

# Managing Supply Chain Risks in an International Organisation - European Space Agency

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# ESA Facts and Figures



- Over 50 years of experience
- 22 Member States
- Eight sites/facilities in Europe, about 2300 staff
- 5.75 billion Euro budget (2017)
- Over 80 satellites designed, tested and operated in flight



# Purpose of ESA



“To provide for and promote, for exclusively peaceful purposes, cooperation among European states in space research and technology and their space applications.”

Article 2 of ESA  
Convention



# Member States

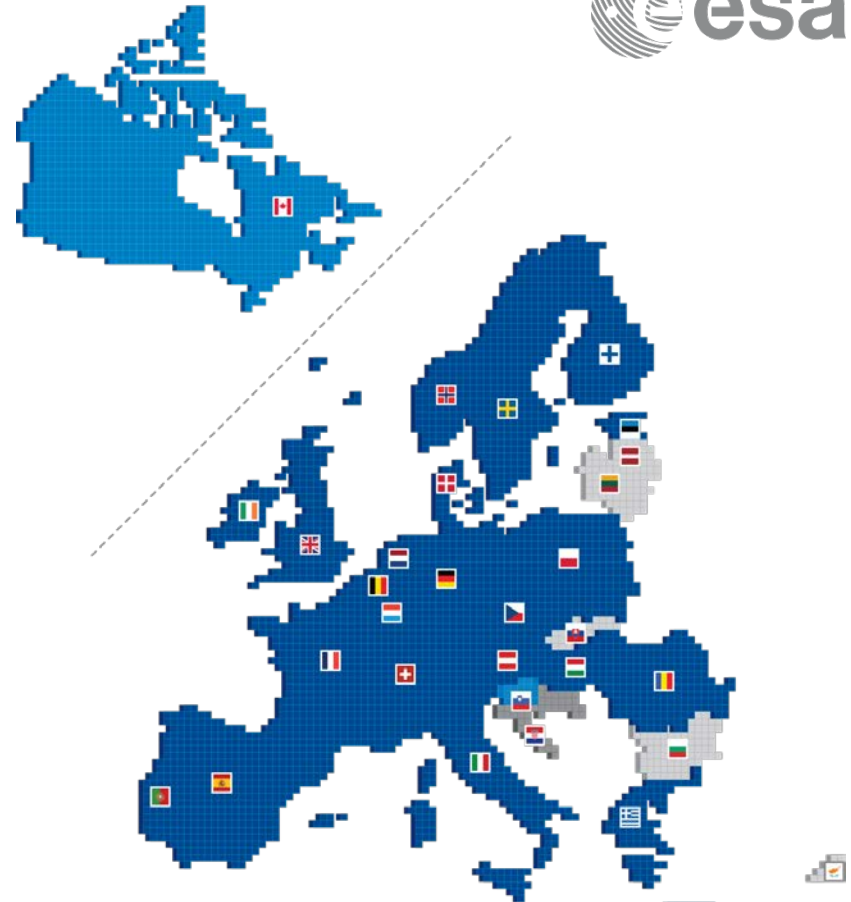


ESA has 22 Member States: 20 states of the European Union (Austria, Belgium, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Luxembourg, Netherlands, Poland, Portugal, Romania, Sweden, United Kingdom) plus Norway and Switzerland.

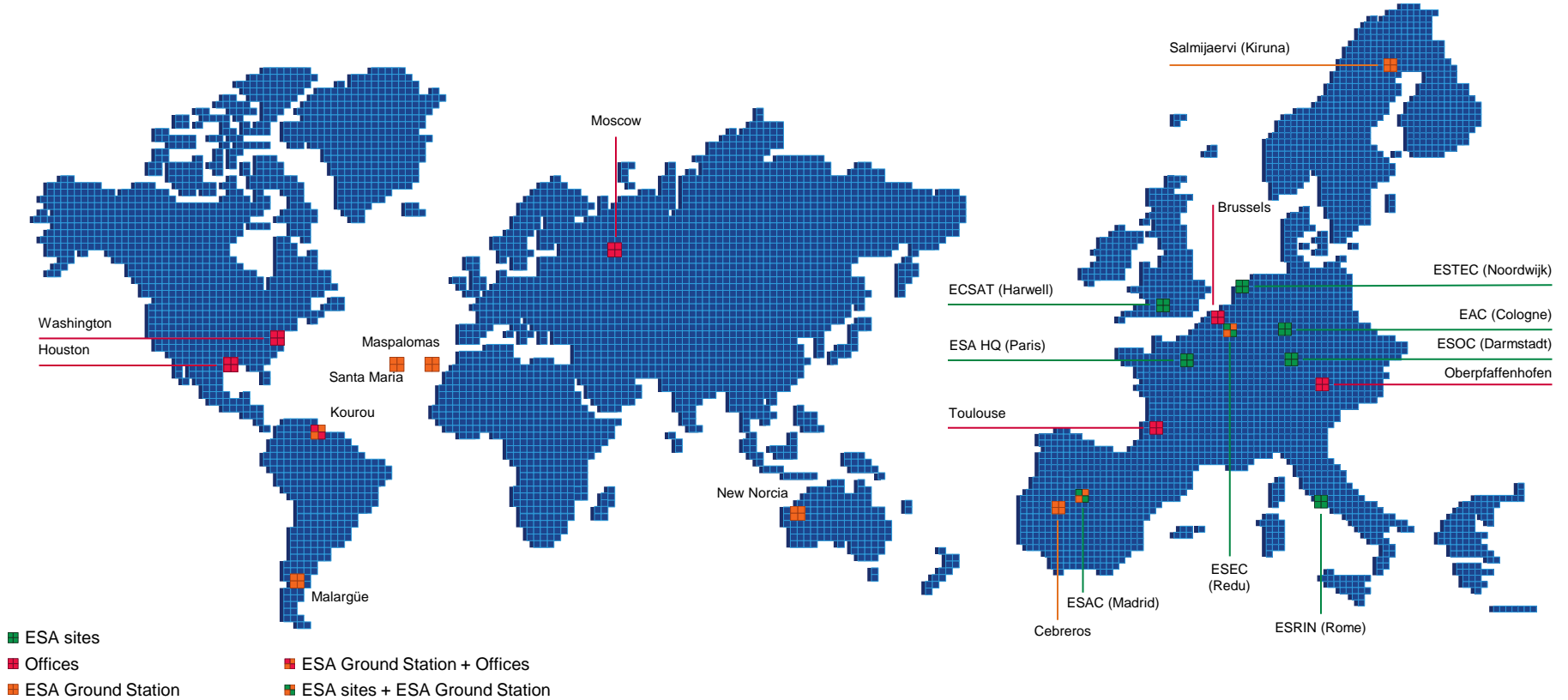
Six other European Union (EU) states have Cooperation Agreements with ESA: Bulgaria, Cyprus, Latvia, Lithuania, Malta and Slovakia. Discussions are ongoing with Croatia.

Slovenia is an Associate Member.

Canada takes part in some programmes under a long-standing Cooperation Agreement.



# ESA Locations

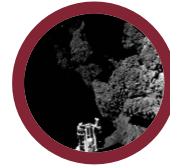


# Activities



ESA is one of the few space agencies in the world to combine responsibility in nearly all areas of space activity.

\* Space science is a Mandatory programme, all Member States contribute to it according to GNP. All other programmes are Optional, funded 'a la carte' by Participating States.



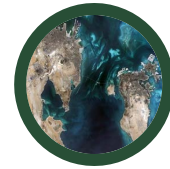
space science



human spaceflight



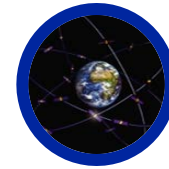
exploration



earth observation



space transportation



navigation



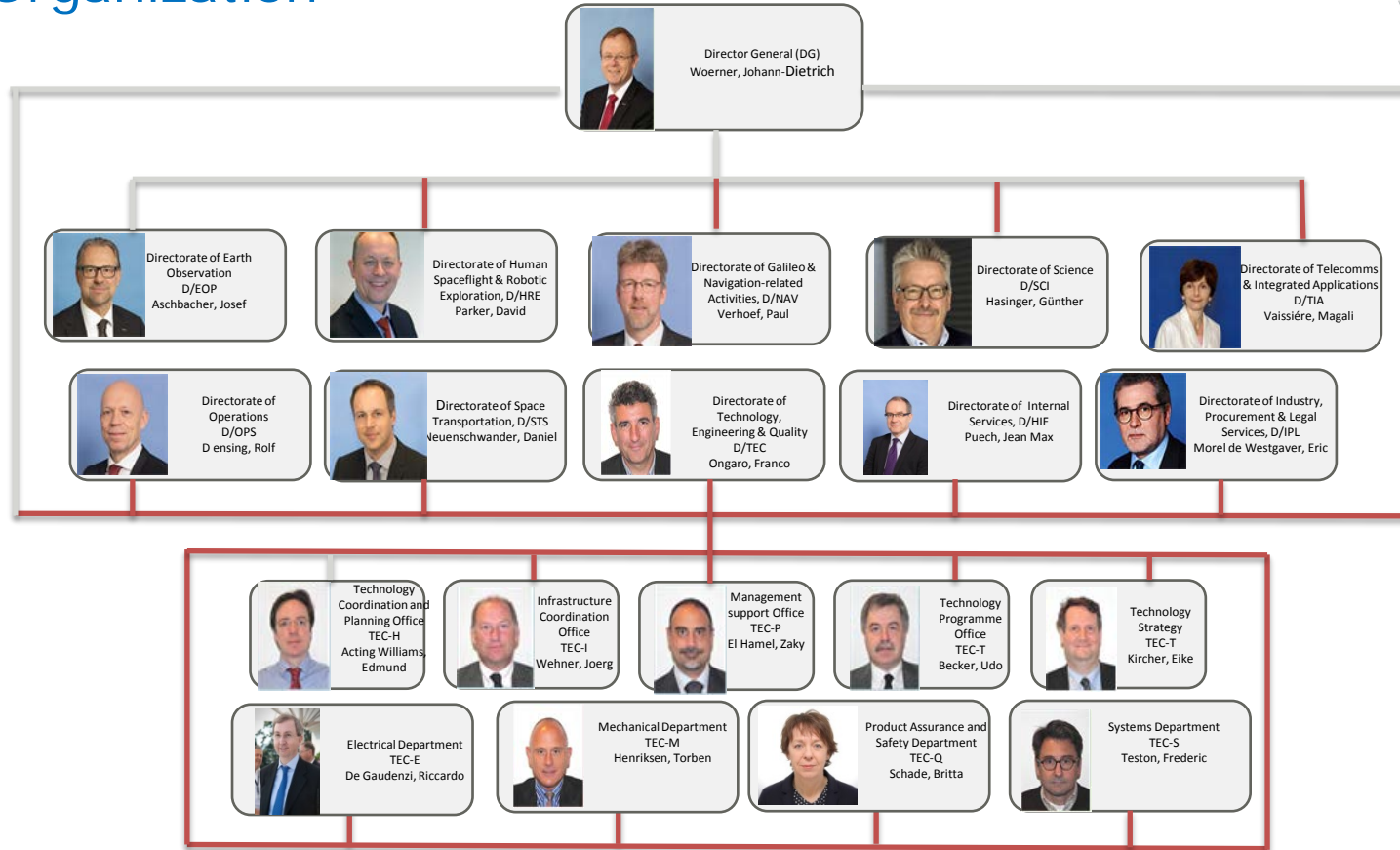
operations



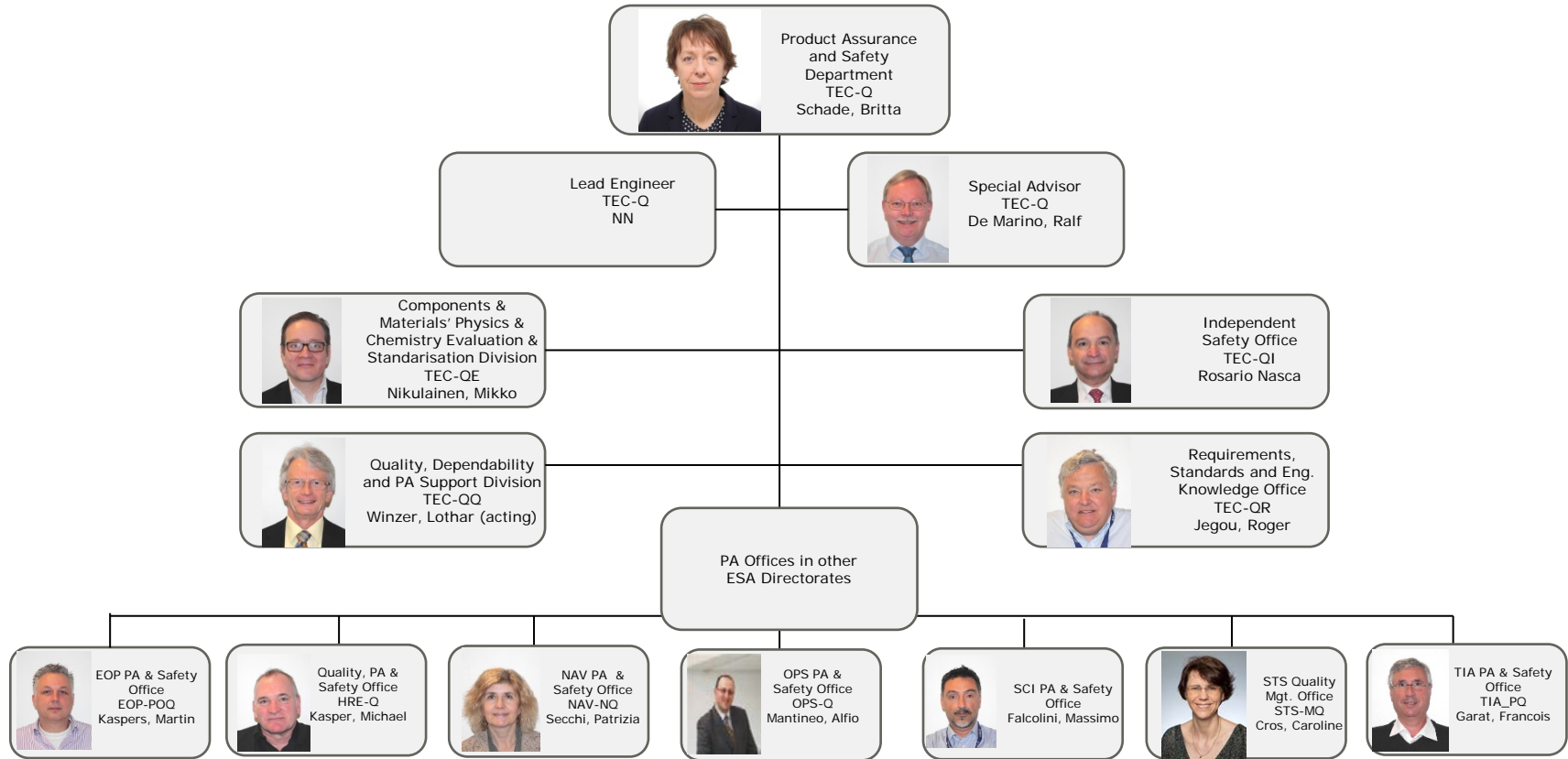
technology



telecommunications



# Product Assurance & Safety Department (TEC-Q)

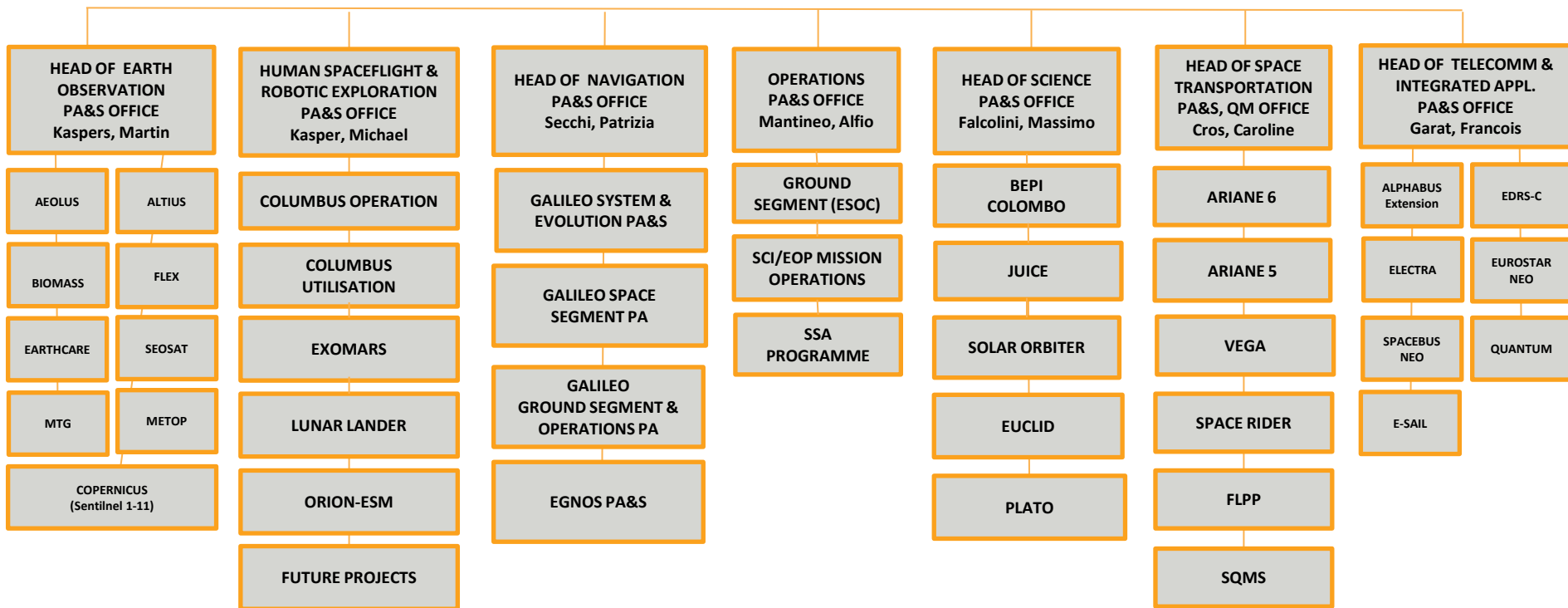




# TEC-Q PA ORGANIZATION

PRODUCT ASSURANCE & SAFETY DEPARTMENT  
Schade, Britta

QUALITY MANAGERS



# Product Assurance Management



- TEC-Q provides functional and integrated Product Assurance and Safety (PA&S) support to all ESA projects.
- PA&S Managers integrated in projects report directly to TEC-Q via Heads of PA&S Office in the respective Programme Directorates.
- PA&S Managers coordinate all PA disciplines with support from experts.





# PA Support to Technology Developments



- ESA manages technology programmes within different areas of activity.
- TEC-Q assures compliance with product assurance and safety requirements throughout the technology development lifecycle.
- PA&S support ensures the timely qualification of technology through the traceability and control of parts, materials and processes.
- It prepares future Equipment Qualification Status Review (EQSR) to provide relevant quality information, and planning acceptance of high-TRL products.

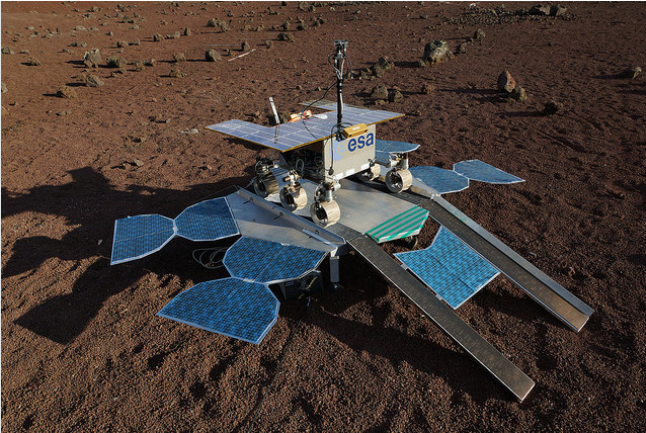
- Qualification of space materials, components and processes
- Failure analysis destructive and non-destructive
- Test chambers temperature, vacuum, radiation
- Analytical tools x-ray tomography, scanning electron microscopes, atomic force microscopes, gas chromatographs, mass spectrometers...)





## Registration, Evaluation, Authorization and Restriction of Chemicals (REACH):

- About 8-9% of space used materials and processes are currently affected by obsolescence risk in mid-term.
- REACH Office established in TEC-Q to support ESA projects in managing obsolescence risks and to cooperate with (inter)national partners and regulatory bodies. Its priority actions include:
  - Exemption from REACH authorization the use of hydrazine
  - Supply chain sustainability for chromate conversion coatings
  - Awareness and networking towards European industry
  - Support to industry and ESA projects for regulatory compliance



- The Independent Safety Office generates requirements/ standards and maintains the ESA Policy on Planetary Protection.
- It delivers technical support to ESA projects on matters of planetary protection, and approves the planetary protection categorization and requirements for ESA projects.
- The Office is certifying the compliance of projects with the planetary protection requirements.

# Independent Safety Office



## Human Spaceflight Safety

- NASA has the responsibility for the ISS Integrated Safety.
- ESA's Independent Safety Office is the NASA ISS delegated authority in Europe for ISS Safety Review and certification for ISS payloads, Columbus Subsystems and operations.
- The Office operates the ISS ESA Safety Review Panel composed by safety engineers and technical disciplines experts.



## Space Debris Mitigation

- The Office is generating requirements/standards and maintenance of the ESA Policy on Space Debris Mitigation in cooperation with the ESA Directorate of Operations.
- It is the ESA Technical Authority for the assessment of ESA Space Missions compliance to the ESA Space Debris Mitigation Requirements, and approves Space Debris Mitigation Plans and Reports.



- ESA projects apply ECSS standards, which are developed in cooperation with European industry and national space agencies.
- Project managers are responsible for tailoring ECSS standards. TEC-Q approves the tailoring of Quality standards.
- ESA controls activities, supports the standardization boards and provides the ECSS secretariat.
- Currently published 130 standards and 32 handbooks.







- European Space Components Coordination (ESCC) is operated by ESA and National Space Agencies under Executive Implementation Agreements.
- One of the main purposes is to ensure the availability of EEE space components under the qualification authority of ESA.
- ESA is responsible for the ESCC Secretariat and ESCC Executive Secretariat
- The ESCC Secretariat publishes updates of the Qualified Parts List (QPL), Qualified Manufacturer List (QML), and the European Preferred Parts List (EPPL) frequently.
- ESA is the administrator of the Specification System and the European Space Component Information Exchange System (<http://escies.org>)



About 85% of ESA's budget is spent on contracts with European industry.

ESA's industrial policy:

- Ensures that Member States get a fair return on their investment.
- Improves **competitiveness** of European industry.
- Maintains and develops **space technology**.
- Exploits the advantages of **free competitive bidding**, except where incompatible with objectives of the industrial policy.

# Main External Risks to the ESA Supply Chain

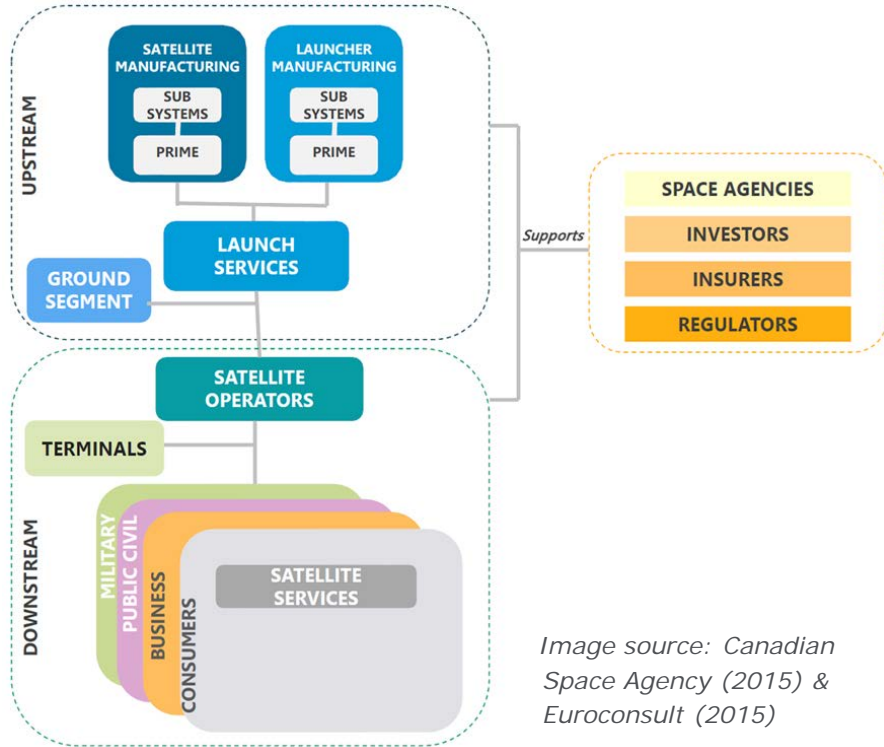


Image source: Canadian Space Agency (2015) & Euroconsult (2015)

- Dependency of “geo-return policies” may lead to the selection of low maturity suppliers.
- Suppliers may fail to acquire or sustain technical capabilities (e.g. expertise, facilities).
- Reliance on single source suppliers impacts sustainability of European space industry.
- Lack of visibility of the whole supply chain and related problems.
- Increased supply chain globalization and complexity, with further international constraints (e.g. ITAR/EAR, EU regulations).
- Corporate risks of the supplier can lead to reduced strategic interest (less investment), buyout/takeover from a 3<sup>rd</sup> party supplier, or financial difficulties/bankruptcy.

# Existing Supply Chain Risk Mitigation

All ESA PA Managers help to reduce and control the quality risks in their individual project supply chain. Some cross-cutting PA initiatives managed by TEC-Q include:

- Capability Assessments:
  - Software capability assessment
- Verification Schemes:
  - PA/QA Audits on request of ESA programmes
  - 3<sup>rd</sup> party certifications: e.g. EN9100, ISO9001, NADCAP
  - Quality and Safety Assurance: e.g. Test Centre Certification
  - Materials and processes: e.g. qualification of Printed Circuit Boards, Surface Mount Technology Verification
- Accreditation:
  - ESA Approval of Skills Training Schools
  - Lab accreditations to ISO/IEC 17025



# Main Internal Risks to the ESA Supply Chain

- Limited resources for the effective control of the ESA supply chain across all programmes/projects.
- Internal communication of supplier performance data across ESA Directorates has room for improvement.
- ESA Product Assurance data systems are not interconnected (often Project restricted) and do not follow an integrated workflow.
- Lacking a systematic approach to supplier evaluation and control based on established criteria.



# New Approach to Supply Chain Risk Management



**Objective:** Improve cost-efficiency in supplier management processes across the Agency.

**Concept:** Optimise processes risk-based approach, taking into account heritage.

- *Streamline* project specific PA&S monitoring for suppliers with demonstrated high capability
- Support suppliers achieve high capability with *improvement plans*

**Approach:** Establish a program to assess and monitor supplier capability to provide products and services in line with ESA requirements.

- Supported by prime suppliers.
- ESA internally agreed and coordinated

# The 4 pillars of the New Supply Chain Risk Management Approach



1

Optimize the use and consolidation of existing supplier data, using a centralised supplier database

2

Perform a risk analysis of critical suppliers of space programmes based on technical and contractual criteria

3

Incorporate supplier data and risk analysis in the procurement process

4

Improve the Agency-wide processes for the evaluation and monitoring of suppliers

The proposed new risk-based approach supports the successful supply chain integration, viewing the supply chain not as a fragmented entity but as a coordinated effort across ESA.

# Benefits of the New Approach

- Optimize the use of Agency resources
- Reduce monitoring (burden) on top performers
- Support insufficient maturity suppliers (improvement plans), leading to improved supplier performance
- Increase supplier capabilities and competitiveness
- Strengthen the integration, transparency and coordination across the supply chain
- Maintain and improve compliance with Agency requirements

