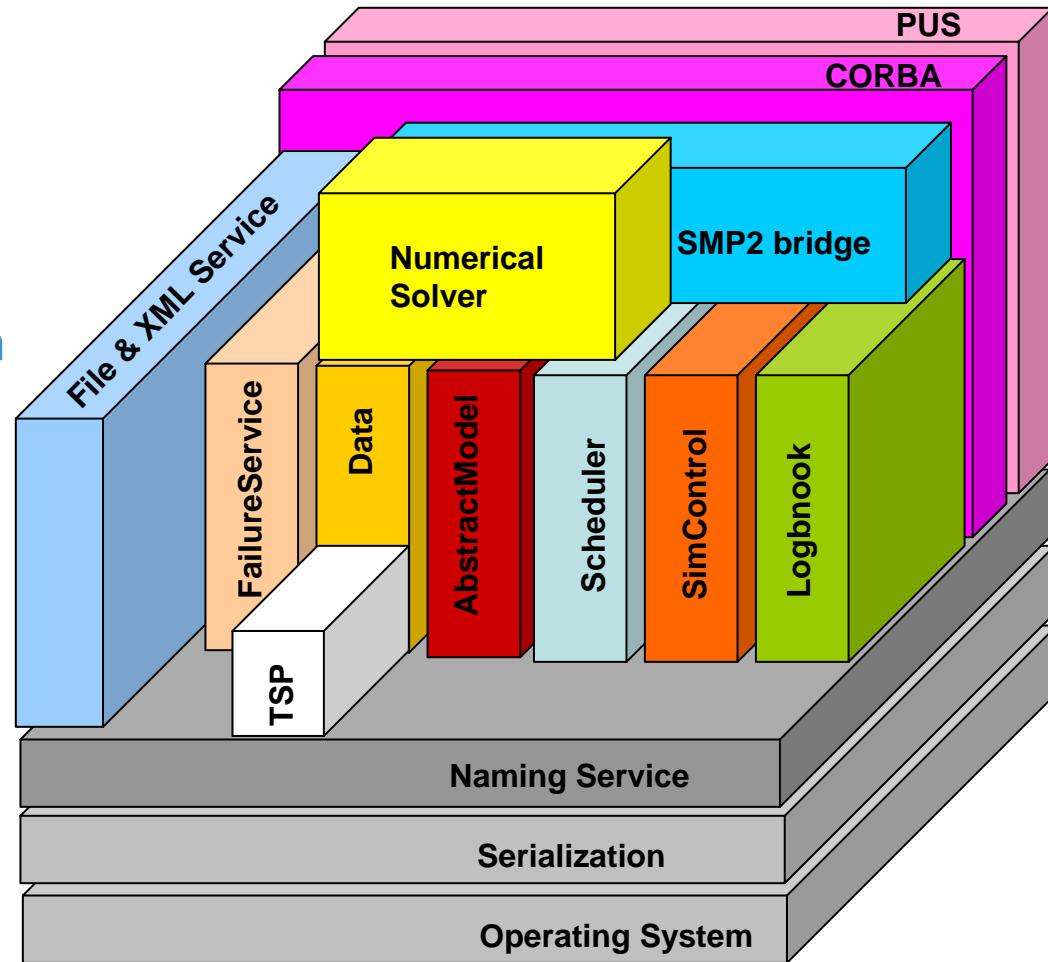
EGSE User Interface



# Development status

## SimTG kernel components

- All the components have been delivered
- SimTG Model ICD provides SimTG model structure definition and SMP2 compatibility

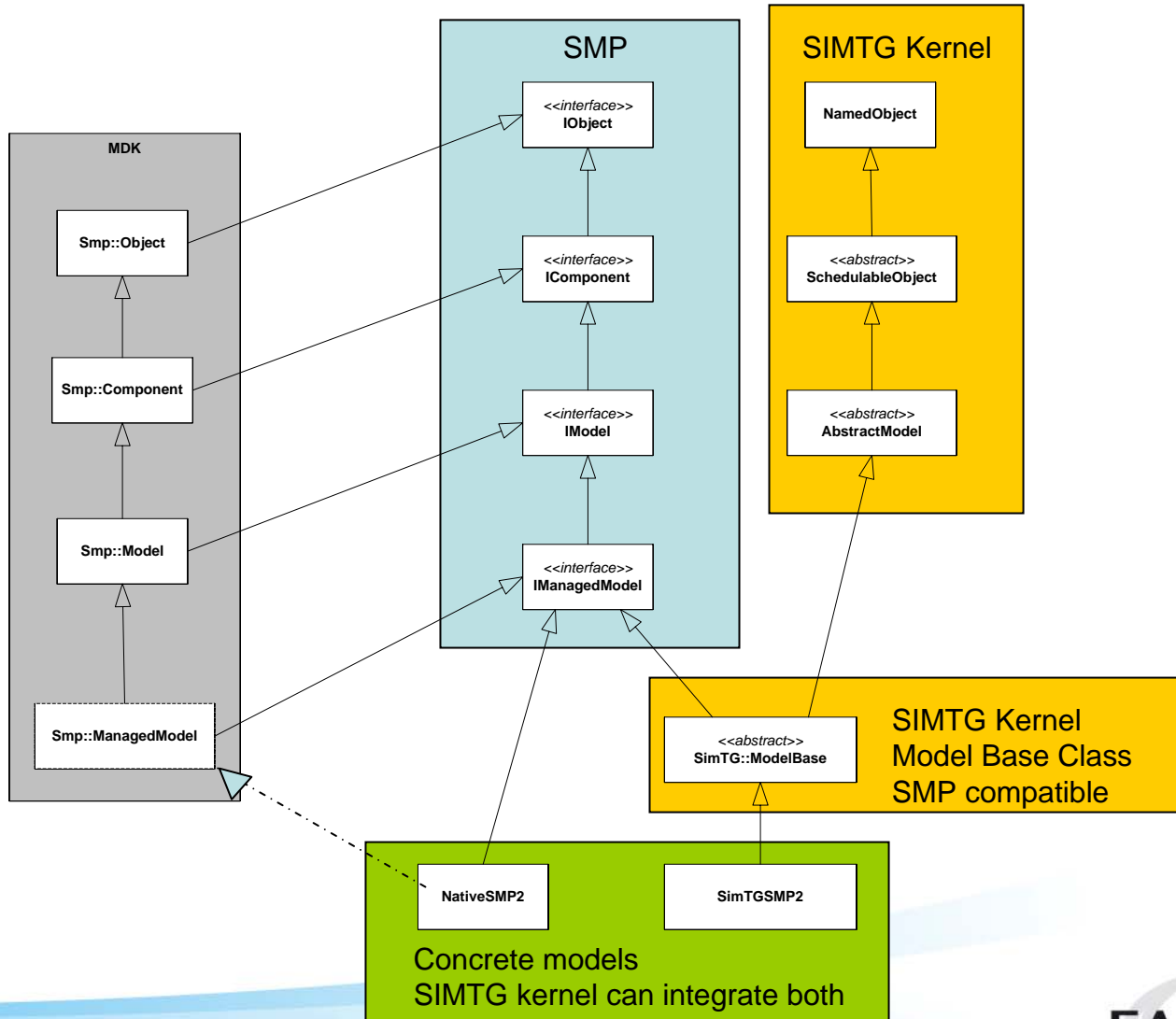


# Development status SimTG kernel technologies

- ACE : encapsulates OS services (threads, sockets, ...) on the targeted platforms
  - Linux and Linux RT (currently RedHawk)
  - Windows (using mingw)
  - VxWorks
- TAO : for CORBA communication
- XERCES : for XML file reading
- TSP : for real time simulation sampling
- Development environment
  - SVN + trac
  - GCC
  - ANT (makefiles)
  - Eclipse (optional)



# Development status SMP and SimTG Models



# Development status

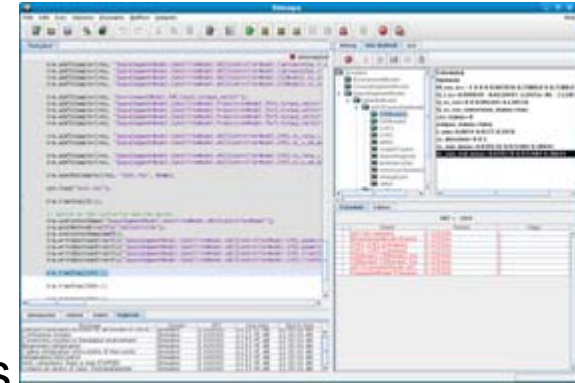
## Other components

### ■ Processor emulators :

- SimERC32 and SimLEON (see dedicated presentation)

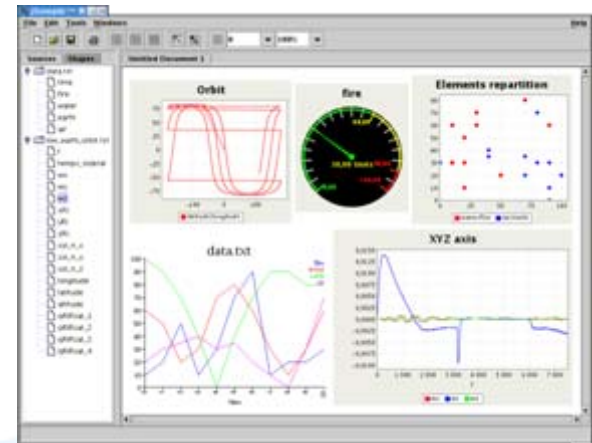
### ■ SimOPS

- Light-weight test environment for simulators
- Supports defining and running validation tests



### ■ JSynoptic

- Graphical data visualization
- Visualization of on-line and offline data



# Development status

## Other components cntd

### ■ SimDB and SimML

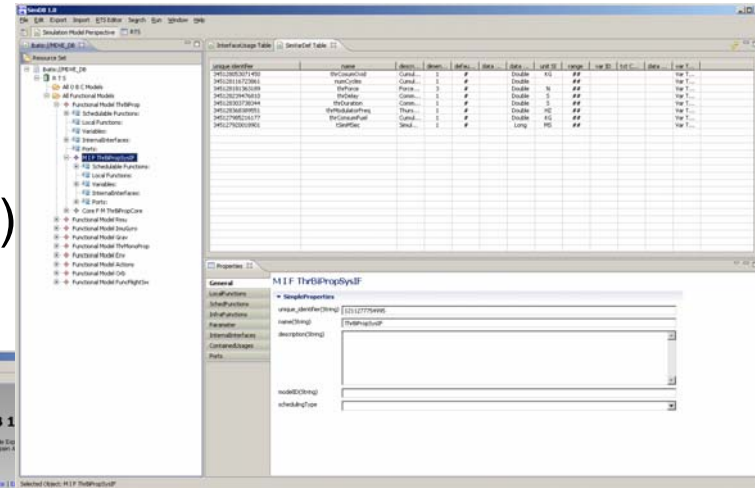
- Definition of simulator characterization data
- Import / export simulator and engineering data
- XML based exchange of simulator data

### ■ SimTG M1553

- Numerical simulation  
(calibrations according to data base)
- HW interface available on VxWorks  
and Linux RedHawk

### ■ SimTG Spacewire

- Numerical simulation
- HW interface ...



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# Current and upcoming Application of SimTG

- DIVAS
  - SVF delivered
  - Avionic prototype bench under development
- Inmarsat payload
  - SVF delivered
- BEPI
  - FVB prototype delivered
  - STB, SVF and ATB under development
- EarthCare: planned FVB, SVF, ATB
- Sentinel-2: planned FVB, SVF, ATB
- ExoMarsRover: planned FVB, STB, SVF, ATB



# Next Steps

- **Simulation modelling framework**
  - Simulation Model Design including code generation
  - Simulator Configuration
  - Document generation
  - ...
- **Maintain current tool in the state of the art**
  - Integration within Eclipse for SIMOPS and JSynoptic
- **Virtual Spacecraft**
  - Further integration with (existing) engineering databases
  - Enhanced integration with S/C visualization
  - Improved configuration to follow S/C design

# Conclusion

- SimTG is a state of the art simulation environment - fully operational
- SimTG kernel is development jointly by a transnational team
- SimTG development eases
  - Working together within Astrium including sharing experience, workload balancing
  - Development of common models (examples 1553, SpaceWire)
  - Set-up SimTG model library
- Simulator Modeling tool is the next challenge!