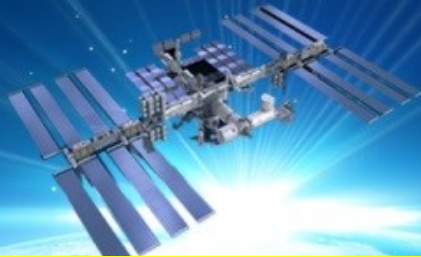


Istituto Nazionale di Astrofisica
Radio Astronomia



Bologna, 18 e 19 Maggio 2018

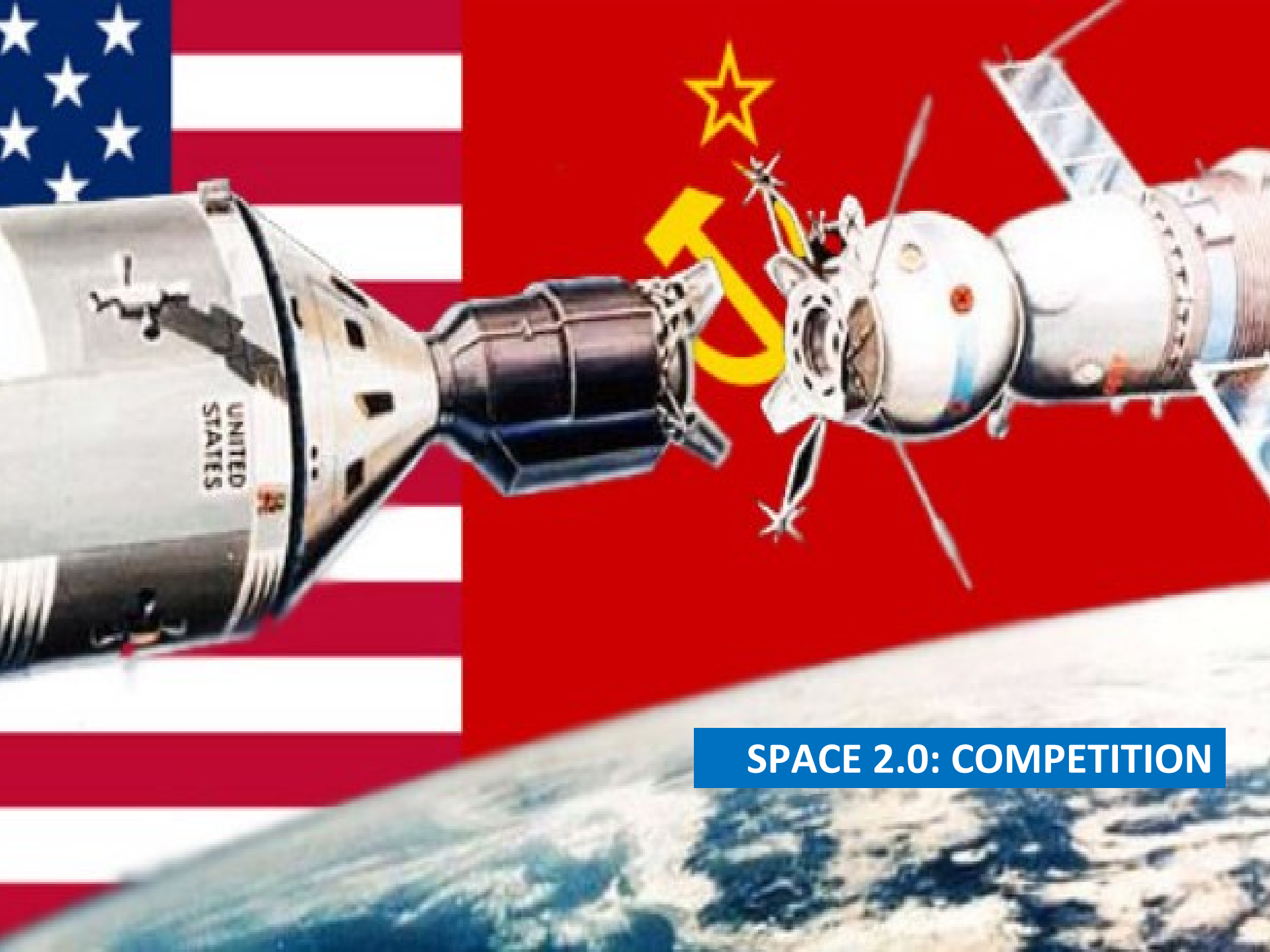
SRITAC 2 - 2018 Officine orbitali, primo livello di espansione civile nello spazio



**ESA and Space 4.0 – Spurring
Sustainable Space Business**
ANDREA VENA, EUROPEAN SPACE AGENCY

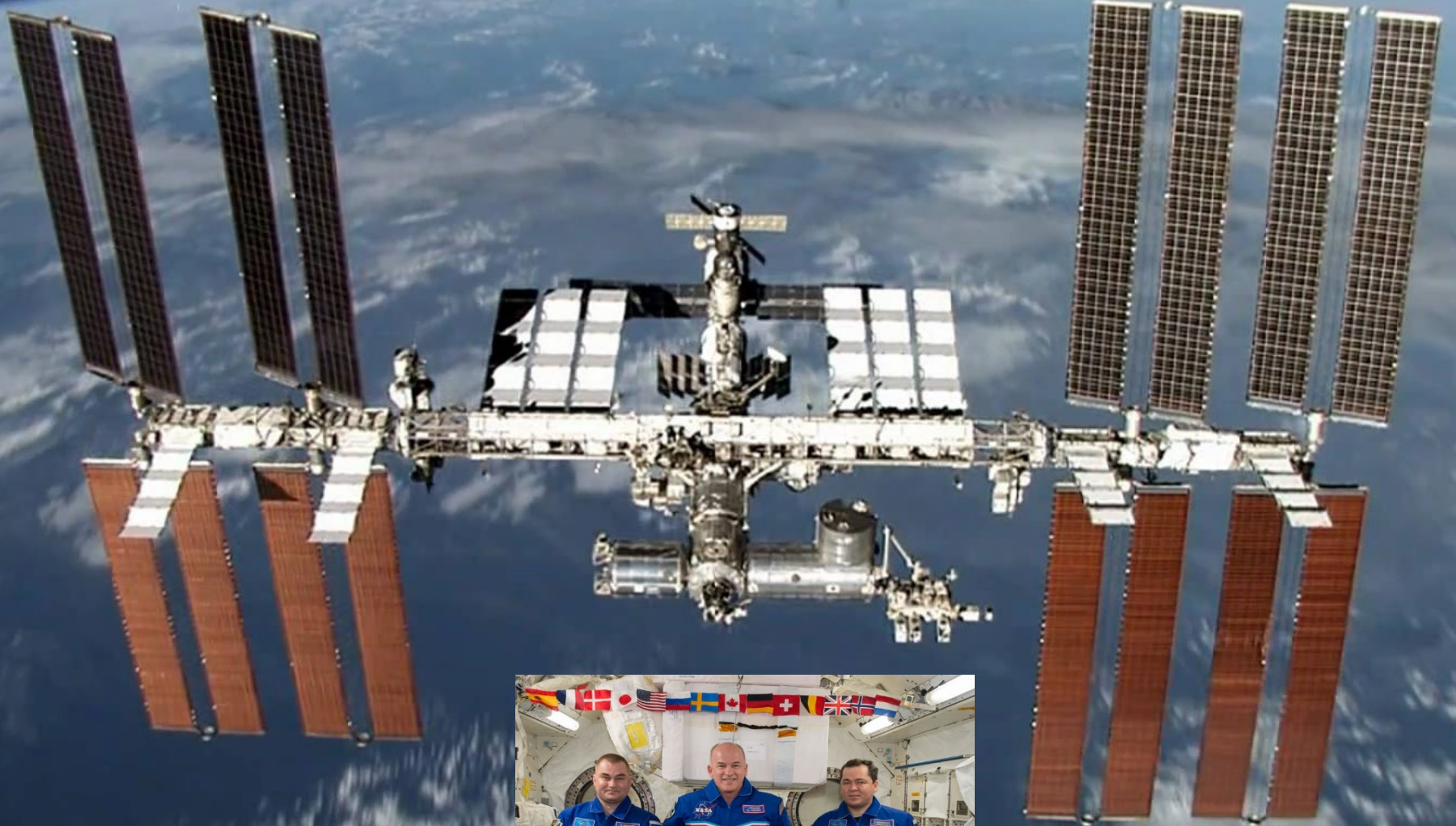
SPACE 1.0: ASTRONOMY





SPACE 2.0: COMPETITION

SPACE 3.0: COOPERATION



Shift of paradigms!

Change of

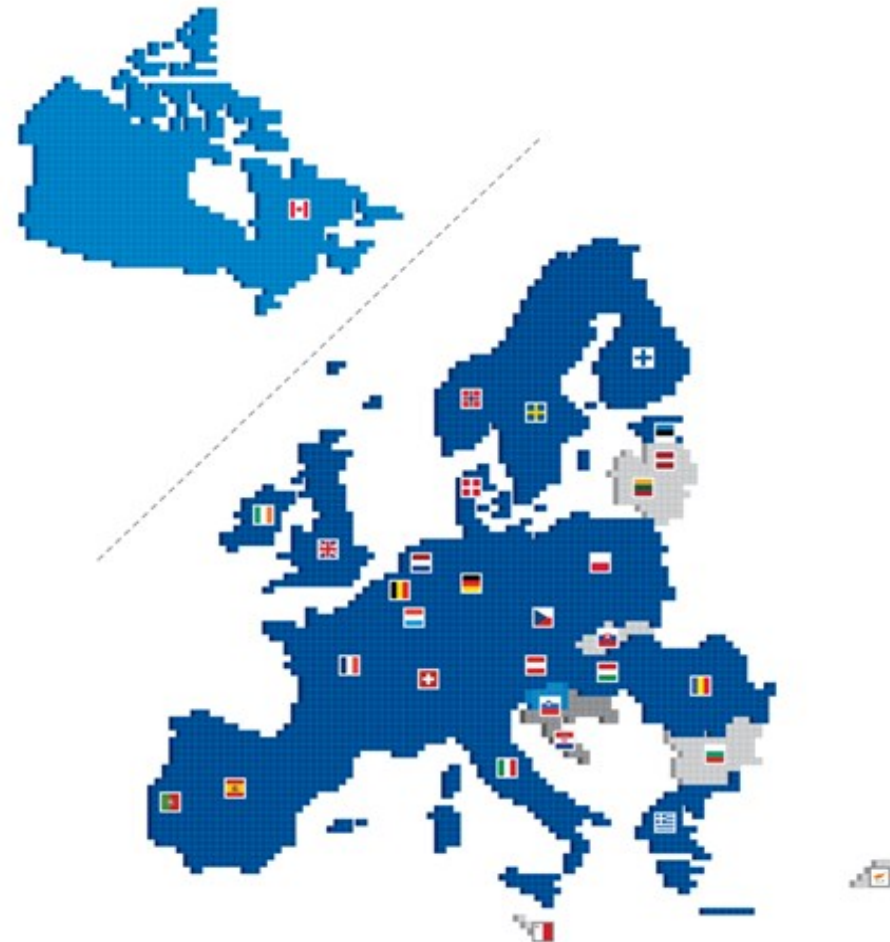
- Motivations**
- Actors**
- Contents**
- Roles**
- Technologies**

- Commercialisation**
- spin in / spin off**
- Participation**
- Diversity**
- Information**
- Innovation**
- Interaction**
- Inspiration**
- Cooperation**
- Jobs & growth**
- Digitalisation**

ESA, 50 YEARS OF INTERNATIONAL COOPERATION IN SPACE

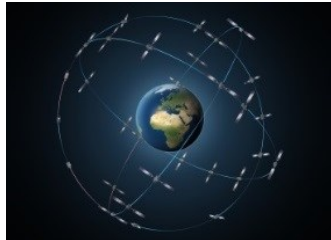
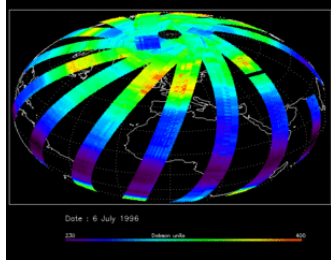
“To provide for and promote, for exclusively peaceful purposes, cooperation among European states in space research and technology and their space applications.”
Article 2 of ESA Convention

- **22 Member States, special cooperation with Canada**
- **5.75 billion Euro budget (2017)**
- **about 2300 staff**
- **Over 80 satellites designed, tested and operated in flight**
- **8 main establishments in Europe**
- **European Spaceport in French Guiana**

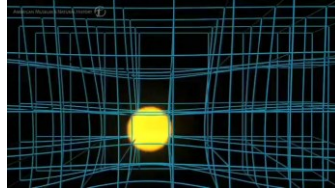
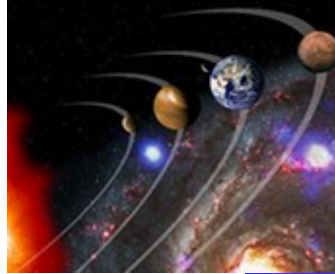


ESA TODAY

Applications



Science & Exploration



Enabling & Support



Safety & Security



Administration

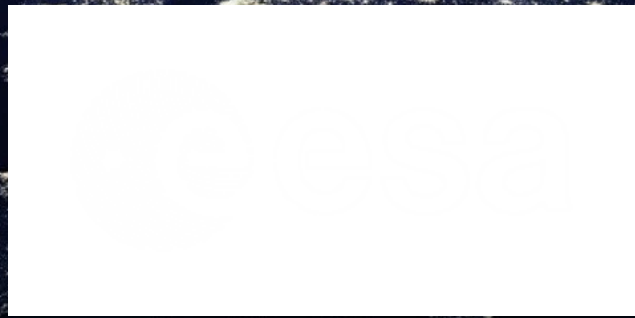


SPACE 4.0

„stakeholder“

„shareholder“

ESA-MS



„customer/partner“

ESA-MS

EC/EU...

public entities

industry

„contractor/supplier“

“ industry

academia

public entities



→ Diversity of instruments

Traditional projects

open concepts

Shareholder projects

ppp projects

Turn key projects

Crowd funding

→ Diversity of roles

SPACE EXPLORATION MASTERS: 2018

[HTTP://WWW.SPACE-EXPLORATION-MASTERS.COM/](http://www.space-exploration-masters.com/)



**SPACE
EXPLORATION
MASTERS**



Expose the challenge to a **global audience** with ESA



Be a **player** of *NewSpace*



Benefit from innovative **problem-solvers**



Drive your business **stimulating new solutions** embedding Space Exploration

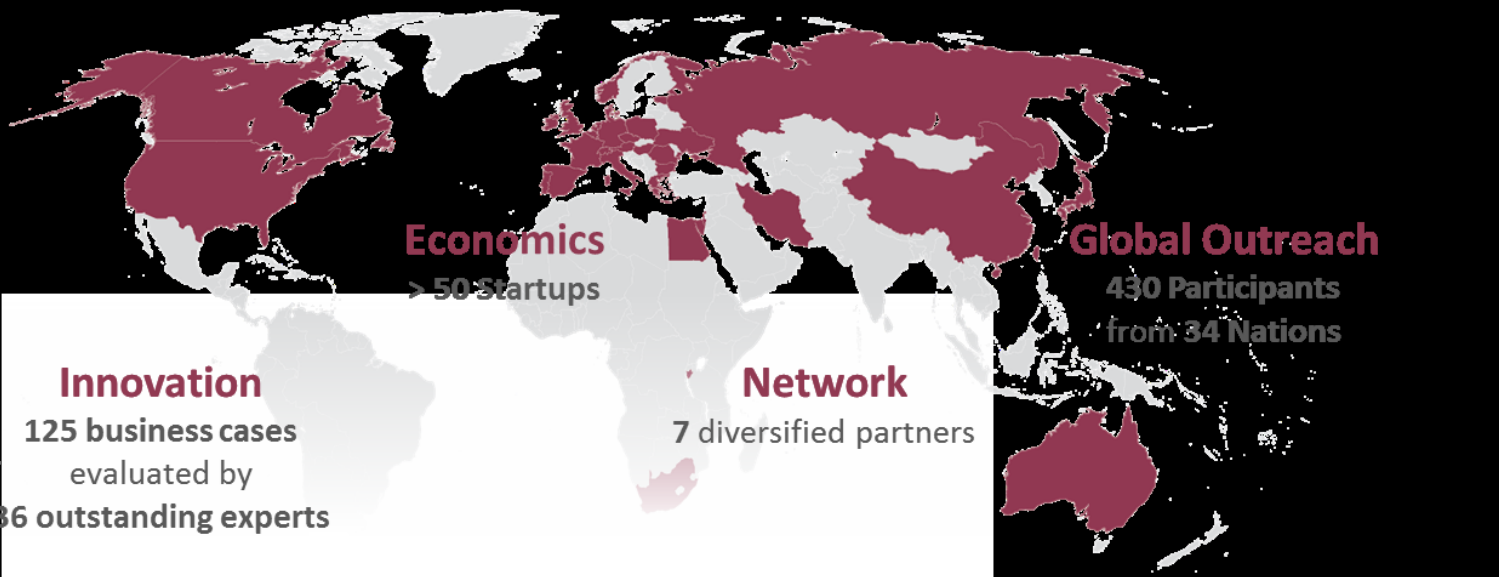


Join your voice to **innovate** Space Exploration



Discover how Space Exploration enables UN Sustainable Development Goals

2017 Achievements



challenges:
Transfer Success
New Business Innovation

J.Hufenbach@esa.int
Strategy
Innovation Team

SPACE FOR INSPIRATION

Space for Inspiration is a core element of a comprehensive ESA Innovation Plan for Space Exploration, aimed at

- Unlocking Space Exploration to non-space actors
- Creating a platform to share information and have companies interested in learning more about the added value of research in space
- Promoting opportunities for research/development and education/outreach in the context of space exploration
- Promoting the European Space Exploration Envelope Programme
- Providing a networking opportunities and engage the general public

Call for “**Disruptive Ideas Growing Innovation Towards Sustainability**” - DIGITS

on Exploration, Earth and society, business and transformation, participation

A green banner for the 'Space for Inspiration' event. On the left, the text 'space for inspiration' is written in white, with 'space for' on one line and 'inspiration' on the line below. In the center is a glowing lightbulb with a stylized human figure inside, surrounded by faint orbital lines. On the right, there is a white rectangular box containing the text 'BILBAO' in large green letters, '29-31 October' in smaller green letters, and '2018' in large green letters. In the top right corner of the banner is the ESA logo. At the bottom right of the banner, the URL 'http://space4inspiration.esa.int' is written in white.

space for
inspiration

BILBAO
29-31 October
2018

http://space4inspiration.esa.int

THE Φ -LAB IN EARTH OBSERVATION

Mission: "Opening ESA to disruptive innovation in EO"

Explore



Non-EO Technologies
Artificial Intelligence
Future Architectures
Disruptive Technologies

Inspire



Open Work Space
Digital Education
Hackathons
Challenges

Connect



New Actors
Startups Innovators
Ecosystems
Internal/External

Invest



Incubated
PPPs
New Joint Ventures

Contact

Pierre.Philippe.Mathieu@esa.int
Head of Phi-Lab Explore Office



→ THE ESA EARTH OBSERVATION Φ -WEEK
EO Open Science and FutureEO

22-26 October 2018 | ESA-ESRIN | Frascati (Rome), Italy

ESA_Lab@...

A hub for: disruptive innovation & x-fertilisation



NOVEL COLLABORATION OPPORTUNITIES IN ESA

Leverage ESA assets



POST-ISS HUMAN SPACEFLIGHT RESEARCH AND APPLICATIONS CAPABILITIES IN LEO

- Aiming at **new partners** to work on orbital infrastructures and transportation for affordable research platforms and novel applications
- **Calls for concepts** that allow for sustainable human-tended and automated research and applications in low Earth orbit in partnership **with the private sector**.



FUNDING BUSINESS APPLICATIONS



OVERVIEW OF BUSINESS APPLICATIONS



€200m invested in over 500 European businesses

- 4.3 ROI
- 2,100 new jobs
- 36% export

€160m funding available for further investment



business@esa.int

SPACE OPERATIONS AND MERCK



Data Analytics

- from space operations applied in pharmaceutical production (Novelty/Anomaly Detection, Artificial Intelligence)

Innovation Processes

- “Space2Health”, Human Health Care vs. Satellite Health Care (e.g. Hackathons)

New Technologies

- Liquid Crystals for Smart Antennae
AR/VR for connected research labs and operations for human space exploration

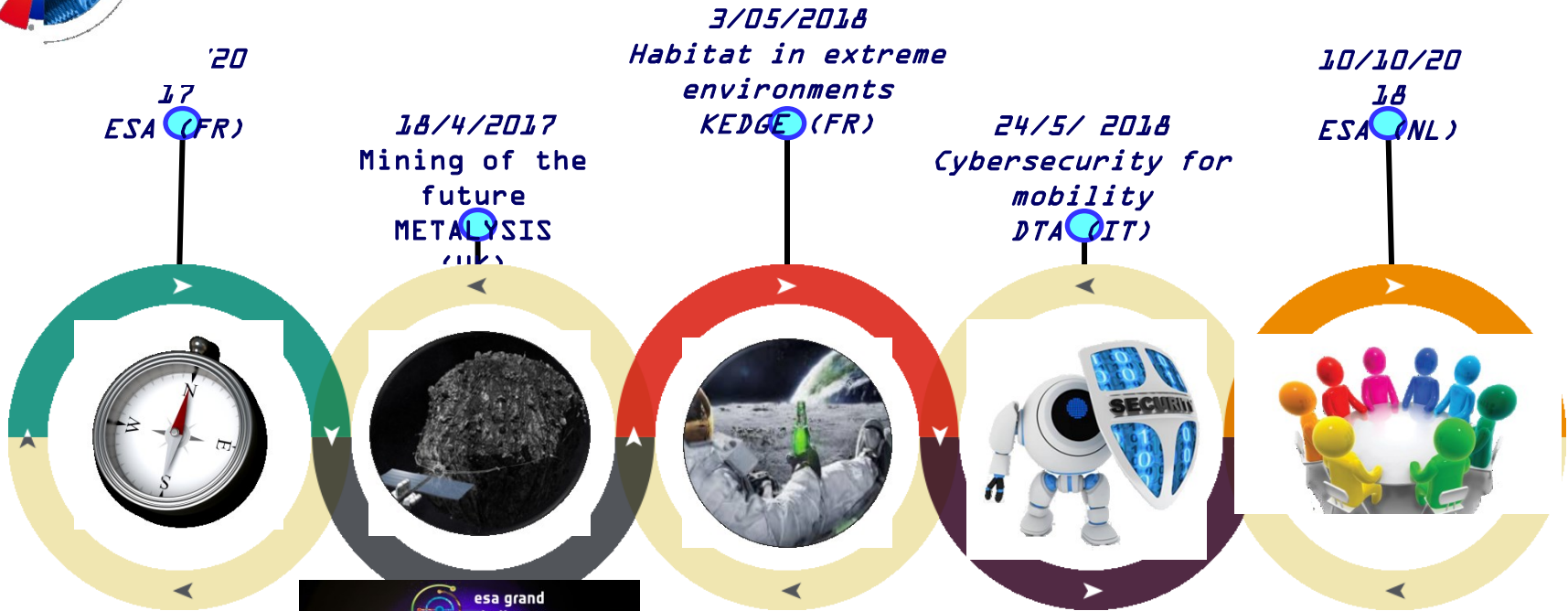
Contact

Mariella.Spada@esa.int

Head of Strategy and
Coordination Office

GLOBAL SPACE ECONOMY WORKSHOP INITIATIVE

GSEW connects diverse industrial cultures to discuss future global challenges, new territories and imagined future.



More than 180 executives from 55 space and 44 non-space companies



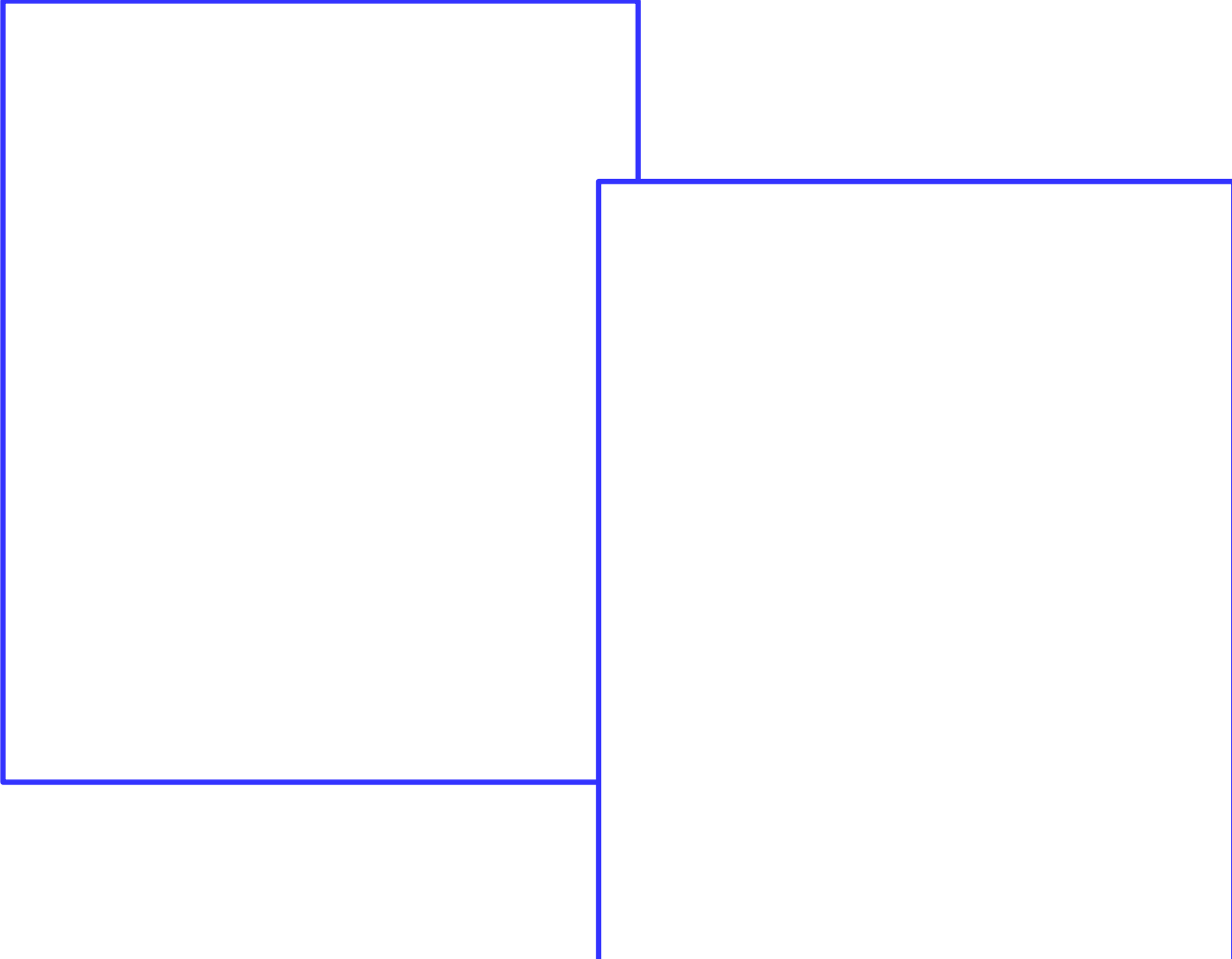
Contact

Luca.del.monte@esa.int

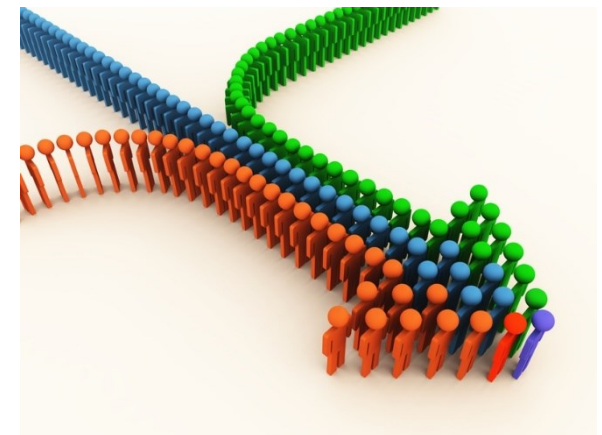
Head of Industrial Policy and SME

Division

NOVEL COLLABORATION OPPORTUNITIES IN ESA



Collaborate in Future Missions



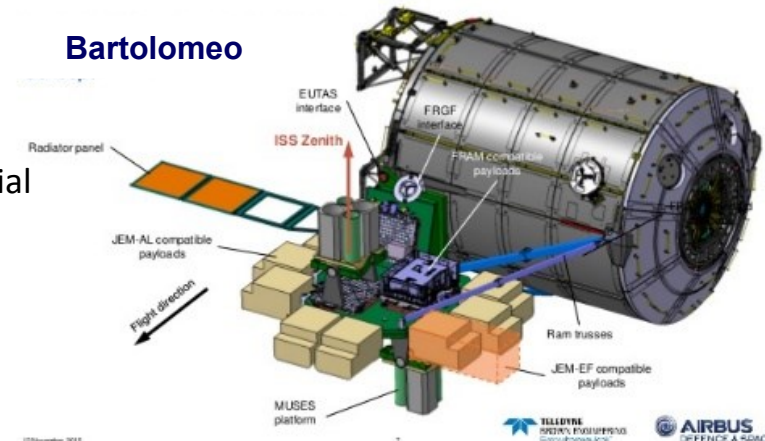
COMMERCIAL PARTNERSHIP INITIATIVE IN EXPLORATION

- Foster **new commercial services** led by European private companies to
 - strengthen the competitiveness of the space and non-space industrial base
 - stimulate R&D
 - integrate innovative solutions into ESA space exploration missions
- Acts as a **business partner**, and sometimes customer, in commercial partnerships for competitive services or products.
- **ESA offers** technical support and reviews, access to ESA expertise and facilities, and co-funded technology development.
- **Permanent call:**
http://www.esa.int/About_Us/Business_with_ESA/Business_Opportunities/Partners_for_Space_Exploration

ICECUBES



Bartolomeo



LUNAR PATHFINDER



ISRU DEMONSTRATION MISSION

Goal

Produce drinkable water and/or breathable oxygen on the Moon by 2025 with an industrial procurement budget < 250 M€

Implementation

- Engagement of new industrial sectors through partnerships
- Procured as commercial services for payload delivery & lunar communications through private-sector developed key capabilities
- Coordinated with international Partners

Outcomes

1. Validated ISRU technologies plus related science return
2. Strong European ISRU community
3. Test commercial services/ new procurement approach
4. Evidence that exploration can be enabled by 'living off the land'

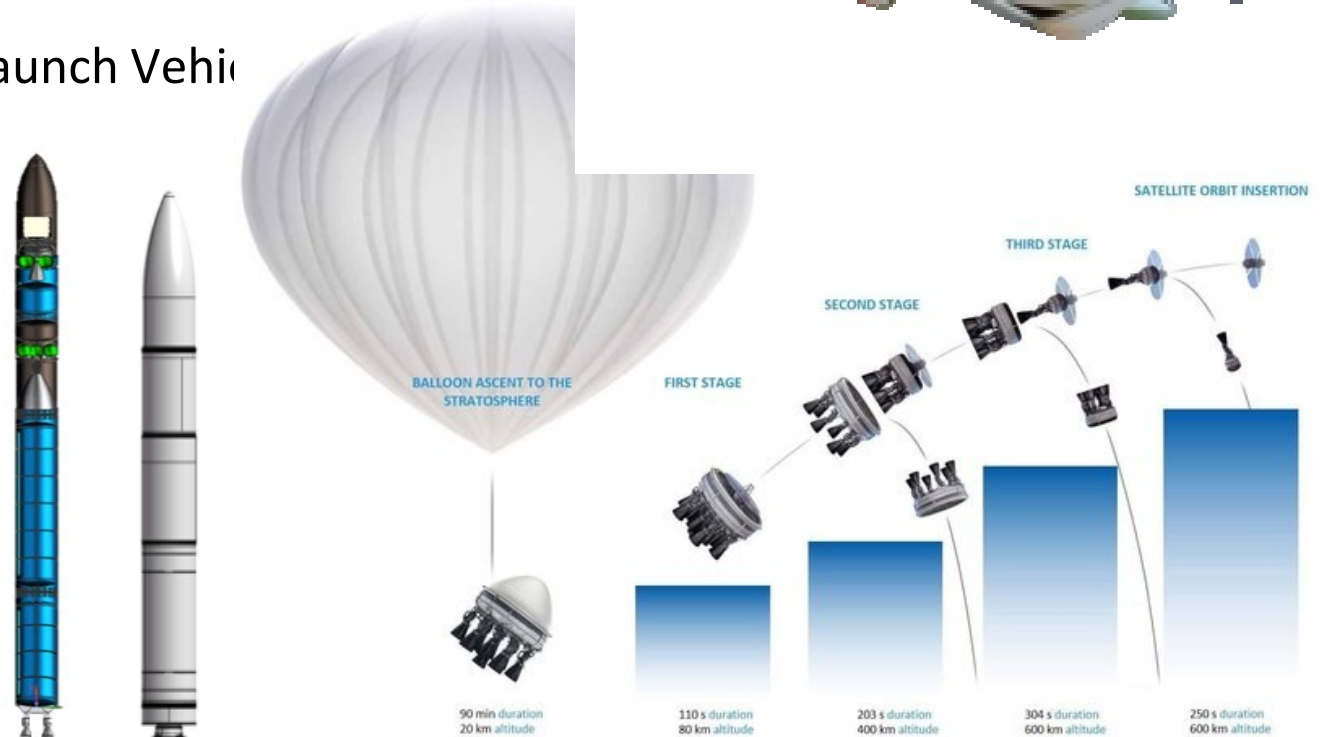
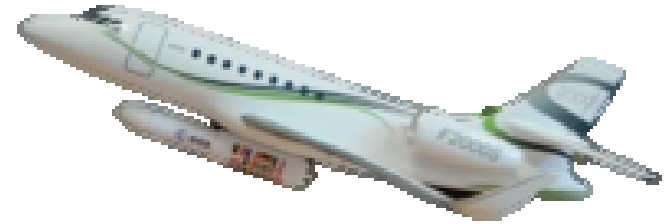


<http://exploration.esa.int/jump.cfm?oid=60127>

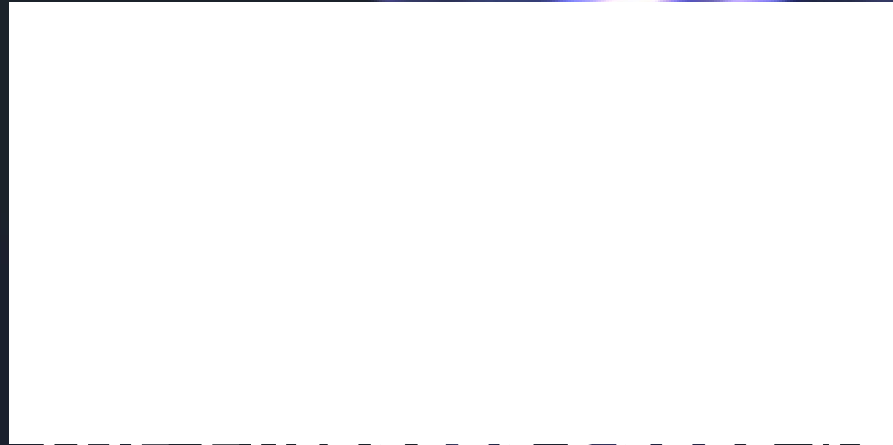
MICRO-LAUNCHER BASED LAUNCH SERVICE STUDIES

- On-going 5 parallel preliminary feasibility studies are aimed at assessing the economic viability and credibility of technical concepts for access to space of satellites up to 200Kg.

- ArianeGroup
- MT Aerospace
- European Launch Vehicle
- Deimos
- PLD Space



Wind of change



ESA: THE European Space Agency

plasma interactions between comet 67P/Churyumov-Gerasimenko and the solar wind