Space research

Horizon 2020 - Work Programme

Information day

Lisbon, 31 January 2014

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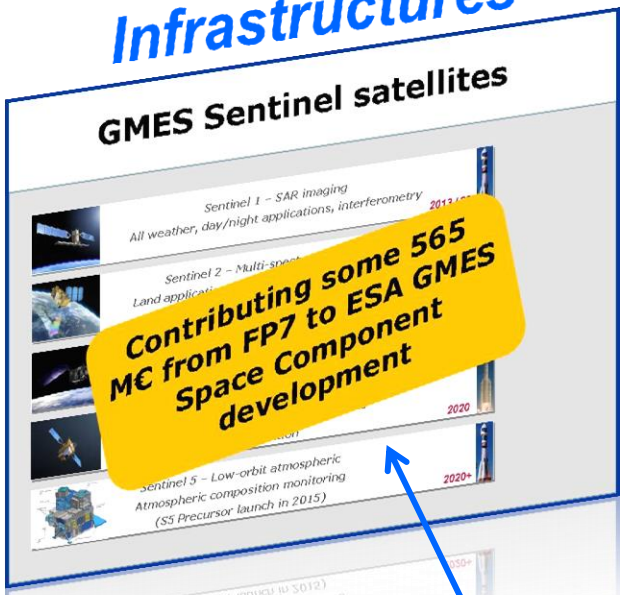
FP7 / SPACE

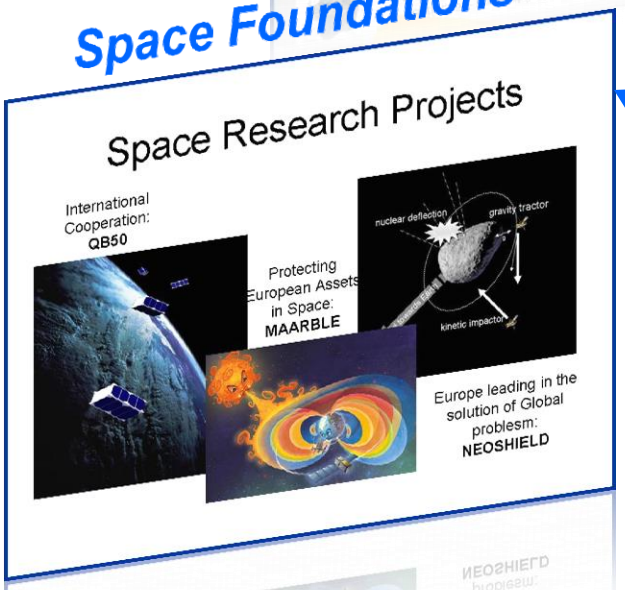
European Commission

Infrastructures

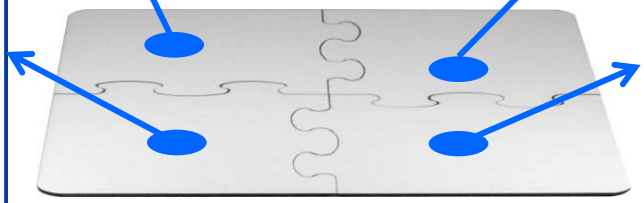


Data for exploitation

Space Foundations



Applications & Services



Activities developed under the FP7 / SPACE

The R&D Projects in FP7 / Space

European Commission

999 PROPOSALS submited in 6 CALLS (Call 6th in negotiation)

259 PROJECTS funded by EC with ~ 654 M€*

2007

1st Call

2009

2nd Call

2010

3rd Call

2011

4th Call

2012

5h Call

Further information available ec.europa.eu/embrace-space

European Commission

New Multiannual Financial Framework 2014-2020

~ 12.000 M€

~ 3.800 M€

Copernicus
The European Earth Observation Programme

~ 1.400 M€

~ 6.300 M€

GALILEO

EGNOS

A view of the

Space Research Programme

Horizon 2020 Space work prgramme

Consultations with stakeholders since 2010

Discussions with member states in September-November 2013

Publication: 11 December 2013
http://ec.europa.eu/research/participants/portal

A ”two year” work programme 2014 and 2015

- 2015 “indicative” at his stage – final decision in 2014
- Call deadlines 2014 call:
  - 26 March 2014
  - 3 April 2014 for EGNSS applications

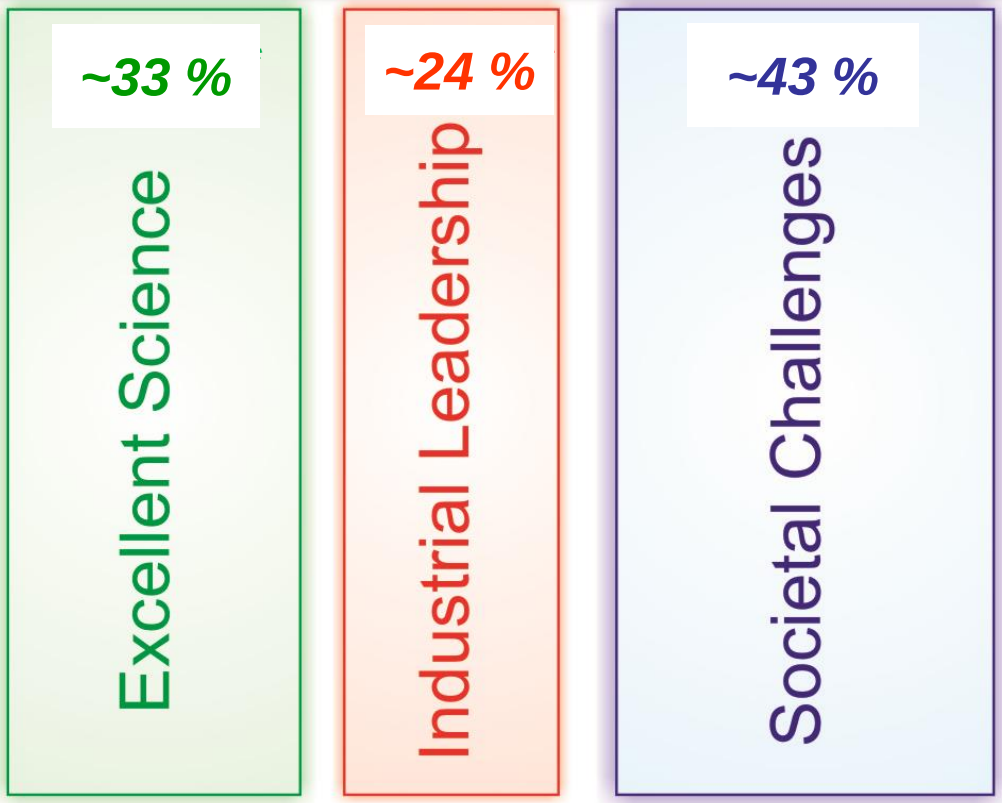
H2020

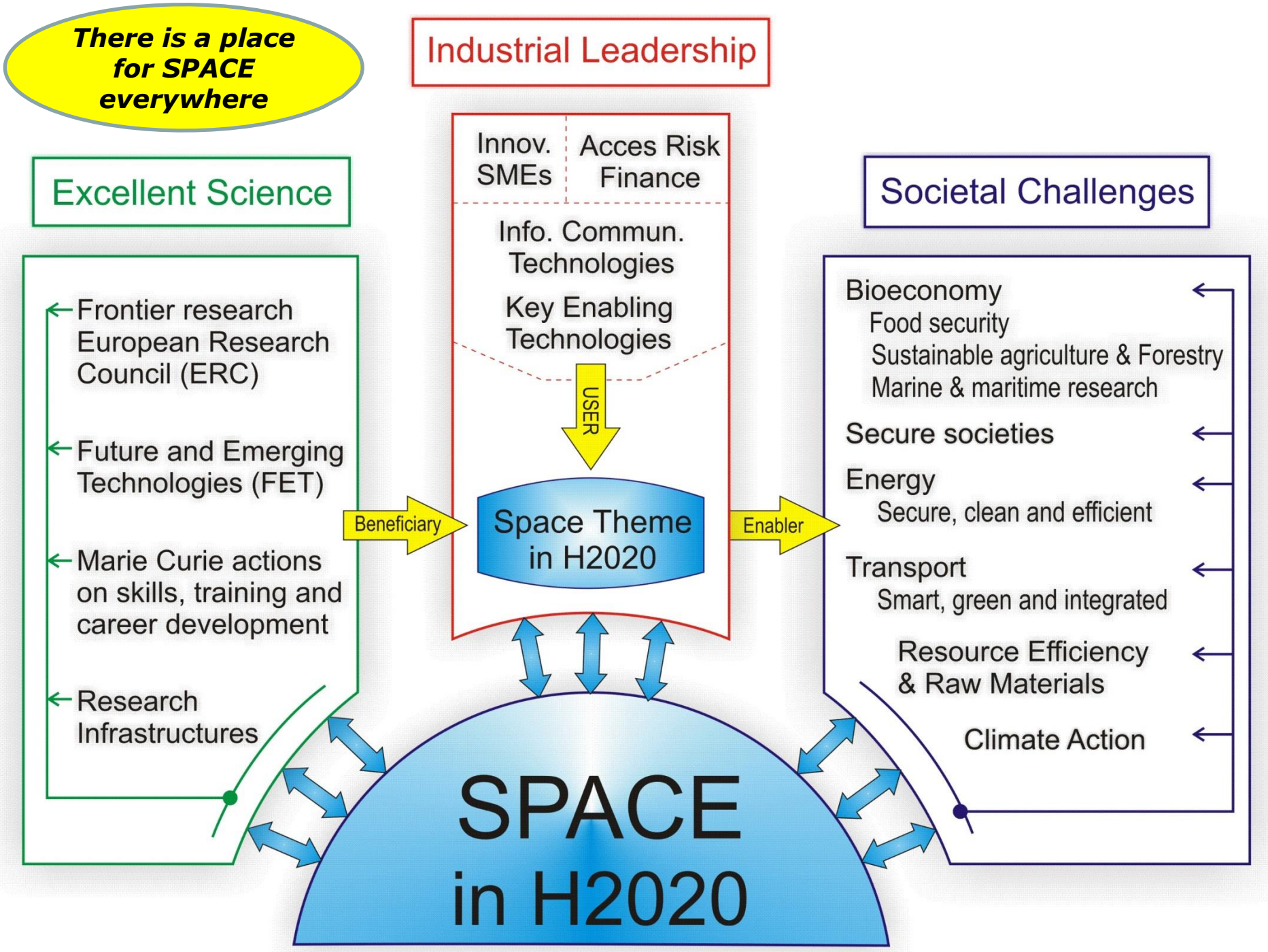
European Commission

Horizon 2020

The three pillars

~ 72.000 M€




There is a place for SPACE everywhere
Industrial Leadership
Innov. SMEs
Acces Risk Finance
Info. Commun. Technologies
Key Enabling Technologies
USER
Excellent Science
Frontier research European Research Council (ERC)
Future and Emerging Technologies (FET)
Marie Curie actions on skills, training and career development
Research Infrastructures
Beneficiary
Space Theme in H2020
Enabler
Societal Challenges
Bioeconomy
Food security
Sustainable agriculture & Forestry
Marine & maritime research
Secure societies
Energy
Secure, clean and efficient
Transport
Smart, green and integrated
Resource Efficiency & Raw Materials
Climate Action
SPACE in H2020

European Commission

Four objectives (Specific Programme)

Enhance competitiveness, non-dependence, and innovation of EU space sector

Enable advances in space technologies

Increase exploitation of space data

Enable participation in international space partnerships

+ *relevant space applications under Societal Challenges*

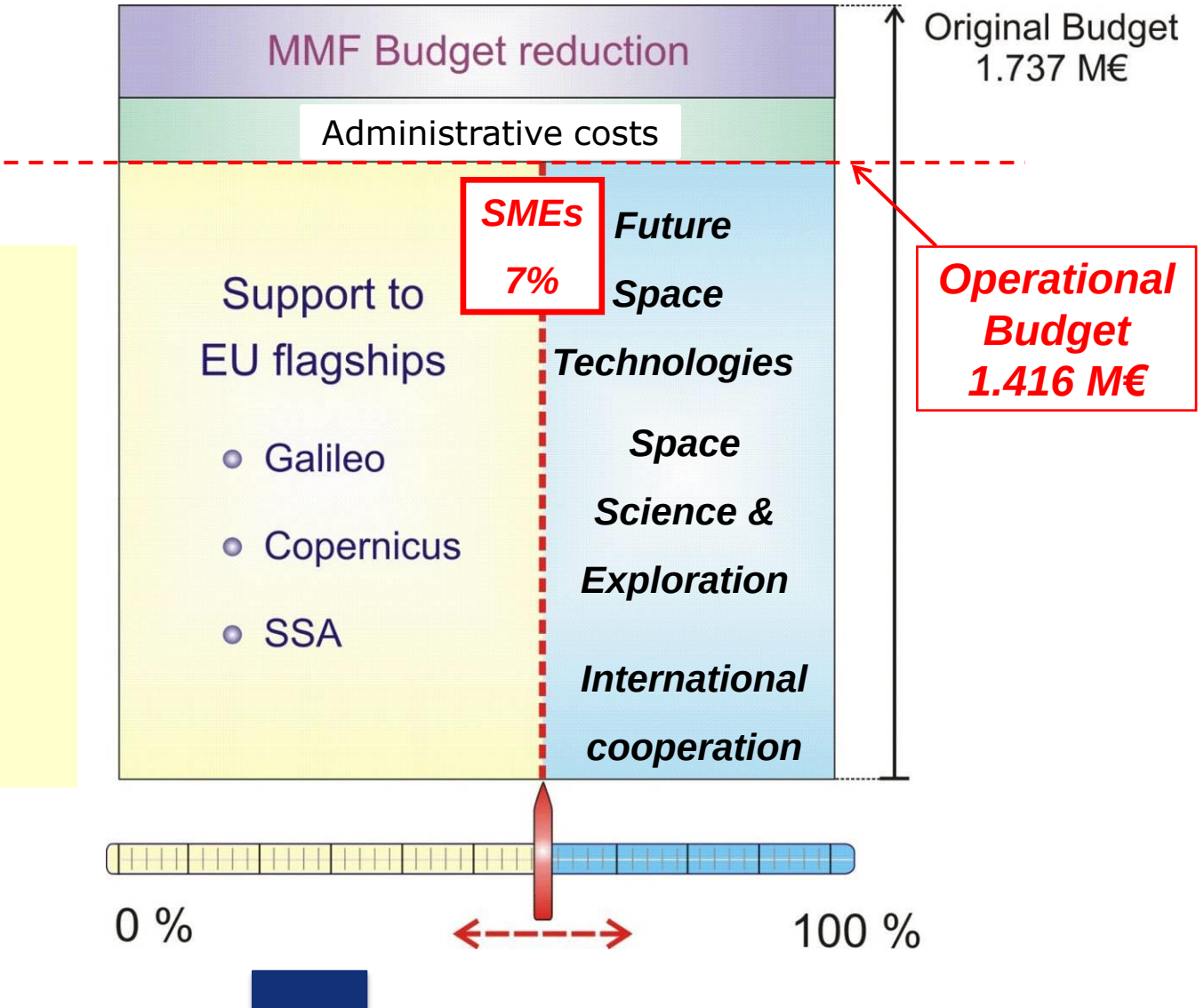
- **Transport, Climate, Security,.....**

State of play of H2020 / Space

European Commission

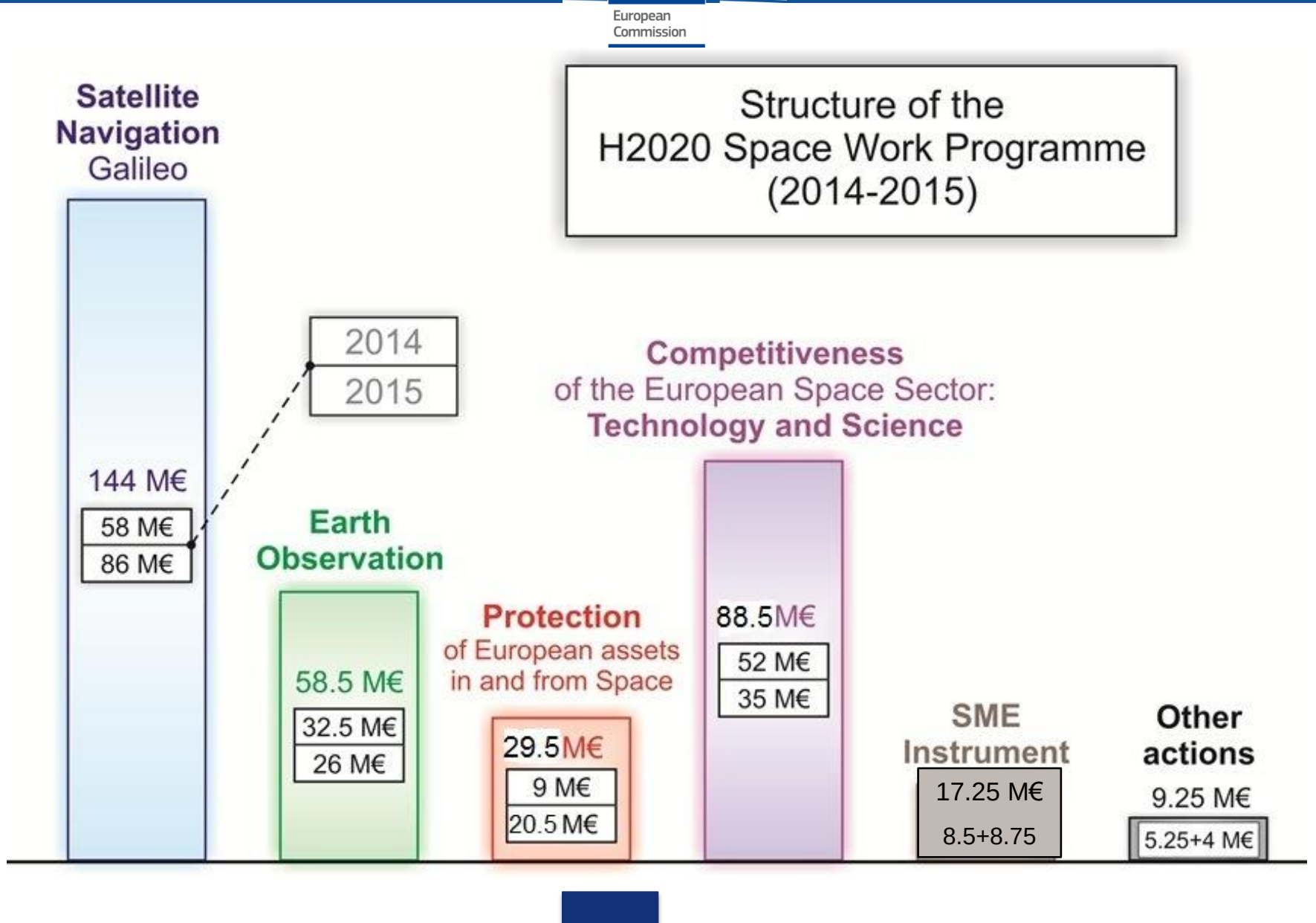
Main topics

- Satellite navigation (Galileo)
- Earth Observation (Copernicus)
- SSA → Protection from Space-related threats (SST)



European Commission

SPACE



Galileo

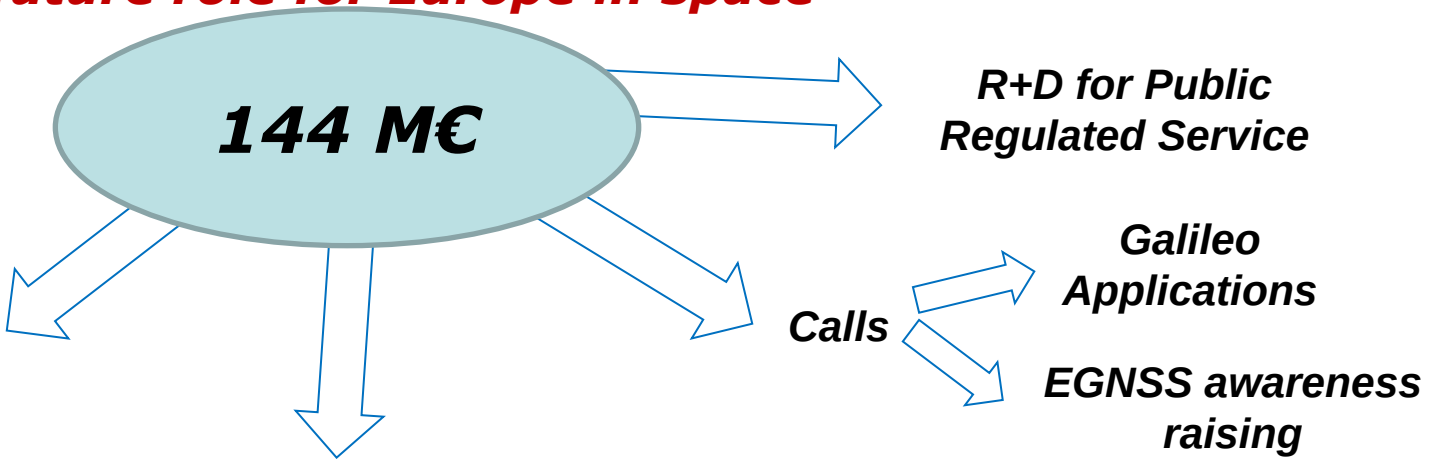
2014-2015

European Commission

European Global Navigation Satellite System

Horizon 2020 Framework Regulation:

Union level action and investment in space research are required in accordance with Article 189 (TFEU), in order to maintain the competitive edge, ***to safeguard Union space infrastructures and programmes such as Copernicus and Galileo and to sustain a future role for Europe in space***



Galileo applications 2014

European Commission

Galileo 1 - EGNSS applications

15-20 M€

Galileo 2 - SME based EGNSS applications

5-10 M€

Galileo 3 - Releasing the potential of EGNSS applications through international cooperation

5-8 M€

Main aim is to ensure that Galileo is going to be used in the future…

EGNSS offers various possibilities for the development of new space enabled applications based on continuous, real-time, reliable, accurate and globally available position, velocity and time.

The objective of all these 3 topics is to develop new and innovative GNSS-based applications.

Galileo 4

2014

European Commission

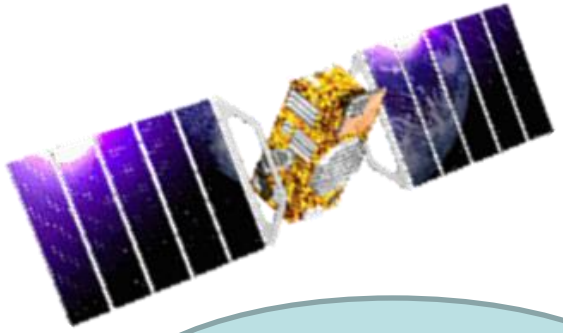
Galileo 4 - EGNSS awareness raising, capacity building and/or promotion activities in and outside of EU

Awareness raising – knowledge and visibility of Galileo and EGNOS

Capacity building – ability to benefit from services offered by Galileo and EGNOS

Promotion activities – actions aims at promoting the use of innovative GNSS applications

The overall objective of this action is to use various means to promote the use of Galileo and EGNOS inside and outside of the EU.



5-10M€

Galileo applications

2015

European Commission

Galileo 1 - EGNSS applications — ***10-15M€***

Galileo 2 - SME based EGNSS applications — ***5-10M€***

Galileo 3 - Releasing the potential of EGNSS applications through international cooperation — ***0-5M€***

GNSS Evolution: R&D for enhanced mission and services

R+D to achieve the best performance from the EGNSS infrastructure and to reap the full benefits of the initial services (2014-2020)

- ★ ***Prospective research in advanced GNSS mission concepts***
- ★ ***R&D for enhanced services***
  - ***Ionosphere modelling and prediction***
  - ***Commercial service performance***
  - ***Safety of Life Service, EU-US collaboration***
- ★ ***R&D in GNSS signal evolution***

6M€

Procurement

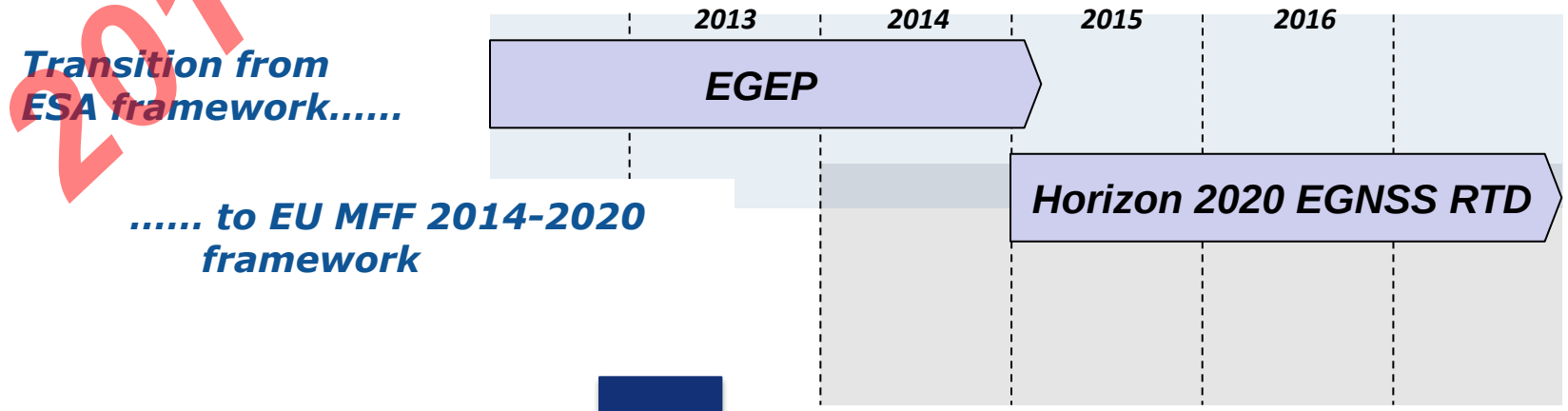
GNSS Evolution: infrastructure-related R&D activitieses

Prepare for 2nd generation Galileo system

R+D to have European state-of-the-art and cost-effective technologies for the development of the next generation (>2020) Galileo system.

55 M€

ESA – Indirect Management



Earth Observation

2014-2015

New ideas for Earth-relevant space applications

Scientific exploitation of existing and forthcoming European space infrastructure needs to be enhanced, by stimulating the emergence of novel ideas on what can be observed from space. Copernicus data are expected to provide improved data quality, coverage and revisit times, and increase the value of Earth Observation data for scientific work and future emerging applications.

- **Development of new/emerging uses for Earth-relevant space-based data**
- **Could include a wide variety of Earth-relevant space-based data (e.g. remote-sensing data, gravity data, magnetic data, GNSS signals)**
- **Mitigation test mission**

10 M€

EO 2: Climate Change relevant space-based Data reprocessing and calibration

The data from past remote sensing missions available either from European and non-European missions, must be made accessible in a way to establish seamless time series of similar observations, contributing to the generation of Climate Data Records across sensors and technologies over two decades and more.

5,5 M€

European Commission

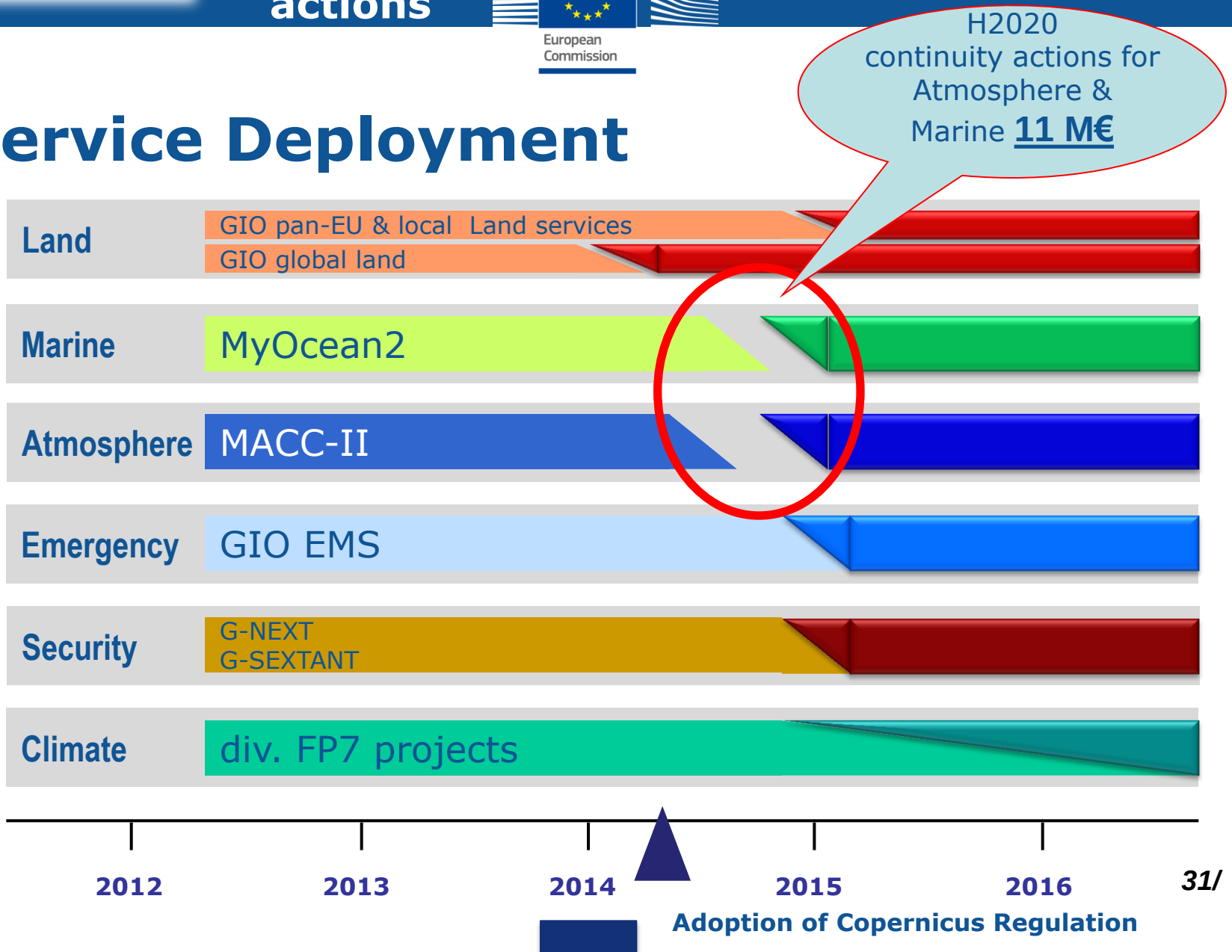
Observation capacity mapping in the context of Atmospheric and Climate change monitoring

Space based remote sensing data have to be integrated with measurements taken at various places in the atmosphere. Efforts must be coordinated at national and international levels to optimise the use of existing in-situ measurements, the deployment of new measuring systems and the design of campaigns for calibration/ validation of remote sensing data. Research is needed to assess gaps in remote observation availability and approaches to define virtual observation constellations.

- **Gather the consensus of key players**
- **Foster advances in the consistency and cross-calibration of long-term measurements**
- **Better overview of uncertainty of available data to generate Climate Data Records**

6 M€

Service Deployment



European Commission

EO 1: Bringing EO applications to the market

It is essential that EO products and information generation are taken out of the research environment and products are put into the market. The outcome of these innovation projects should be a commercial service platform, sustained by a production process capable to deliver to the user a product which is validated and accepted as a marketable product.

"Innovation actions (70%)"
10 M€

European Commission

Stimulating wider research use of Copernicus Sentinel data

Europe's investment in the Copernicus Sentinel satellites will provide Europe with an unprecedented source of operational satellite data. Data streams are expected to amount to several terabyte per satellite orbit, thereby delivering unprecedented temporal and spatial resolution and data continuity. To utilise the high scientific potential of the Sentinel data, stable and predictable access methods need to be developed, such as:

- **Efficient data retrieval from repositories**
- **Software for reading/transforming data for access by scientific users**
- **Data fusion (various Sentinels/contributing missions)**
- **Advanced visualisation techniques**

11 M€

European Commission

EO 3: Technology developments for commercial imaging

Research should be undertaken to review the emerging fractionated observation system concepts. The required technology challenges as regards interfacing, formation flying, communication within the constellation or with ground stations are to be identified. Potential benefits for EO are to be examined.

5 M€

2015 indicative

European Commission

Protection of European assets in and from Space

2014-2015

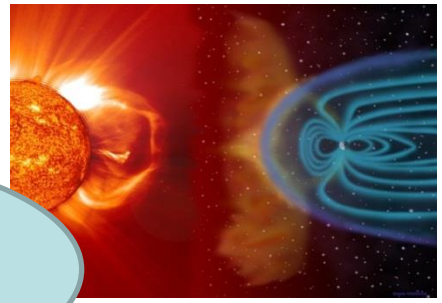
PROTEC 1 / 2 2014

European Commission

Space Weather

Exploratory work studying new ideas for data analysis and modelling of space weather with a view to enhancing the performance of space weather prediction

- **Focus on international aspects**



8 M€

Access technologies and characterisation for Near Earth Objects:

Account should be taken of complementary efforts currently in progress (UN Action Team 14, ESA's SSA and other national programmes, e.g. US, RU, Japan, China).

- **Technologies and instructments for orbiting, manoeuvering, GNC, sampling,…**
- **Physical characterization & modelling (mineralogy, shapes, , structure, reaction to impactor…)**

PROTEC 1 2015

European Commission

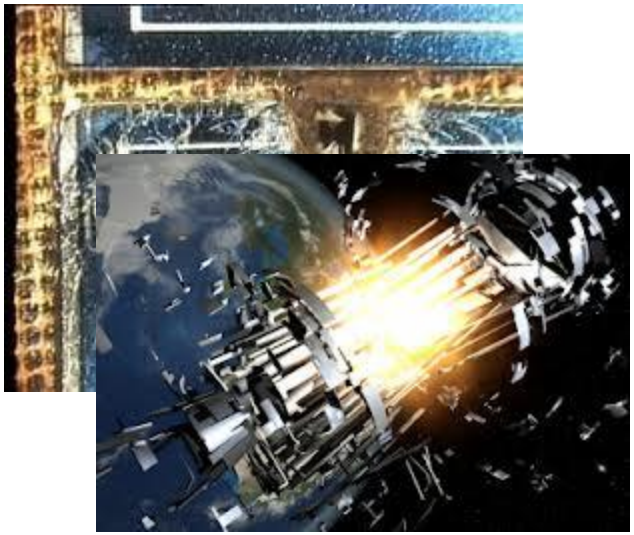
Passive means to reduce the impact of Space Debris

To develop and test concepts and technologies needed for

- safe de-orbiting and disposal of space objects
- planned end-of-life de-orbiting or safe disposal of new satellites and launch vehicle's upper stages
- non-technical issues including legal issues should be considered.

Alignment with international and European guidelines and legal requirements.

6,5 M€



Competitiveness of the European Space Sector

Non-dependence & technology development 2014-2015

European Commission

Technologies for European non-dependence and competitiveness

"Independence" would imply that all needed space technologies are developed in Europe.

"Non-dependence" refers to the possibility for Europe to have free, unrestricted access to any required space technology.

The objective of this action is to contribute to ensure European Non-dependence

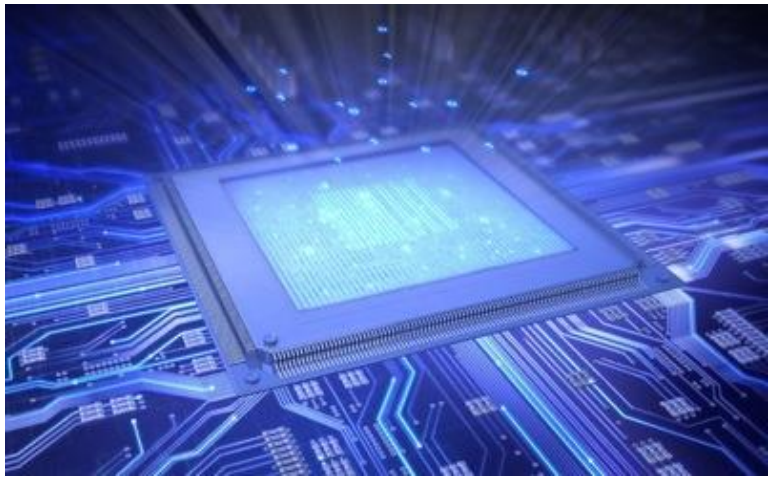
A selection of the list of urgent actions for critical space technologies defined by the Joint EC-EDA-ESA Task Force will apply for this call

European Commission

Technologies for European non-dependence and competitiveness – Urgent Actions

1) Application Specific Integrated circuits (ASCIS) for Mixed Signal Processing (U11)
2) Advanced thermal control systems (U2)
3) Space qualification of low shock non-explosive actuators (U1)
4) Alternative to Hydrazine in Europe (U5)
5) High density (up to 1000 pins and beyond) assemblies on PCB (U17)

10 M€



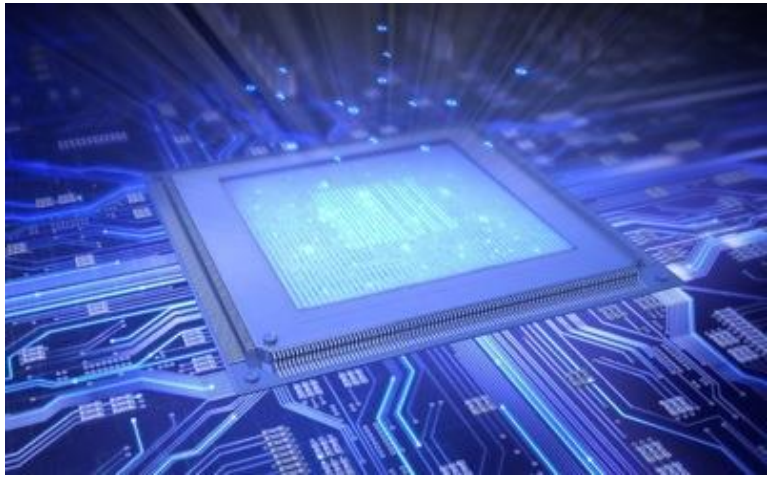
European Commission

Technologies for European non-dependence and competitiveness – Urgent actions 2015

1) Advanced materials and material technology for combustion chambers (U4)
2) Fiber Optic gyro (FOG) based Inertial Measurement Unit (U6)
3) Power amplification: Travelling Wave Tube (TWT) materials (U7)
4) Passive components (U13)
5) Active discrete components (U14)

2015 indicative

10 M€



European Commission

Independent access to space

All possible complementary technologies not overlapping with on-going launcher developments. Proposals are expected in:

- Conventional launching systems
- Innovative systems to access to Space

The objective is to develop technology for relevant optimisation of the launch propulsion systems to foster the European capabilities of accessing space

2014
8 M€

2015 indicative

2015
6M€

Strategic Research Clusters - Call for Programme Support Activity (PSA)

- **SRC:** System of operational grants connected through to a roadmap designed by a separate consortium receiving a PSA grant
- As part of the application, **PSA** presents a WP for itself and for SRC

- During its 5-year life: identifies activities, delivers a detailed master plan, a plan for analysis and evaluation of results, a plan for the specific exploitation and potential use of SRC outputs, risk assessment and contingency analysis of the SRC
- COM remains responsible for calls for operational SRC grants to be included in future WP of Horizon 2020

- **PSA**
  - **≥3 partners from ≥3 member states or associated states**
  - **open to ESA participation**
  - **PSA partners may participate in operational calls (restrictions apply)**

European Commission

PSA for In-Space electrical propulsion and station keeping

Major advances in electric propulsion to guarantee the leadership of European capabilities at world level within the 2020-2030 timeframe in:

- Incremental advances in the development of **thrusters** (with an in-orbit validation not later than 2023)
- Promoting possible **disruptive** RTD **in the field of** in-space electrical propulsion

4 M€

1 PSA

The **final objective** of the SRC is to validate electrical thrusters during the SRC with a flight to be executed not later than 2023

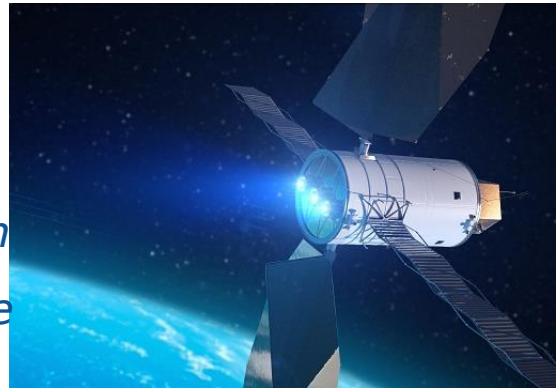
Open for ESA participation

Consortium of ≥3 orgs from ≥3 countries

Programme Support Activity (PSA), for the future implementation of a Strategic Research Cluster (SRC)

COMPET 3 2014

- **Strategic Research Cluster:**
  - **In-space electrical propulsion & station keeping**



CHALLENGE: *to enable major advances in electric propulsion for in-space operations and transportation, and guarantee the leadership of European capabilities in electric propulsion at world level within the 2020-2030 timeframe… (in the range of several tens M€)*

SCOPE:

***1st OBJECTIVE**: to foster **incremental advances** in the development of thrusters…*

***2nd OBJECTIVE**: to set up activities for promoting possible **disruptive RTD** in the field of in-space electrical propulsion, including the **increase of electric power** for propulsion…*

2014: **PSA** – *Open for proposals (4 M€) of* **Programme Support Actions**

European Commission

PSA for Space Robotics Technologies

- To enable major advances in space robotic technologies for future on-orbit satellite servicing.
- **The final objective** of the SRC in H2020 is to achieve an in-orbit demonstration of an autonomous system (at a significant scale) for on-orbit satellite servicing (not later than 2023), planetary surface exploration, debris removal, human-robotic partnerships
- Spin-off to Earth bound activities like under water and automotive applications

Open for ESA participation
Consortium of ≥3 orgs from ≥3 countries

Programme Support Activity (PSA), for the future implementation of a Strategic Research Cluster (SRC)

4 M€

1PSA

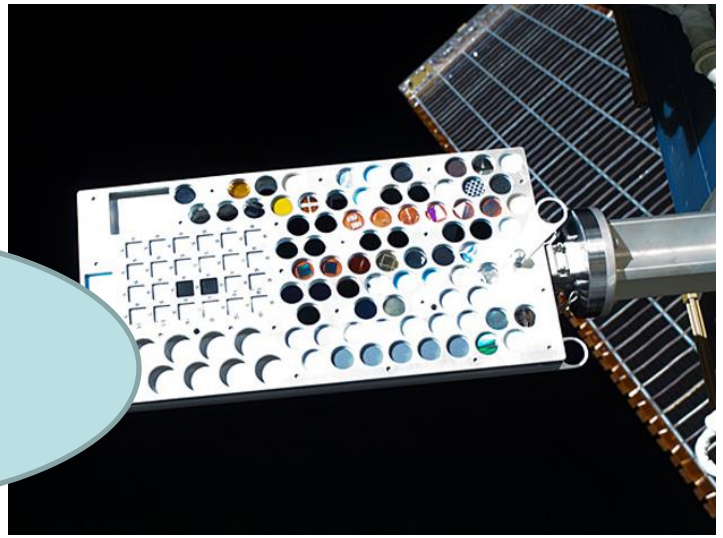
European Commission

In-Orbit demonstration/Validation (IOD/IOV)

- To make access to space possible for new technologies and innovations by means of IOD and/or IOV

- **The objective** of this topic is to motivate studies (~500 k€) to help define the envelope and the requirements for the implementation of affordable missions of IOD/IOV (in combination with the launching system to be selected) within the Horizon 2020

2 M€



European Commission

Bottom-up space technologies at low TRL

- Spinning-in of new Enabling Technologies (e.g. KETs) with TRL 1-3 to space systems up to TRL 4-5. **4 + 5 lines** are targeted:

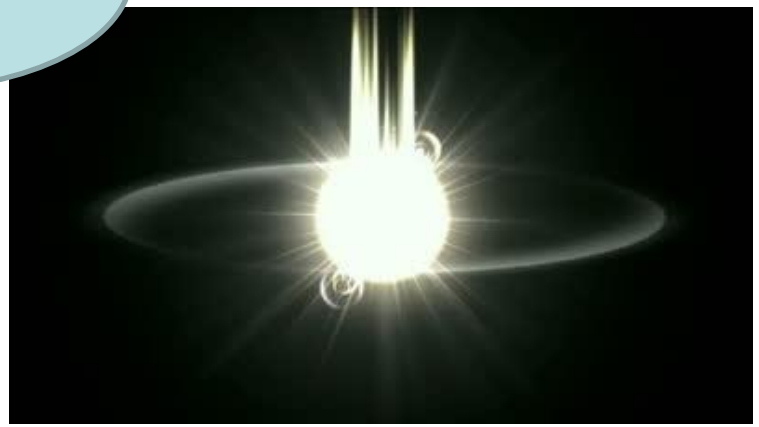
2014
1) High-resolution imagery
2) Radiation-hardened instrument components
3) In-situ sensors/instruments of physical parameters
4) Advanced satellite communications techniques

5 M€

2015
1) Energy storage
2) Energy production
3) Materials and structures
4) Wireless power transmission
5) Thermal management systems

2015 indicative

2015
7 M€



Objective: mobilising the incorporation of non-space actors (SMEs, R&D groups) into the space landscape

Competitiveness of the European Space Sector

Space exploration & science

2014-2015

EXPLORATION & SCIENCE

2014
COMPET 7 / 8

Space Exploration – Life Support

8M€

This call focus on closed loop regenerative support system technologies

Synergies between space and non-space sectors actors is expected. Participation from SMEs and academia is encouraged.

Open for ESA participation

Science in context: sample curation facility and scientific exploitation of data from Mars missions

A) **Roadmap** for the implementation of a European extra-terrestrial sample curation facility (Moon, Mars, Asteroids)

B) **Development of tools** for the exploitation Mars data for scientific research, **and analysis** in preparation of the ExoMars missions (2016 / 2018)

4 M€

Space Exploration – Habitat management

ISS is the current cornerstone of European activities in human spaceflight. Its scientific and technological utilisation should be strengthened as a platform for the preparation of the next steps in human exploration. Life support is one of technological priorities for Europe.

This call focuses on microbial quality control of indoor environment in space.

Synergies between space and non-space sectors actors is expected. Participation from SMEs and academia is encouraged.

2015

6M€

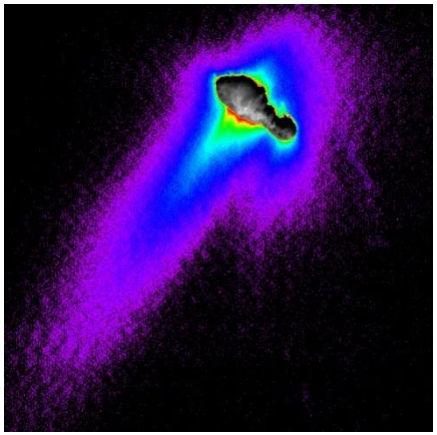
Open for ESA participation

European Commission

Scientific exploitation of astrophysics, planetary and comets data

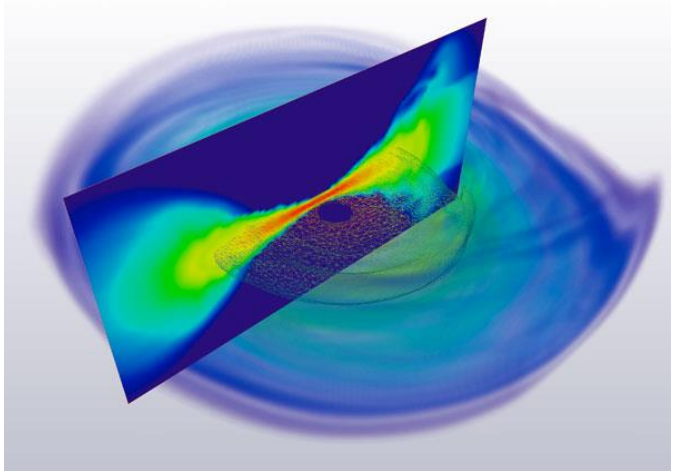
Supporting space astronomy observation proposals in Astrophysics and comets data.

Objective: the development of **tools for advanced processing** and the generation of **high-level data products**. These will be made available through appropriate archives (ESA, NASA, JAXA…)



2015

6 M€



International cooperation
Outreach/communication
2014-2015

European Commission

Technology "demonstrator" projects for exploration

Demonstrator projects would target underpinning enabling technologies for space exploration (e.g. robotics, energy, propulsion or life support).

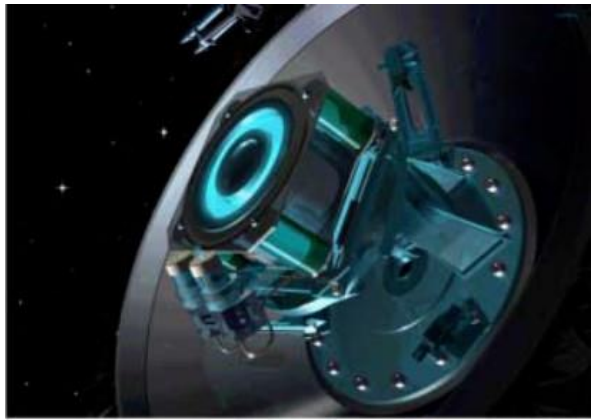
3 M€

International Cooperation in space science

Europe should continue to play a leading role in planetary science shaping the research in the field including the elaboration of Planetary protection guidelines.

2015
1,5 M€

2015 indicative



OUTREACH

2014
COMPET 10

European Commission

Outreach through Education

Trying to stimulate the interest of children and young adults in space careers and achieve a good impact on media for reverberation purposes.

Very open topic: classroom activities or outside the classroom

4 M€

Transnational and international cooperation among NCPs

Reinforcing the network of National Contact Points (NCP) for Horizon 2020, building upon work done in FP7.

Focus on:

- helping less experienced NCPs rapidly acquire the know-how accumulated already in other countries
- promote the SMEs' participation
- promote 3rd countries' participation

SME Call

FTI topic

SME instrument + Fast Track to innovation

2014 & 2015

The **SME instrument** will be a major part of achieving the target of at least 20% of the combined budget of LEIT and Societal Challenges for SMEs

- Initially 5% of LEIT and Societal Challenges budget
- rising to at least 7% averaged over duration of programme

8,5 M€
[8,75 M€ in 2015]

2015

Fast Track to Innovation pilot - launch in **2015**:

- maximum 5 partners, up to EUR 3 million per project
- Bottom-up logic
- Continuously open call with three cut-off dates per year
- Time to grant not exceeding 6 months
- Project will not require Programme Committee approval
- Covering all fields across LEITs and Societal Challenges

2015 indicative

Register as expert!

- For proposal evaluation
- For project reviews

At the participant portal:

https://ec.europa.eu/research/participants/portal/page/experts


Thank you for your attention!
More information at
http://ec.europa.eu/embrace_space