

ESA funding routes

How are ESA space missions funded?

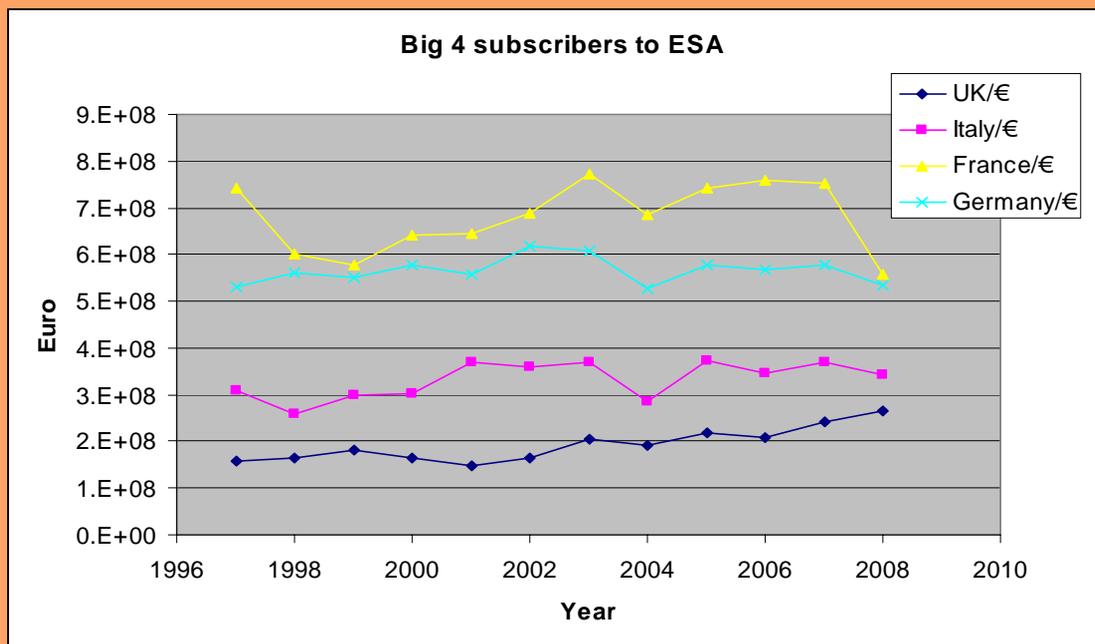
Rob Scott

3/6/2008

Centre for EO Instrumentation

Budgets for ESA

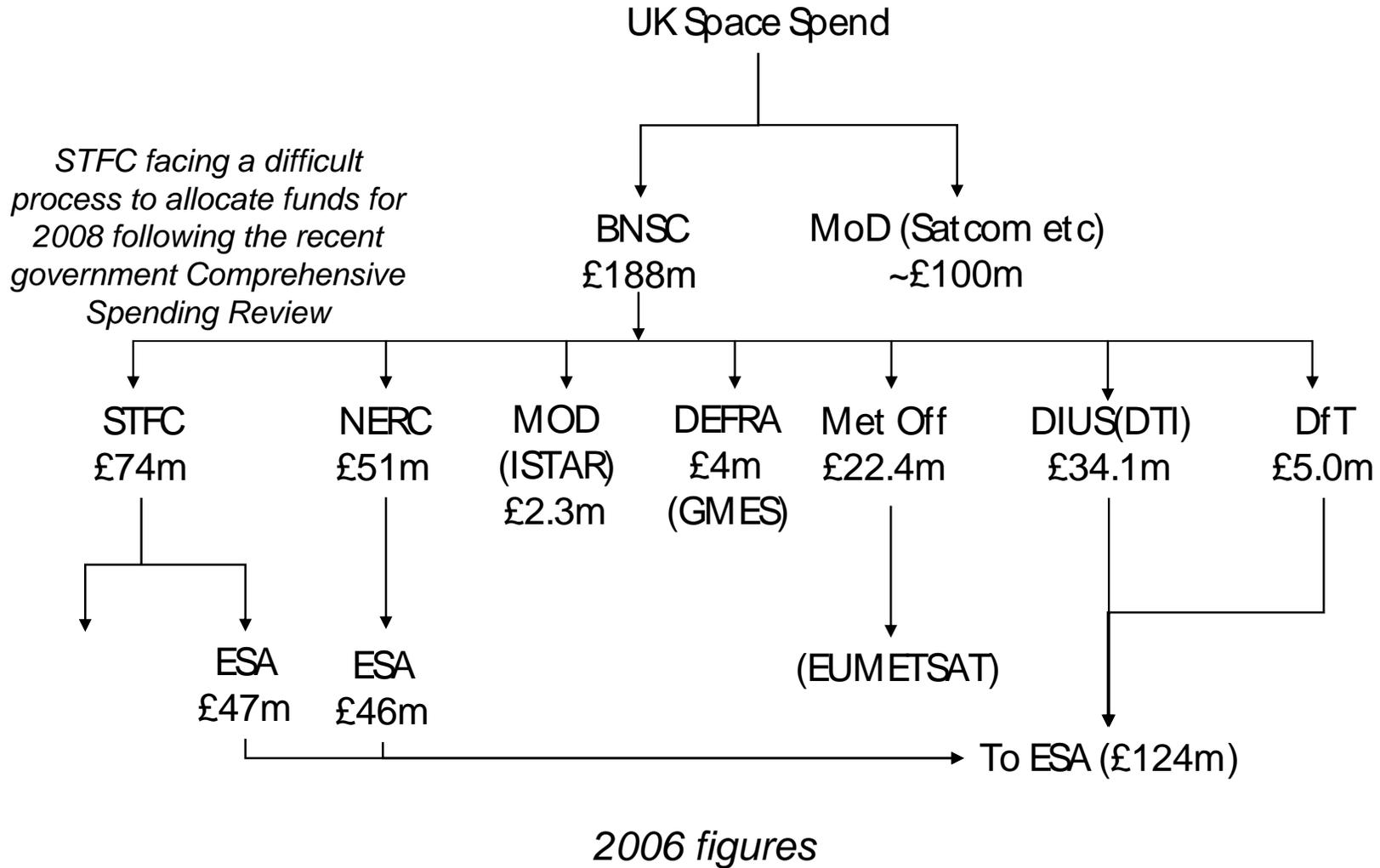
- ESA budget for 2007 was €2,975M, or around £2 billion. For 2008 this has grown to €3,028M - this should be compared with the US (NASA) annual budget of over £8 billion
- ESA's budget is made up of contributions from all of its 17 Member States (shortly to increase to ~23 and above)
- Of the 17 Member States, the largest contributions come from France, Germany, Italy, and the UK, with Spain gaining ground



Member states contributions

- The contributions of the ESA Member States is set every 3 years at the Council of Ministers meetings (next one is November 2008).
- Member States subscribe to activities and a common set of programmes related to Space Science: - **mandatory programmes** – subscription is related to GNP
- In addition, members chose the level of subscription to **optional programmes**:
 - **Human space flight and exploration**
 - 🇬🇧 UK supports only robotic exploration – e.g. EXOMARS
 - **Microgravity research**
 - No UK support
 - **Earth observation**
 - 🇬🇧 UK supports EO
 - **Telecommunications**
 - 🇬🇧 UK partially supports the Telecomms programmes
 - **Satellite navigation**
 - 🇬🇧 UK partially supports the Navigation programmes
 - **Launcher development**
 - No UK support

Where does the UK cash come from?



The ESA Business Model

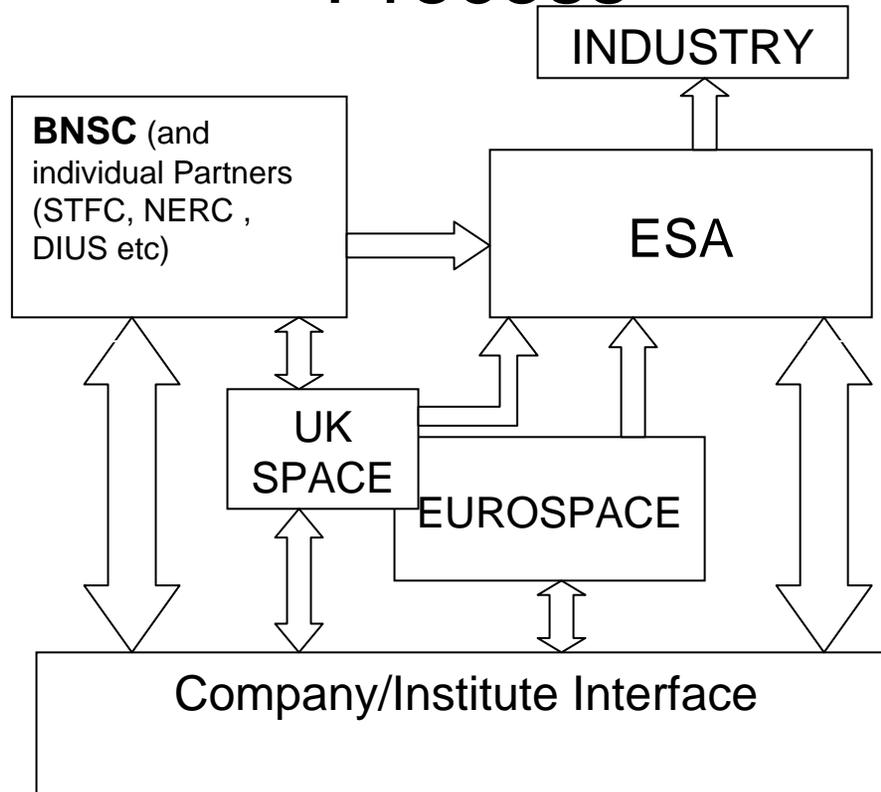
- The primary principle is the 'Juste Retour' mechanism. Member States can only access contracts (more or less) to the value of their delegations subscriptions.
- National Delegations of the Member States lobby for their interests within the Agency, and the Agency will pressure the delegations to increase their national contributions in order to complete expensive programmes.
- ESA use a 'best practice' procurement model, which involves open competition invitations to tender (ITTs). A comprehensive list of opportunities is displayed on the Agency's EMITS web based tender management system.
- Accessibility - All ESA programmes are accessible via open competitive tenders, or in special circumstances, directly negotiated tenders.
- Established Evaluation Criteria and Methodologies. The tender placement and review process is highly developed and on the whole extremely professional and fair.
- To access ESA programmes, and to create new activities and programmes, it is essential to lobby at all levels.

Doing Business With ESA: UK Lobby Process

Contracts

Funding

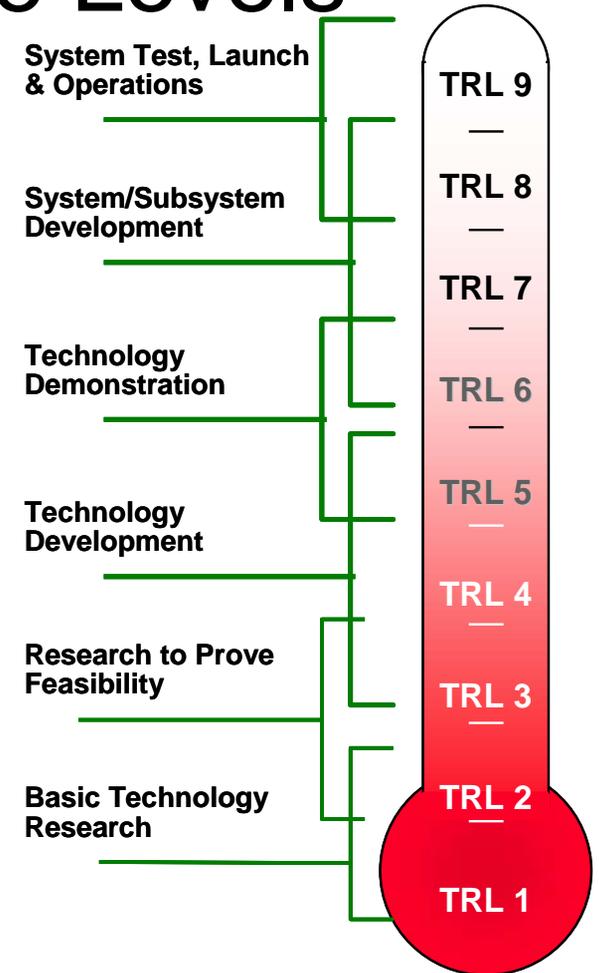
Lobby/
Information



ESA Technology Reference Levels

- A measure of maturity of technology for use in space

9	Actual system “flight proven” through successful mission operations
8	Actual system completed and “flight qualified” through test and demonstration (Ground or Flight)
7	System prototype demonstration in a space environment
6	System/subsystem model or prototype demonstration in a relevant environment (Ground or Space)
5	Component and/or breadboard validation in relevant environment
4	Component and/or breadboard validation in laboratory environment
3	Analytical and experimental critical function and/or characteristic proof-of-concept
2	Technology concept and/or application formulated
1	Basic principles observed and reported



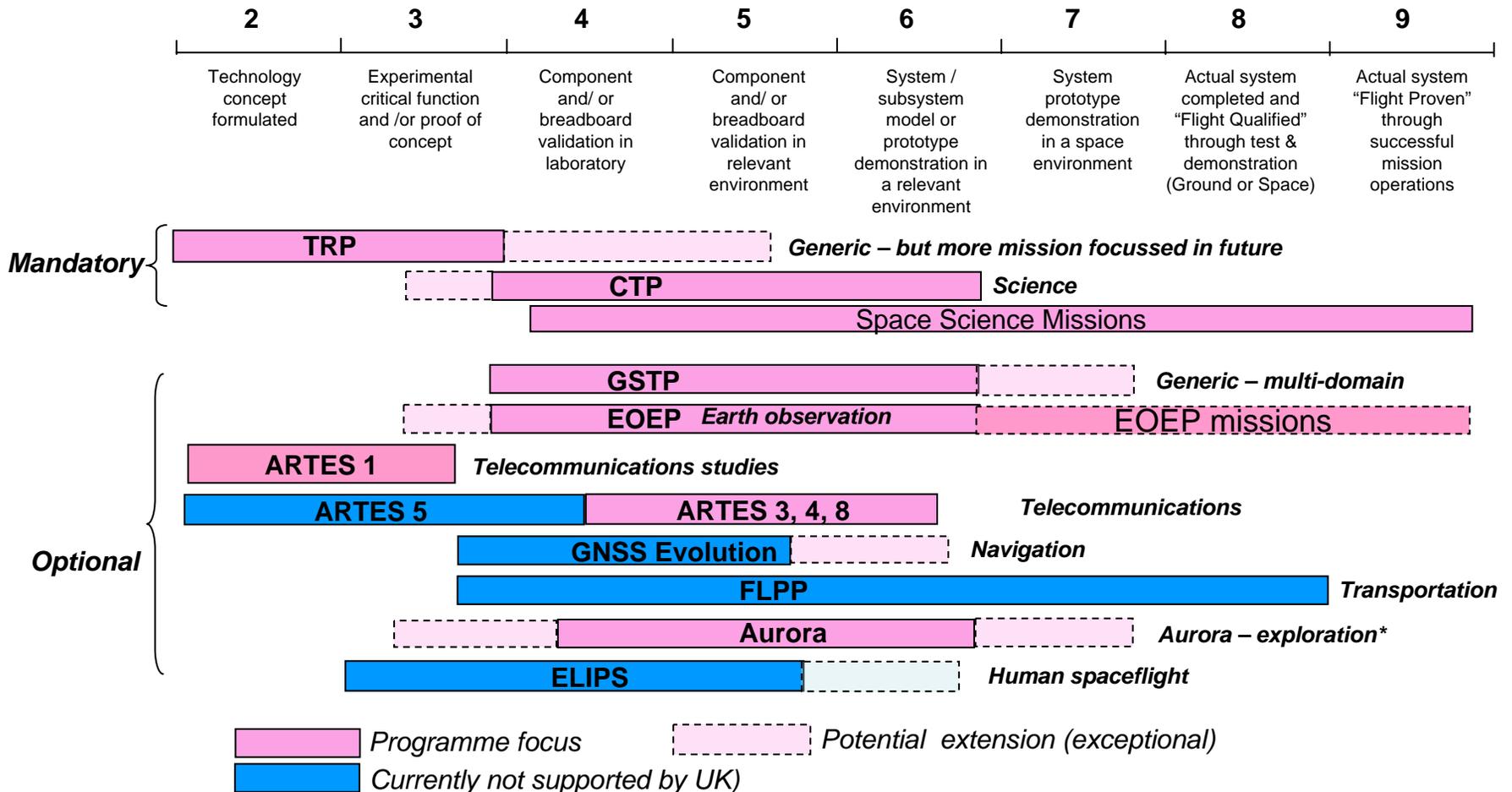
ESA programmes

(we shall examine a few in detail)

- **TRP – Technology Research Programme**
- CTP – Core Technology Programme
- GS – General Studies Programme
- **GSTP – General Support Technology Programme**
- ARTES – Advanced Research in Telecommunications Systems
- **EOEP – Earth Observation Technology Programme**
- GMES – Global Monitoring for Environment and Security
- GNSS Evolution – Sat Nav
- Aurora – Solar system exploration
- IAP – Integrated Applications Programme
- FLPP – Future Launchers Preparatory Programme
- ELIPS – European programme for Life and Physical Sciences

ESA's Technology R&D Programmes

Technology programmes versus Technology Reference Levels (TRL)



Technology Research Programme (TRP)

The Technology Research Programme is the only ESA technology programme supporting all of ESA's fields of activity, providing the technological nucleus for most future developments. As such it represents the backbone of ESA's innovative efforts.

TRP is part of the mandatory programme

TRP addresses lower TRL level activities, up to roughly TRL-3. TRP usually feeds into the GSTP programme and/or directly into missions, depending on the maturity and perceived risk in developing the technology in time for a specific mission.

TRP addresses too low a TRL for some of our mainstream CEOI activities but is a very good target for new technologies, and may be a natural partner for 'proof of concept' activities, i.e. CEOI seedcorn activities

Technology Research Programme (TRP)

- *Assess innovative/prospective technologies - high development risks - high potential payoff - usefulness for space applications*
- *Enable ESA space missions by demonstrating the feasibility of technologies required for these missions.*
- *Demonstrate feasibility of technologies of general interest to all ESA projects and programmes. NB: becoming more mission-focussed now*

ENGAGEMENT

- *TRL Targeted: from 2 to 3*
- *Procurement policy: Open Competitive (DN possible but rare)*
- *Funding rule: 100%*
- *Total yearly budget (06): ~40 M€*
- *Call for ideas: Internal*
- *Invitation to tender: Continuously throughout the year on EMITS, beginning few months after programme approval*
- *Key dates: Yearly work programme approval in January IPC (updates are also possible)*
- *Programme Manager: Eike Kircher (TEC-SRB)*
- *Cycle: 3 Year Work Plan with yearly updates*

General Support Technology Programme (GSTP)

The Goal of GSTP is to improve efficiency & competitiveness of European industry R&D & by preparing technologies for ESA programmes, & supporting coordination & harmonisation of technology R&D activities - both at national & Agency levels.

GSTP often follows TRP projects, and is used to take technologies forward to preliminary space qualified state (to TRL4-5), i.e. ready for onward development and inclusion within a space mission.

GSTP is an optional programme, and funding must be arranged with the national delegations.

- **Upside:** It is possible to avoid competition if only one Member State subscribes, and there is only one bid. I.e. a company can pursue development in collaboration with BNSC on an exclusive basis
- **Downside (1):** Often difficult for industry as it is (normally) 50% funded if a Direct Negotiation, i.e. it must invest some of its own money to transition from TRP to mission money.
- **Downside (2):** If there is competition, either nationally, or internationally with other nations subscribing, then 100% funding is allowable, but competitive bids are required. This is difficult for the National Delegations as they must find twice as much money.

- *Pre-development & qualification of identified technologies required by future space projects*
- *Bridges the gap to user programmes, developing generic/cross-cutting technologies, elements for scientific payloads & instruments, & pilot projects.*
- *In-orbit demonstration activities & certain technology transfer projects may also be supported.*
- *Can also cover exceptional issues, e.g. reusable Space Transportation & Atmospheric Re-entry Technologies.*

ENGAGEMENT

- *TRL Targeted: from 3 to 5 (Higher if an In Orbit Demonstrator Mission)*
- *Procurement policy: Open Competitive (DN possible)*
- *Funding rule: 100% (up to 50 % in DN also possible). One important aspect of the GSTP programme is that individual activities in the plan must be supported by the National Delegation for a contract to be awarded to an industry of that Nation.*
- *Total yearly budget (06): 59 M€*
- *Invitation to tender: Continuously throughout the year on EMITS beginning few months after programme approval*
- *Cycle: 3 Year Plan with yearly updates*
- *Key dates: Yearly work programme approval in January IPC (updates also possible)*
- *Programme Manager: Udo Becker (TEC-SRS)*

Earth Observation Envelope Programme (EOEP)

- The Earth Observation Envelope Programme, is ESA's primary programme and funding line for Earth Observation missions, and also related technologies. It is a major target for CEOI. EOEP is the backbone for implementing ESA's Living Planet Strategy.
- EOEP is an optional rolling programme, approved periodically at the Ministerial Council meetings, and is run by ESA D/EOP.
- EOEP missions are normally defined & executed with involvement of the science community, involving a peer-review selection process.

- Scope of EOEP includes research-oriented Earth Explorer missions (Core Missions & Opportunity Missions) & the preparation of operational service-oriented Earth Watch missions e.g. for GMES.
- Technology development within EOEP includes sensor technologies & algorithms in the following areas (**directly mapping to CEOI aspirations**):
 - ultraviolet to microwaves sensors to probe the Earth atmosphere
 - long wavelength radars in P- and L-band to penetrate Earth's vegetation, soil and ice
 - radars in C-, -X and Ku-band for surface sensing
 - optical super/hyper-spectral sensors to map the Earth surface status and composition
 - laser and microwave altimeters/LIDARS
 - gravity gradiometers and magnetometers.

ENGAGEMENT

- **TRL Targeted: from 3 to 6 – to 9 for missions**
- **Procurement policy: Open competitive (Direct negotiation possible, but rare)**
- **Funding rule: 100%**
- **Total yearly budget (06): 11 M€**
- **Invitation to tender: Continuously throughout the year on EMITS beginning few months after programme approval**
- **Key dates: Yearly work programme approval in January IPC**
- **Programme Manager: R. Zobl (EOP-P), S. Briggs (EOP-S), G. Kohlhammer (EOP-G)**