

# Technology Harmonisation Dossier (THD) AOCS and GNC Systems (Cycle 2024.1)

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GNC, AOCS and Pointing Division (TEC-SA)

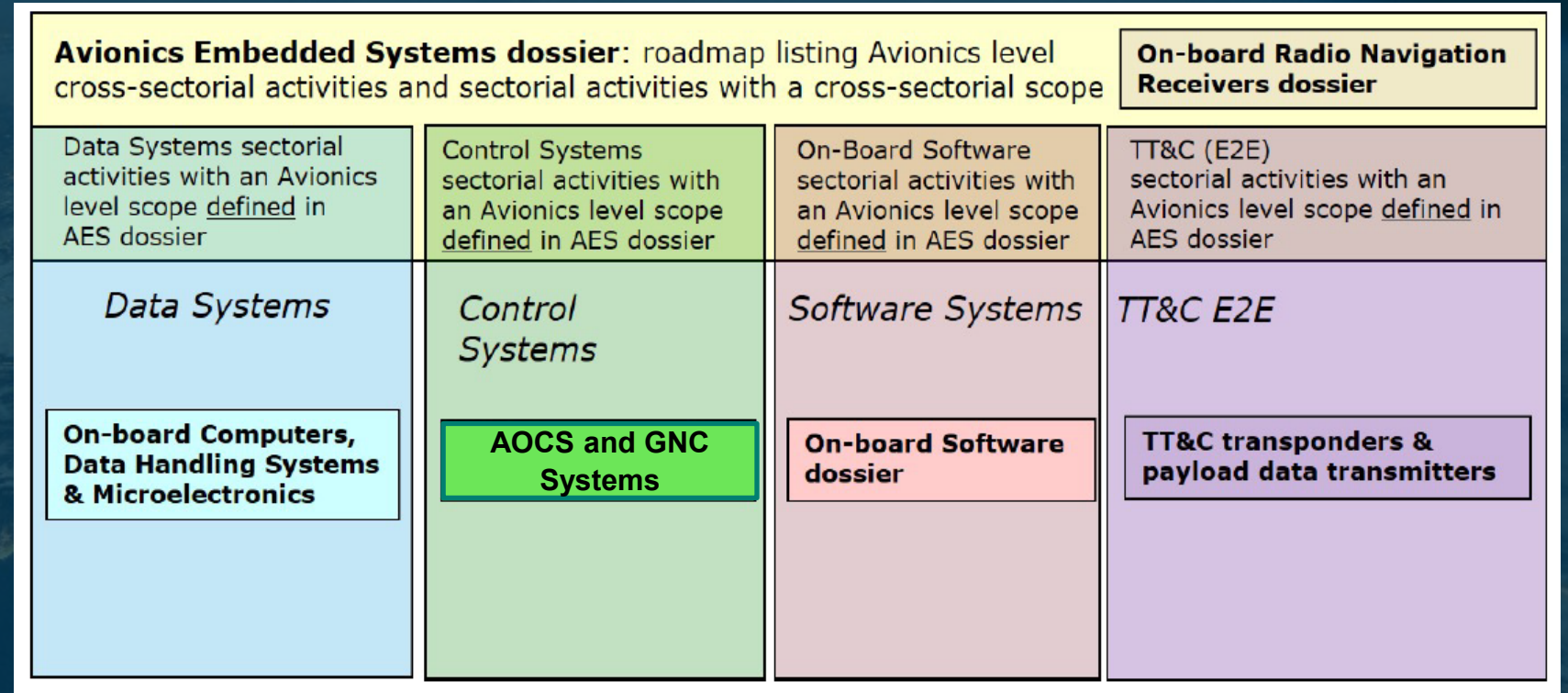
ESA ESTEC

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# AOCS and GNC Systems THD in Avionics Systems

## Technical Domains: AOCS and GNC SYSTEMS

- ✓ Sensors and Actuators
- ✓ Architecture
- ✓ AOCS/GNC Functions
- ✓ Verification
- ✓ Autonomy, FDIR (contr.)



1 - Overarching cross-sectorial : Avionics Embedded Systems (AES)  
 + 5 - THD per technical domain (vertical)

## AOCS and GNC Sensors

- APS Detectors for AOCS
- Star Trackers
- IMUs, Gyroscopes, Accelerometers
- Magnetometers
- Sun Sensors
- Earth Sensors
- Hybrid navigation systems
- Lidar
- Optical navigation

## AOCS and GNC Actuators

- Magnetic torquers
- Reactions Wheels
- Control Moment Gyros

## AOCS and GNC Systems

- ✓ Architecture
- ✓ Control
- ✓ Navigation and Estimation
- ✓ Guidance
- ✓ Verification and Validation (incl. modelling)
- ✓ Autonomy (AOCS and GNC contribution)
- ✓ FDIR (AOCS and GNC contribution)

New !

## Applications

- Telecommunications (GEO, MEO, LEO)
- Constellations (Observation, Telecommunication, Navigation)
- Earth Observation (LEO, GEO, VLEO)
- Meteorology (GEO, LEO)
- Science (observatories, planetology, solar physics, fundamental physics, formation flying)
- Exploration (manned, robotics)
- Navigation
- Micro, nano and pico satellites
- Launchers and upper stages
- In-orbit servicing, assembly and manufacturing (ISAM)
- Debris removal
- Planetary defence
- Space weather and awareness

AOCS and GNC Sensors and Actuators : per type of hardware, in continuity with prior version

AOCS and GNC Systems : Functional, Architecture and Process & Methods

- Develop **Guidance, Control, Navigation and Estimation** techniques, tools and methods for enhancing performance and robustness
- Develop **Guidance, Control, Navigation and Estimation** techniques, tools and methods for enabling **new classes and types of missions** (eg. ISAM, landing, re-usable launcher,...)
- Develop **AOCS and GNC** techniques, tools, methods and subsystem for **commercially-driven missions** (incl. nanosats and smallsats)
- Develop and expand **AOCS and GNC** components for enabling **more autonomy in future mission** (eg autonomous orbit manoeuvres, autonomous AOCS/GNC anomaly recovery, autonomous constellation )
- Contribute to the **zero-debris policy** and initiatives for **sustainability** at AOCS and GNC systems
- Explore and expand **AI techniques use for the benefit of AOCS and GNC systems and engineering**
- Contribute to Space development **digitalization** evolution for AOCS and GNC
- Develop AOCS and GNC systems **Simulation and Verification and Validation ecosystem**, with efficiency, risk-reduction and interoperability
- Prepare and Develop AOCS/GNC **benchmarks** and AOCS/GNC systems **demonstration models**

## AOCS and GNC Systems THD V0 has been released

Deadline for comments from Space Entities is end of day on 10 January 2024  
Dedicated invitation to the Mapping Meeting in January will be sent in the coming days

Mapping meeting on 2024, January 16<sup>th</sup>

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Thank you for your  
attention