Development of Generic AOCS Unit Simulation Models

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Agenda

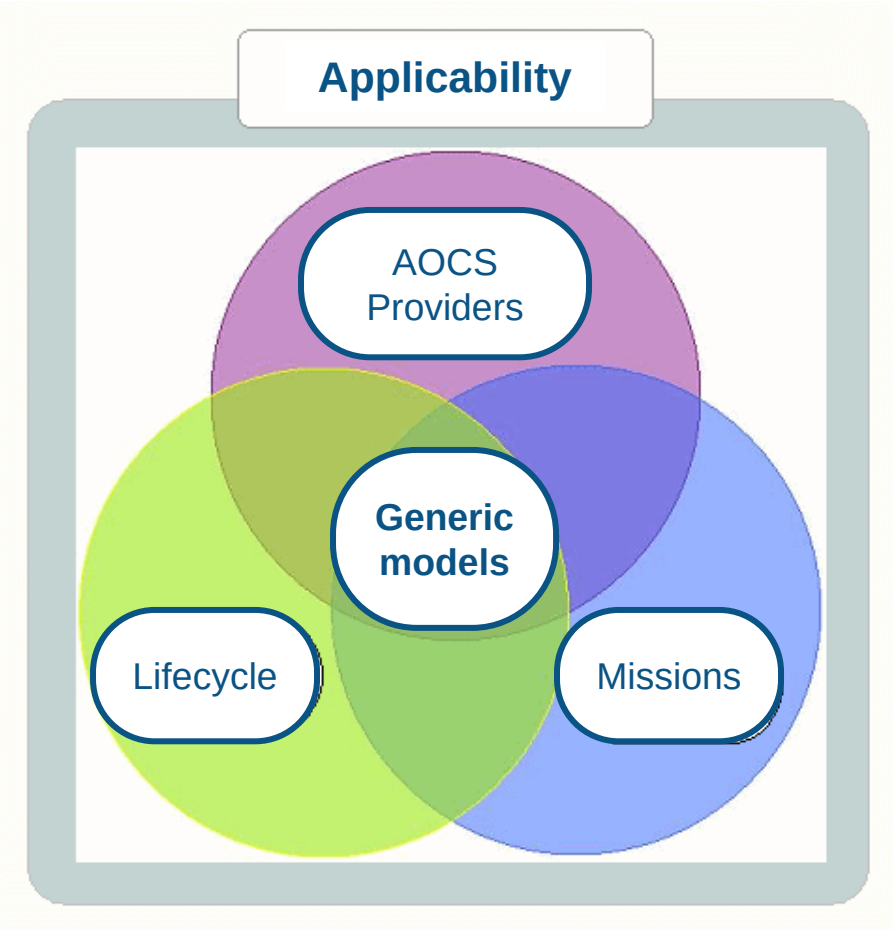
- Benefits of generic unit models
- Aims of project
- Project structure
- The output of the project
- Overview of model for each unit
- Demo of gyro model
- Conclusion

Benefits of Generic Unit Models

- To spacecraft customers/agencies & AOCS primes:
  - Shared models re-used over several projects
  - Validated models
  - i.e. reduction of cost and risk
- To AOCS unit suppliers:
  - Standardised frame for mathematical models
- To AOCS software, validation and test providers:
  - Reduction of learning time
  - Less adaptation needed if re-used models

Generic development recommended by ADCSS in 2007

Aims of Project



- Develop prototype generic unit models for:
  - Gyroscope
  - Star tracker
  - Reaction wheel
- Focus on functional core to be generic
- Validate:
  - Models against real hardware
  - Model usage on range of test benches
- Make available to industry

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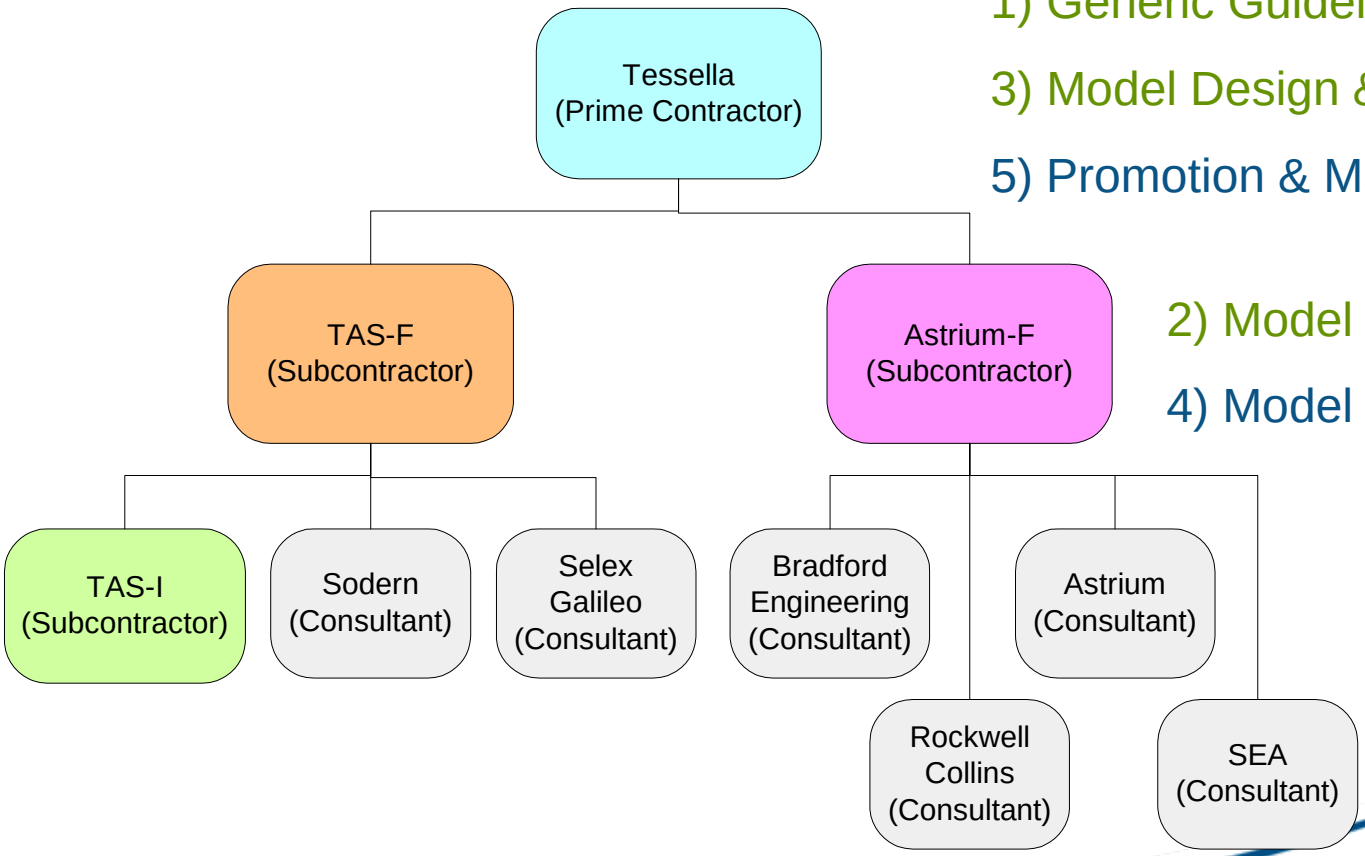
Project Structure (i)

- Project team



1) Generic Guidelines

3) Model Design & Development

5) Promotion & Maintenance Policy

2) Model Specification

4) Model Validation

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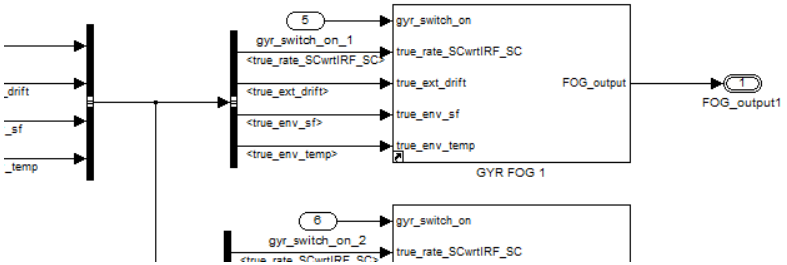
What software will be provided?

- Simulink Models
  - Reaction wheel
  - Star Tracker
  - FOG gyro & MEMs gyro



- C Models (autocoded from Simulink)
- Parameter Files
  - Validated tunings for two units for each model
- Acceptance Test Code

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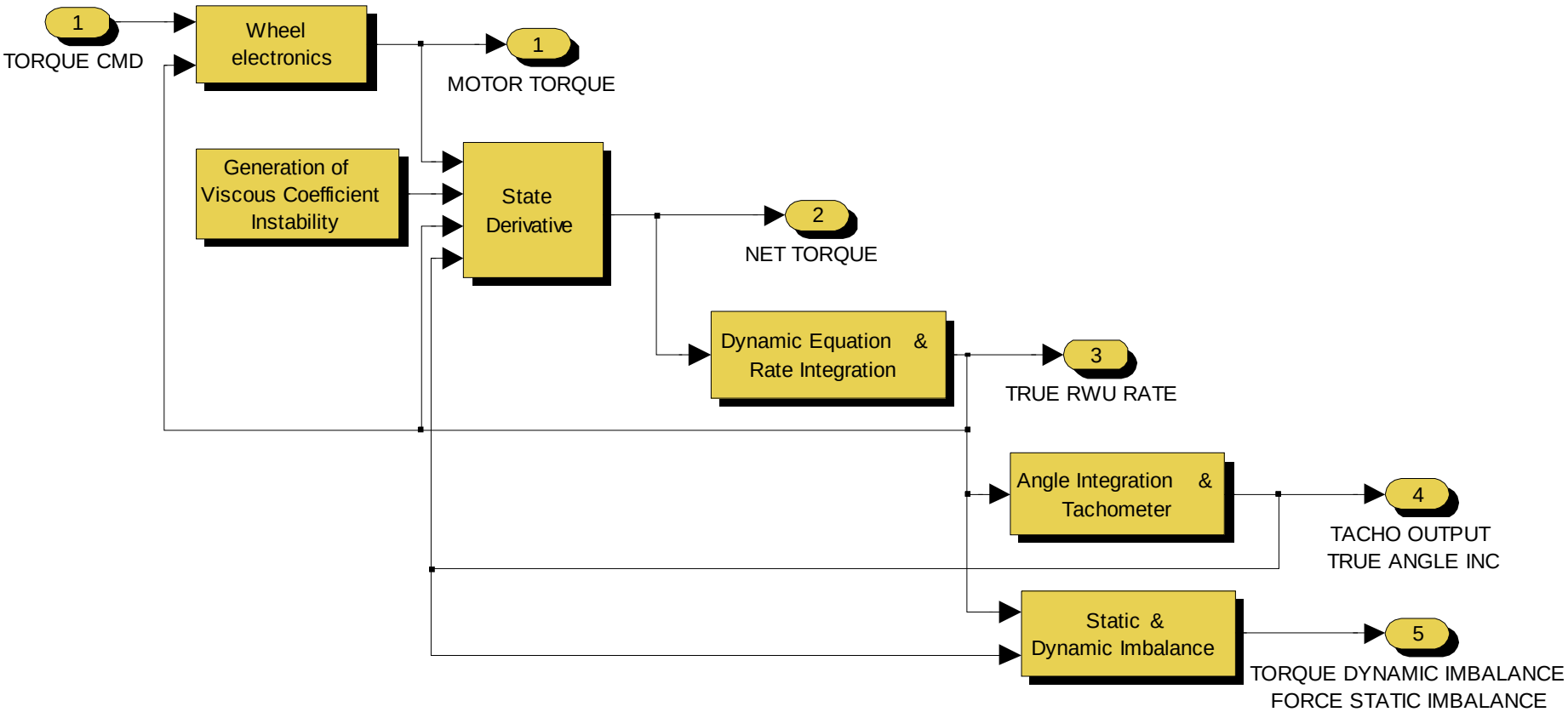
What documents will be provided to users?

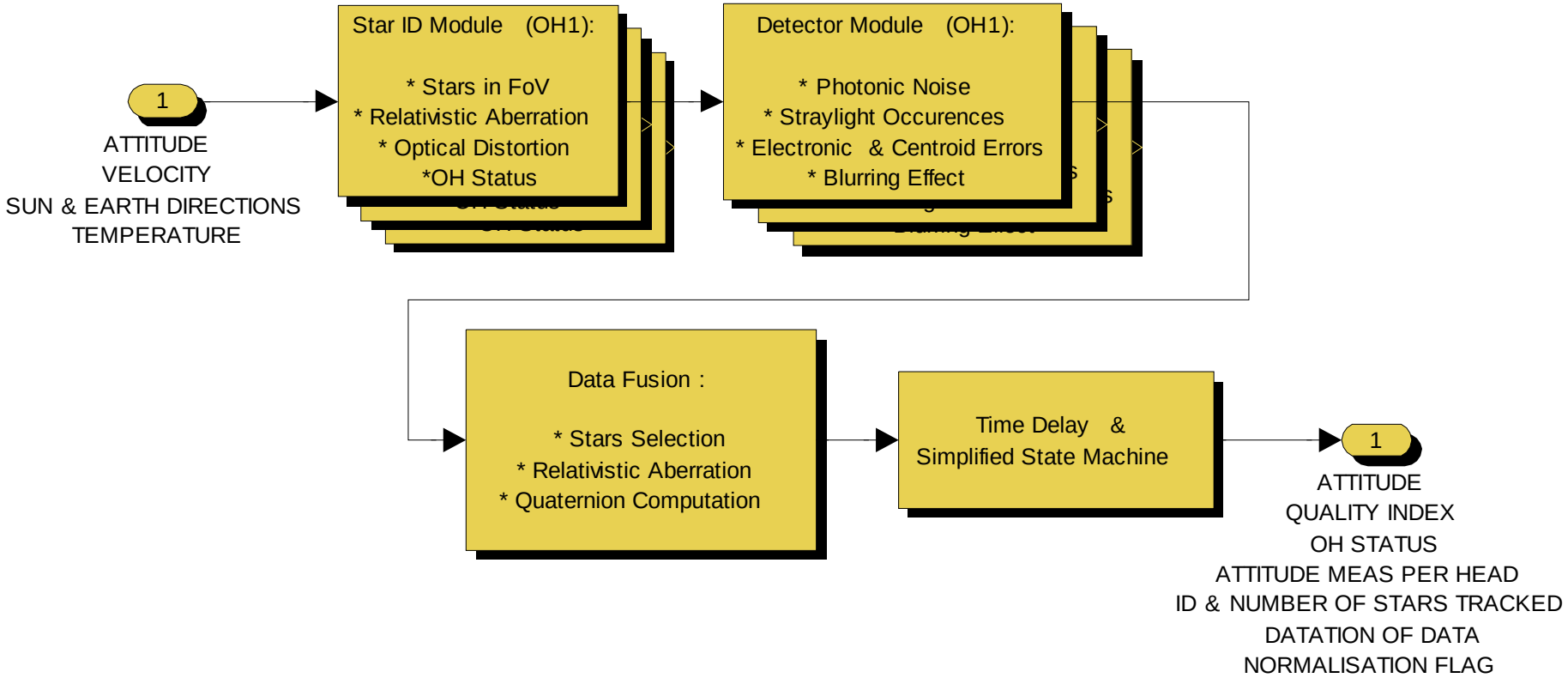
- User Manual
- Detailed Design Report
- Requirement Specification
- Acceptance Test Report
- Validation Plan
- Validation Test Report

Overview of the models for each unit

Reaction Wheel



Star Tracker



Gyro

Model\GYR_FOG.mdl

Conclusions

- Generic models will be available early 2012
- Successful development will bring many benefits to the European space industry:
  - Cost savings associated with re-use
  - Confidence in models
  - Standardization

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See also: ADCSS 2010 Presentation & GNC 2011 Presentation & Paper

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