

International cooperation in space science and exploration

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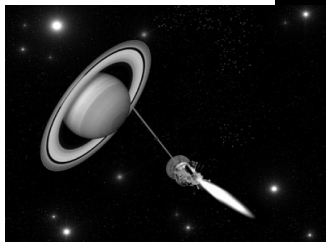
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- Motivations
- Problems
- Potential partners
- Cooperation options
- Models

Motivations for cooperation

- Access to wider base of experience, expertise, unique technologies and capabilities
- Sharing burden of program costs / increase of available resources
- Redundancy (in systems and infrastructure)
- Accomplishment of political goals
 - Prestige: Can we allow ourselves not to be onboard ?
 - Gap in technologies and capabilities acceptable ?



vs.

Large-scale projects



Case-by-case
cooperation

Problems in large-scale projects

- Stability of political commitments
- Influence on the program
- Share of benefits
- Involvement in critical path
- Technology transfer
- Industrial return

USA

- ± **US resources** devoted to space overwhelm all others
- ± **Technological superiority** in a number of areas
- Problems with stability of **commitments**
- ± Prospects for ISS ? Enabling factor!

- US can not be expected to develop legally binding instrument guaranteeing fulfilling of their **commitments**
- **Stability of program goals** cannot be ensured
- Europe's **influence on the cooperative exploration program's shape and course** may be limited (difference in level of invested resources)
- Problems with involvement in critical path may limit **technological scope** of European participation
- **Export control** regulations may hinder efficiency of cooperation
- In a long-term perspective problems related to **peaceful purposes** of the program may arise

Russia

- + Expertise
- Limited resources

- Political environment

Japan

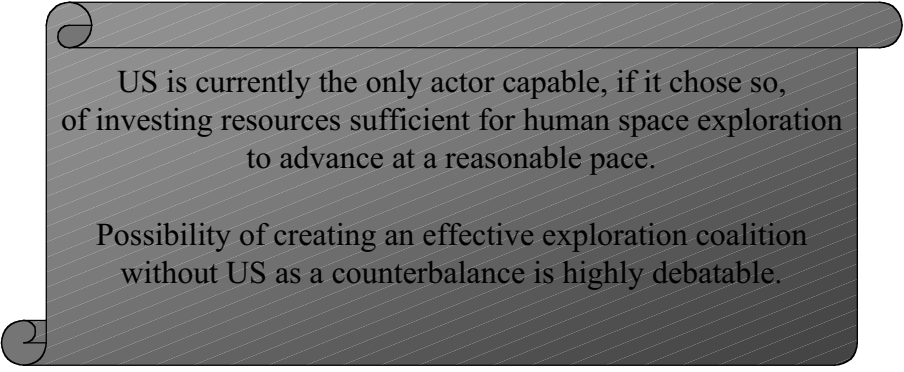
- Limited resources
- + Fulfilling its commitments

- Technical problems

China & other emerging powers

- + Apparent commitment to space activities
- Level of technical expertise

- Technology transfer ?

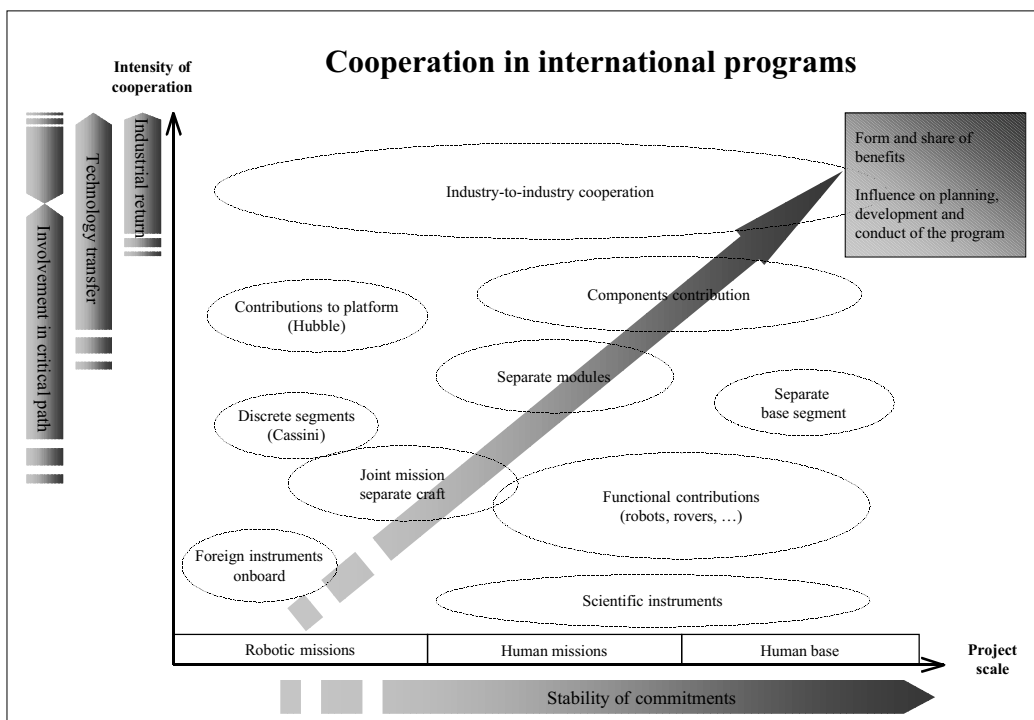
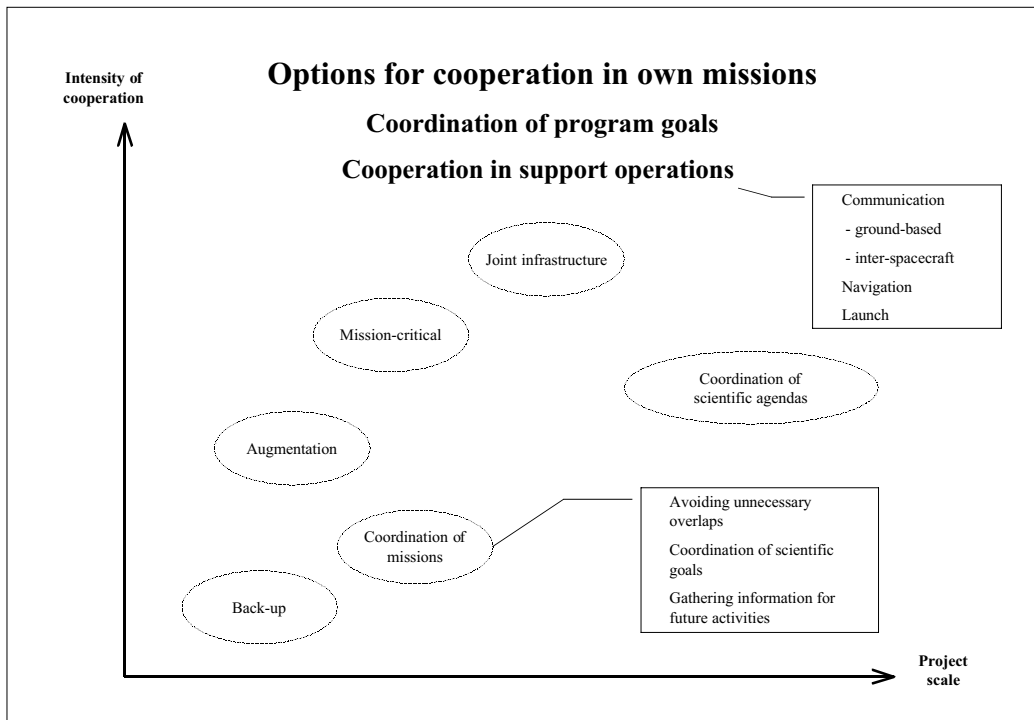


US is currently the only actor capable, if it chose so, of investing resources sufficient for human space exploration to advance at a reasonable pace.

Possibility of creating an effective exploration coalition without US as a counterbalance is highly debatable.

Cooperation options

- Coordination of program goals
- Cooperation in support operations
- International programs



There is no „silver bullet”. International cooperation requires flexibility and diversity of mechanisms.

Cooperation must follow definition of our own objectives. It should not be opportunity-driven.

Scientific specialisation

Science programs specialisation, where **partners take responsibility for solving particular problems** hindering exploration

E.g. ESA committing itself to research on Sun-Earth relations to extend understanding of those processes for the purpose of improved Solar radiation forecasts; and to develop Sun-satellite early warning system if possible. In exchange it would benefit from participation in other aspects of the exploration program.

International Agenda for Space Exploration

- **Coordinated roadmap** of exploration activities
 - a live, overarching, non-binding document
 - development and updating of the Agenda may:
 - Encourage and structuralise communication between potential partners
 - Represent a forum to identify potential synergies and explore cooperation opportunities
 - Facilitate coordination of programs and eventually also coordination of long-term strategies of exploration activities
- **International Scientific Agenda** as a first step

JSF model

- Problems from European perspective
 - **Sufficient influence** on
 - planning, development and conduct of the program
 - form and share of benefits
 - **Guarantee of return** of public resources to European contractors
 - Influence on **choice of work** to be realised in Europe
- Potential modifications
 - Separation of budget line for European contractors
 - Weight factor reflecting hi-tech value of contracts

ATV-derived vehicles

- Current environment
 - ISS utilisation remains priority for Europe
 - Retirement of Shuttle = no downmass and limited upmass capability
- **Synergy between ISS and Project Constellation cargo requirements**
- Family of ATV-derived cargo vehicles to
 - Provide upmass and downmass services for ISS
 - Meet upmass requirements for Project Constellation
 - Provide in future downmass capability for advanced phase of Moon exploration
- Wide scope of possible models of cooperation
 - Gov-gov; industry-to-industry; commercial participation, ...
- Benefits in a form of Project Constellation flight opportunities. Other options possible.

International cooperation in exploration

Expanding the number of states involved in space exploration (even in limited scope) enlarges the international constituency that may expect long-term benefits from space activities, creates the feeling of “ownership” of space exploration and minimises the opposition.

In a long-term perspective cooperation limits the risk that conflicts of interests, which will inevitably emerge, will evolve into more serious issues capable of undermining international stability.