

# Why ESA is promoting Academia and Industry Partnership? And how?

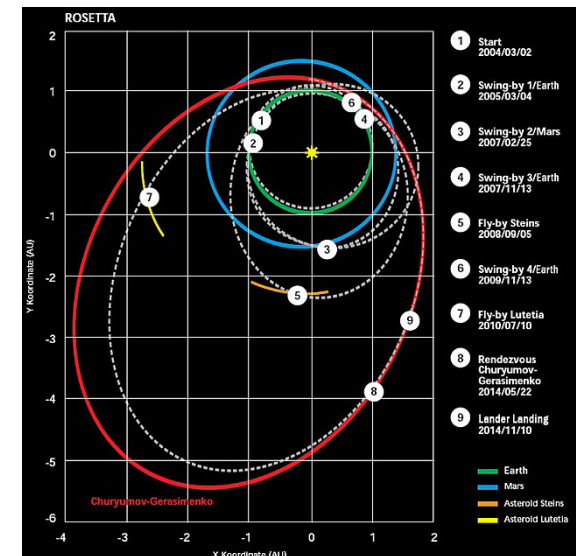
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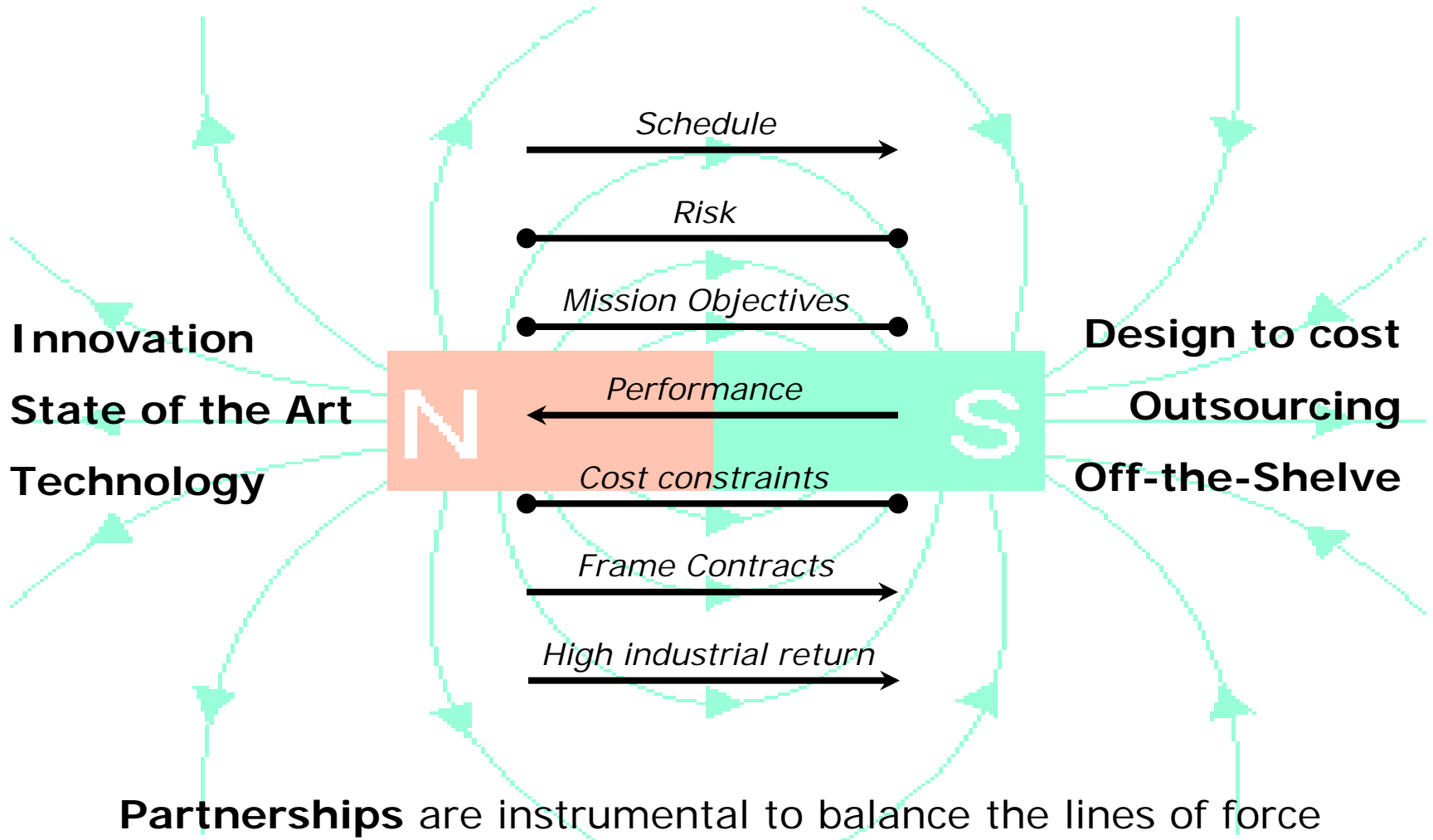
# ESA is a Technical Agency



- Ambitious missions need:
  - The ability to define, implement and verify **complex technical systems** together with the ability to manage the work .... With **limited** resources
- ESA needs:
  - Knowledge on **suitable enabling technologies, processes, tools**
    - to initiate, define, lead, develop critical technologies
  - Hands-on technical and managerial **competence**



- Needs to “produce” high quality results
  - At lowest price
  - Low risk
- Needs to implement
  - max. industrial return (>90%)
  - Geo-return and harmonisation principles at European level
  - Suitable work shares with National Space Agencies



- **Operations** are by tendency conservative (cost, risk, schedule)
- **Innovation** and new technologies are perceived as potential trouble makers for projects (as long as they are not enabling and validated)
- **External partners** (academia and industry) are vital to ensure:
  - Availability of new technologies
  - Innovative push technologies, methods, tools
  - Maintain and evolve technical competence in ESA and industry
  - Allow for a sane and sustained renewal of competences, personal, methods
  - Explore and take new avenues



- Technology strategies
  - **European Space Technology Master Plan (ESTMP)**
  - Collection, harmonisation, prioritisation of **technology requirements**
  - **R&T Activities** definition

Involving internal ESA, National Space Agencies, industry on a regular and structured basis

## Drivers:

- Technology spin-in
- Innovation and technology exploration  
(reservation outside immediate constraints of mission/user needs)
- Mutual build-up of expertise  
(e.g. bridging the gap between operations & advanced technology)
- Hook-up keeps the link with high-potential innovative communities  
(hamradio, cubsats, open source, automobile, telecoms, etc.)
- Prepare recruitments of future high-potential ESA staff

## **ESA cooperation tracks with Academia :**

- Internships, master thesis
- Young Graduate Programme
- Research Fellowship programme
- Network Partnering Programme (see next slide)

## **ESA cooperation tracks with Industry & Academia :**

- Innovation Triangle (inventor + developer + customer)
- Business Incubators (at all ESA sites, mainly SME)
- StarTiger (small “tiger team”)
- Technology Transfer Programme (TTP)
- GSP, TRP, GSTP with involvement of Academia



- **Strategic partnership** ESA↔R&T-Partners for engineering PhDs
  - Agreement between ESA technical division and equivalent R&T partner (e.g. university chair)
  - Reinforced contacts of key personnel, mutual awareness of competencies, interests, R&D areas
  - Direct contacts with first class junior R&T staff
  - Shared/agreed presence at ESA and R&D partner's premises, co-financing 50% / 50%, typically 3 years

# NPI Example: Operation of Autonomous Elements (ESA)



## Robotic Exploration:

- Signal delays
- Real-time requirements on surface
- Unstructured environment
- Sensory limitations

## Enabling Technologies for:

- Autonomous robotic elements
- Autonomous operations



# NPI Example: Operation of Autonom. Elements (TU Darmstadt)



- Autonomous robotic model system
- Behaviour controlled
- “Off-line” ground segment

Cooperation:

- PhD (NPI) on space operations for autonomous systems

# NPI Example: Operation of Autonom. Elements (TU Darmstadt)

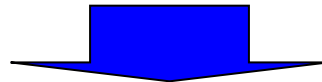


## R&T partner:

- Robotic system and know-how
- Autonomous operations concepts

## ESA

- Space operations concepts/experience
- Ground segment infrastructure



- Common / complementary development activity (Win/Win)
- Innovative and relevant use case
- Spin-back potential for terrestrial applications
- Show case cooperation

Partnerships with academia / industry for ESA are **instrumental** to

- **Balance the lines of forces** between traditional and innovative technology and processes
- Maintain and evolve a sane level of **in-house technical expertise** (interpersonal contacts and staff recruitments)
- Be linked to **non-space** developments and expertise
- Hook-up to highly **creative** specialists communities
- Implement R&T activities with a high degree of work delegation outside of ESA (**industrial return**)