



# The Electromagnetic Compatibility Section at ESA ESTEC

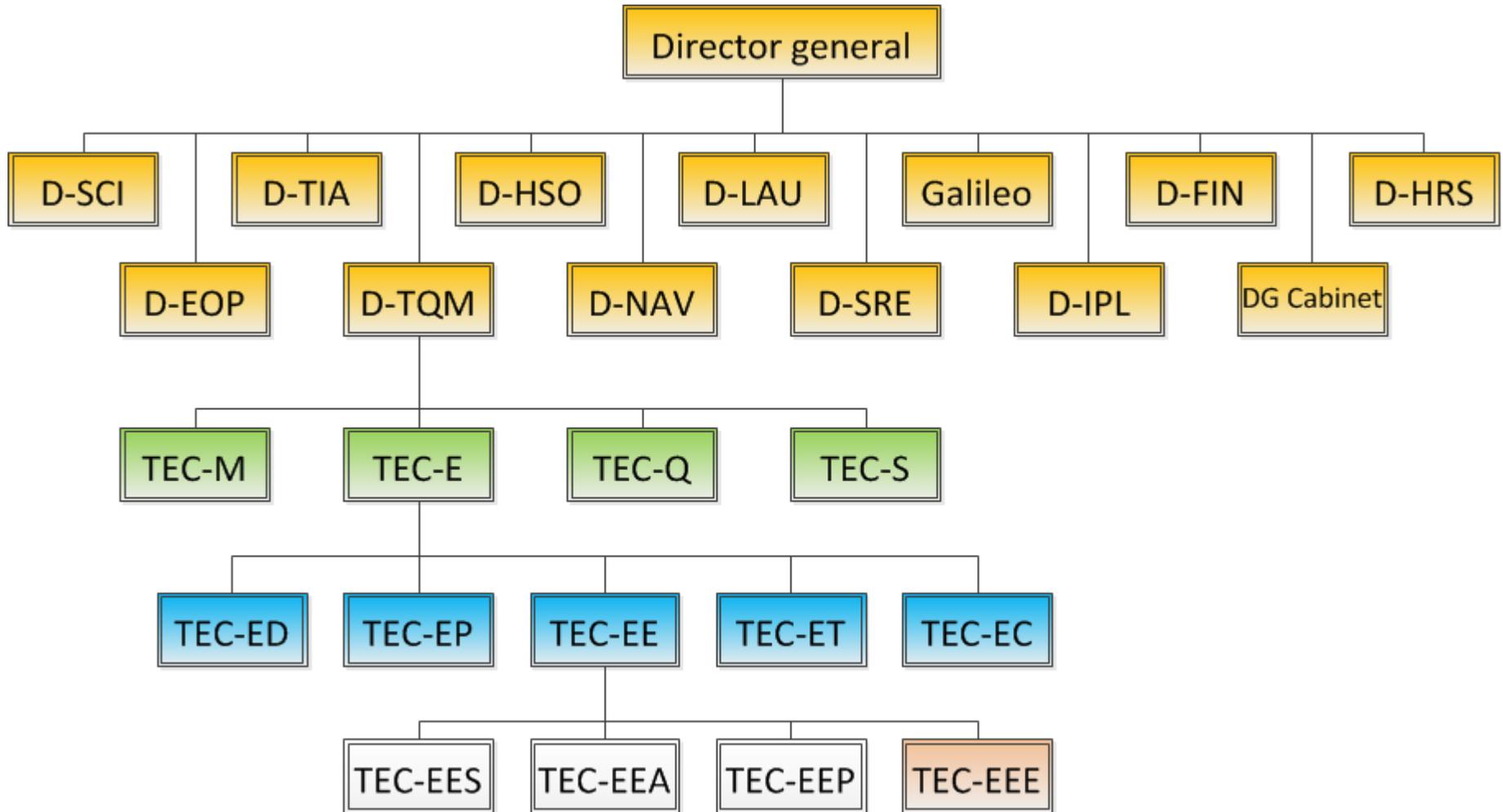


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European Space Agency

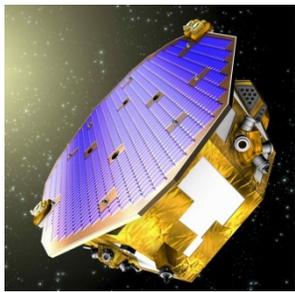
# Organigram



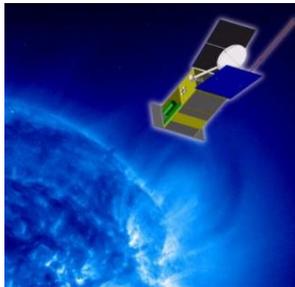
# Project Support (1)

The EMC section provides support to all ESA projects, ranging from small experiments to complete spacecraft.

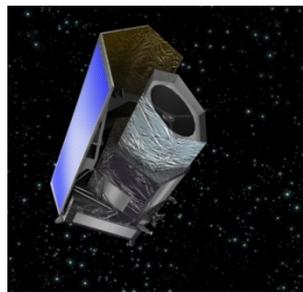
## Science



Lisa Pathfinder



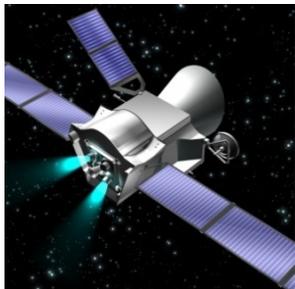
Solar Orbiter



Euclid



Juice



BepiColombo

## Earth Observation



Goce

CryoSat-2

Swarm

ADM Aeolus

EarthCARE

MTG

MetOp

Sentinel series

# Project Support (2)

## Telecommunication



Alphasat

## Navigation



Galileo

## Robotic Exploration



Exomars Rover



SmallGEO

# Project Support (3)

## Space transportation and Manned spaceflight



ATV



ISS / COLUMBUS



MPCV-ESM

## Launchers



IXV



Vega

Ariane5 ECA



## The TEC-EEE EMC test facility

Anechoic chamber size [m]	8.55 x 7.5 x 4.75 (l x w x h)
Control room size [m]	3.40 x 6.6 x 2.90 (l x w x h)
Freq. Range [MHz]	DC - 25000
Shielding factor at 10GHz [dB]	120
Temperature [deg C]	20 .. 24
Relative Humidity [%]	40 .. 55



## The TEC-EEE magnetic coil facility

- two pairs of squared Helmholtz coils for compensation of the local magnetic field (70cm x 70 cm x 70 cm)
- one pair of perm/deperm coils (3 Hz / ~3.5 mT)
- four 3-axis magnetometers and a turntable with motor drive
- Numerical software for magnetic modelling of equivalent (multiple) dipole moments

## The EMC section carries out research activities in the following areas:

- Magnetic cleanliness and magnetic measurements
  - Compact low noise magnetic gradiometer
  - Magnetic characterisation by rotational measurement (MCF\*) or multi-magnetometer snapshot
  - Multiple dipole modelling (MDM) by both deterministic non-linear optimisation\*\* and randomised search\*\*\*
  - Uncertainty analysis and budgeting of Multiple Dipole Models
  - Magnetic cleanliness budget management
- ESD
  - ESD test method for spacecraft equipment
  - Probability of latent failures caused by electro-static discharge

\* Mobile Coil Facility, featuring Earth field compensation by Helmholtz coils

\*\* Gauss-Newton, Levenberg–Marquardt

\*\*\* PSO = Particle Swarm Optimisation, ES = Evolutionary Strategy

## The EMC section carries out research activities in the following areas:

- Simulation and analysis
  - Advanced System Level Radiated Noise Analysis and Simulation for EMC
  - Open source cable models for EMI simulation
- Special test methods
  - Alternative approaches to radiated susceptibility testing at unit level
  - AC magnetic field verification methods
  - RS and antenna RF pattern tests in thermal vacuum chamber
  - Low frequency calibration of EMC current probes and loop antennas
- Not directly EMC related
  - Carbon fiber structure bonding
  - Multi Layer Insulation (MLI) bonding
  - Power Line Communication for Spacecraft (PLC)
  - Biological effects



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