



HORIZON 2020

DG GROW - Internal Market, Industry Entrepreneurship and SMEs

GROW/I1 - Space Policy and Research Unit

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London – 5 July 2016

Summary



1. Space in Union Research Framework Programmes
2. Space Programmes in Multiannual Financial Framework 2014-2020
3. Space research in Horizon 2020
4. Horizon 2020 Space Work Programme 2017
5. Additional information



1 - Space in Union Research Framework Programmes

Space in Union FPs

FP6

2002-2006

€ 17.5 billion



€ 0.240 billion

Part of the
"Aeronautics and **Space**"
thematic area –
Focusing and Integrating
European Research

FP7

2007-2013

€ 53.3 billion



€ 1.900 billion

Space theme, and part of
the **Transport** theme –
*Cooperation Specific
Programme*

H2020

2014-2020

€ 79 billion



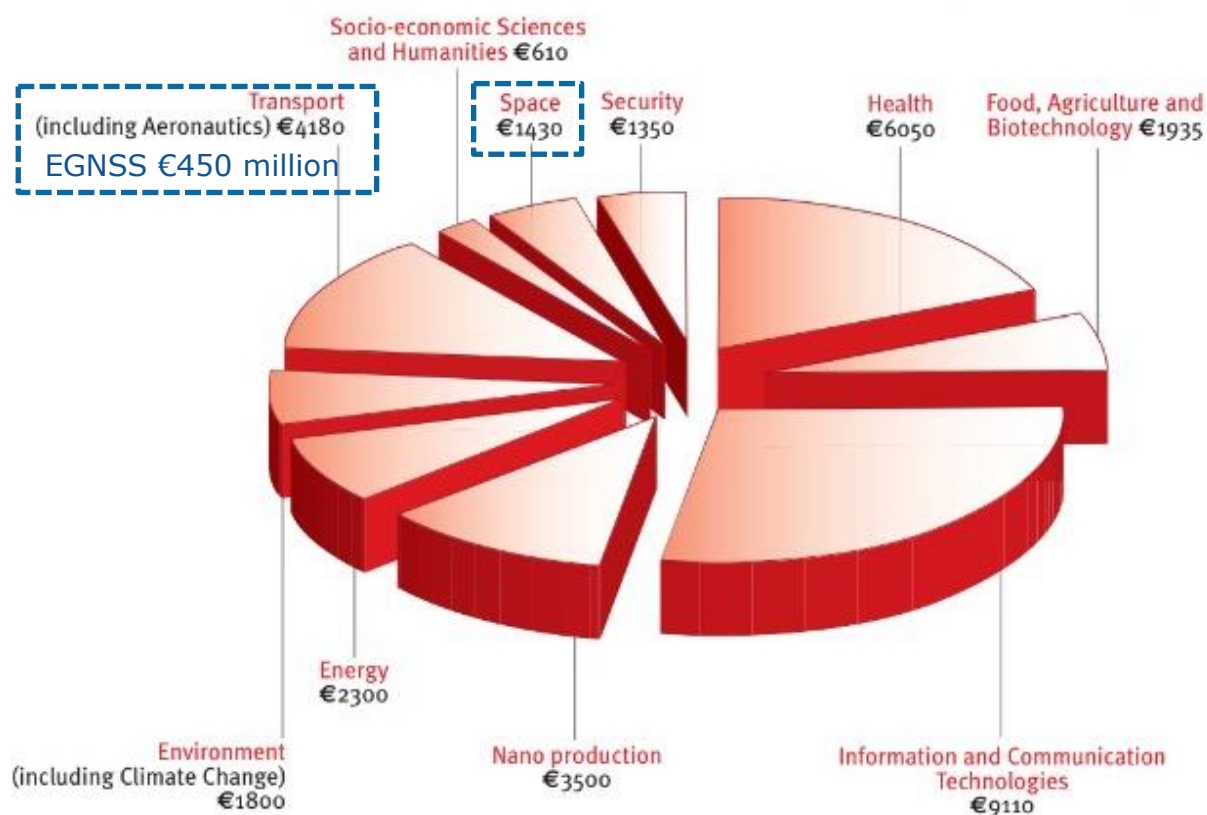
€ 1.479 billion

Leadership in Enabling
Industrial Technologies
(LEIT) – **Space**

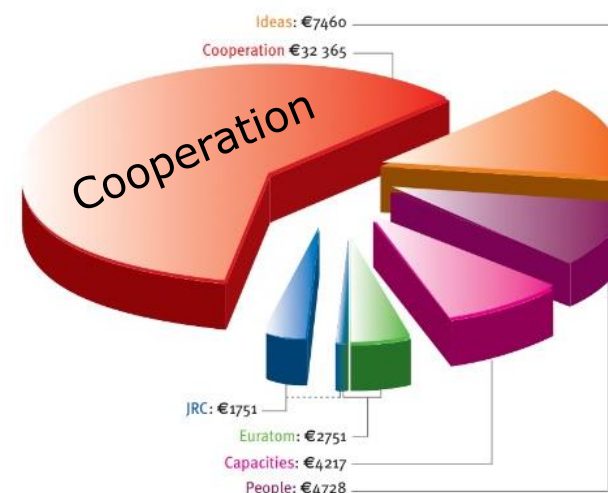
NB: Approximate figures presented above are expressed in different economic conditions.

Space in FP7

The Cooperation Programme breakdown (€ million)



The indicative breakdown (€ million) of FP7



Space in FP7: € 1.9 billion including:

- € 565 million: GMES Space Component (implemented by ESA)
- € 450 million: EGNSS from **Transport** theme

NB: Approximate figures presented above are expressed in 2007 economic conditions.

FP7 space-related themes building blocks

Transport theme

**Satellite
Navigation**
(Galileo and EGNOS)

Applications

EGNSS
infrastructure

Space theme

GMES
(Copernicus)

Space
component

Services

Downstream

**Strengthening
Space
Foundations**

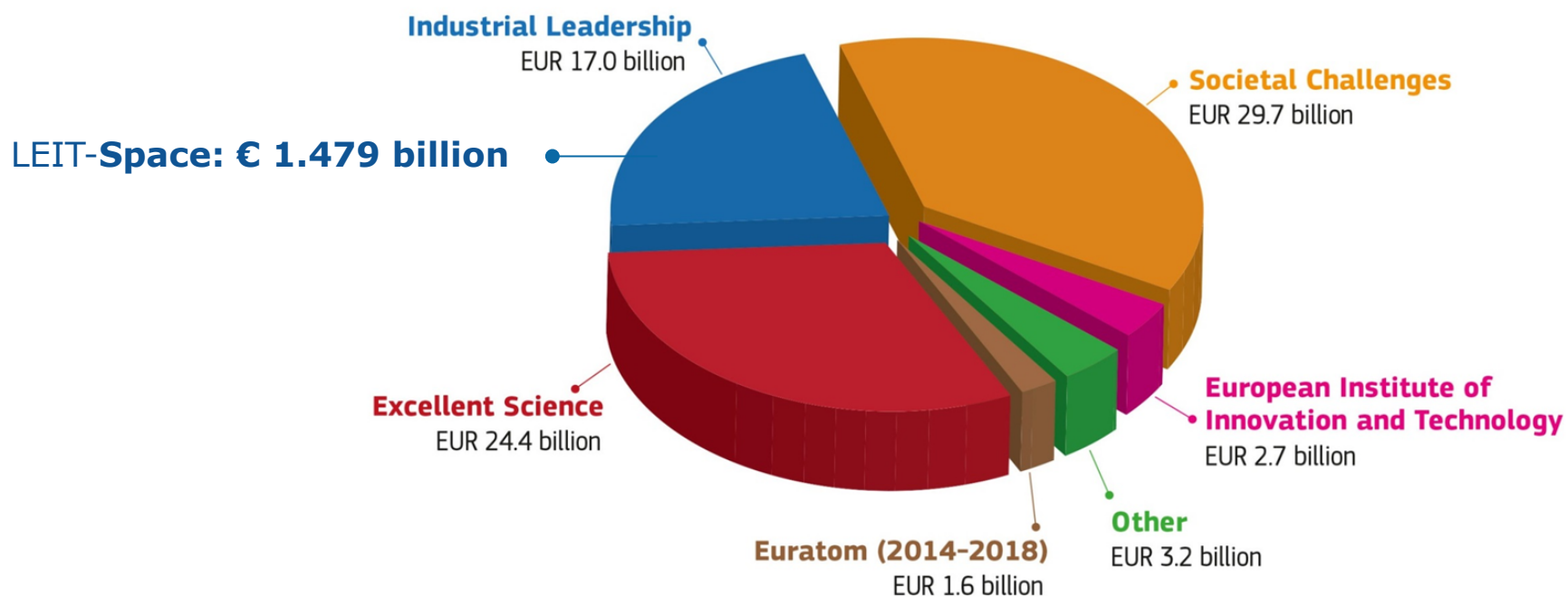
Space
technologies

Space science
and exploration

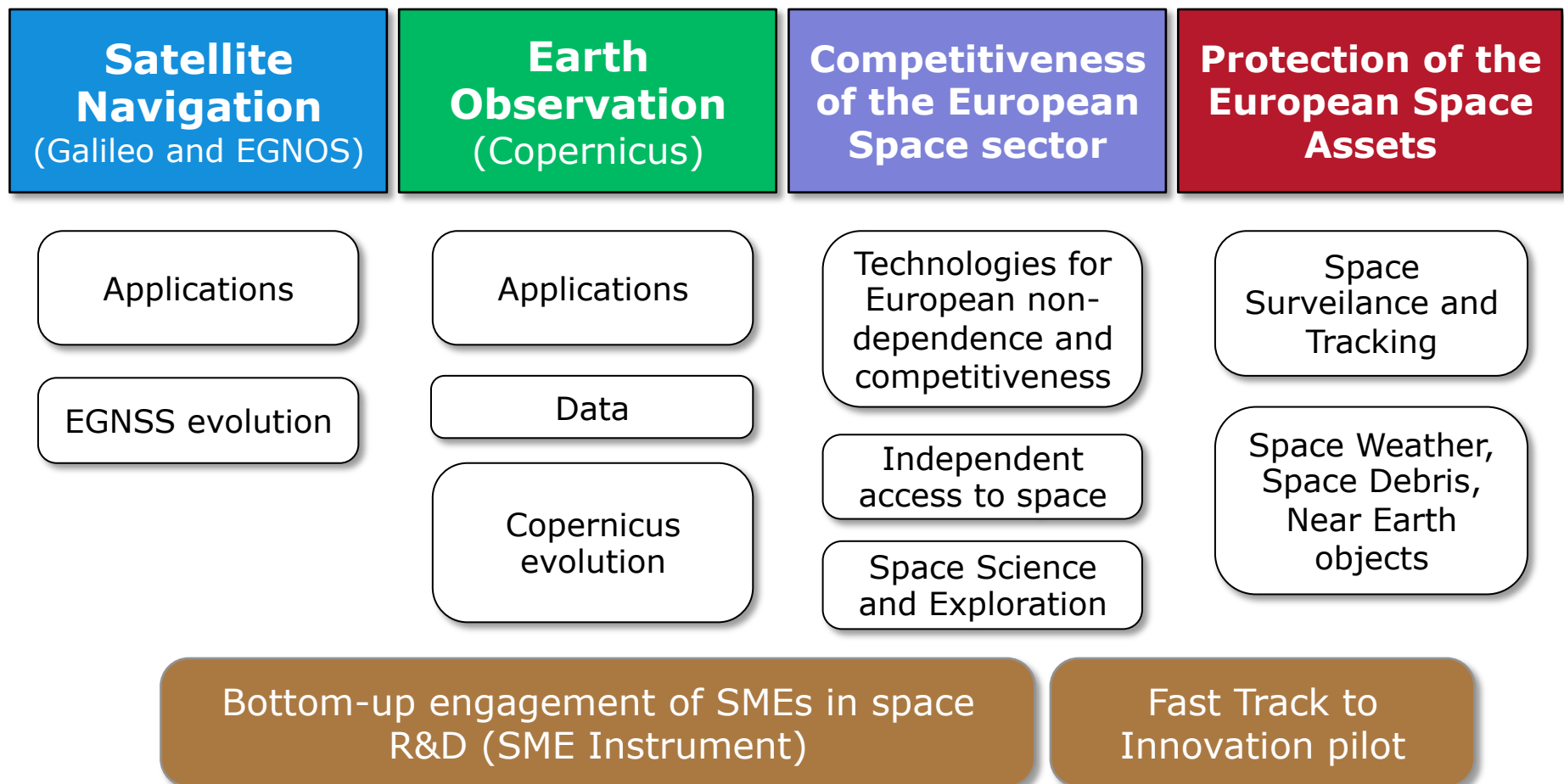
Space Weather,
Space Debris,
Near Earth
objects

Space in H2020

HORIZON 2020 BUDGET (in current prices): € 79 billion



Horizon 2020 space building blocks

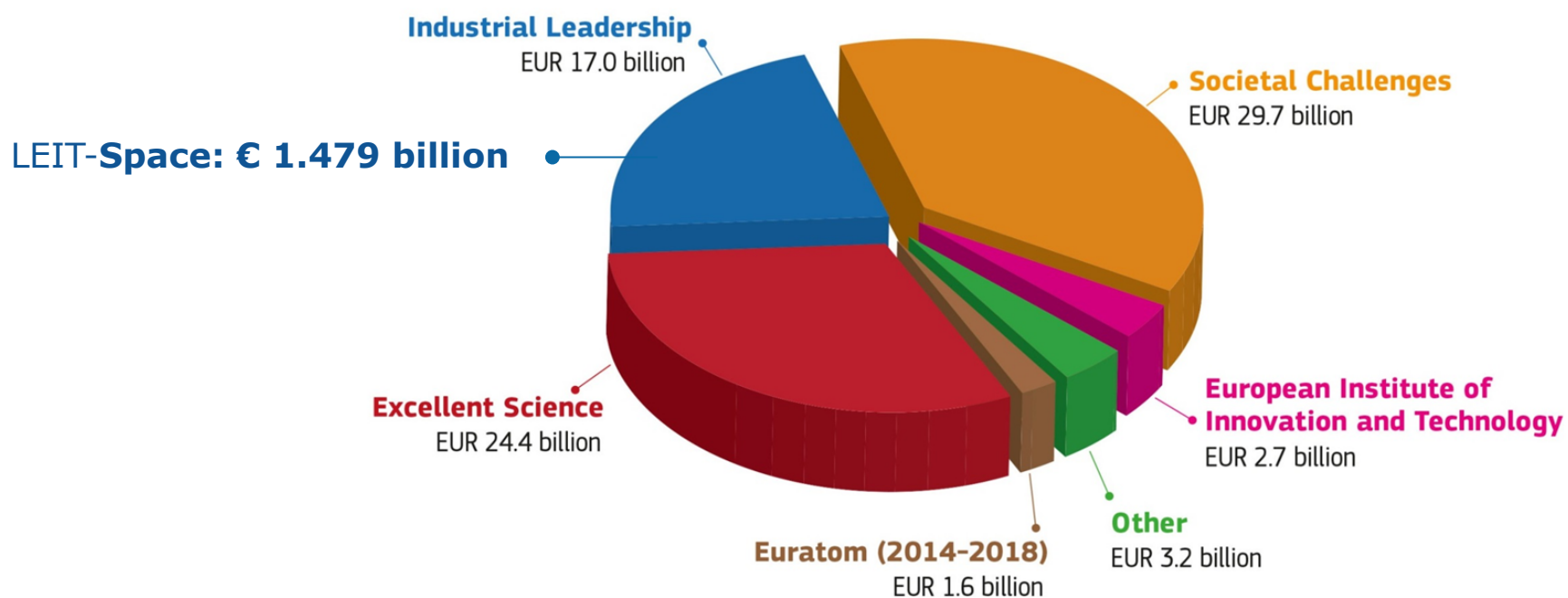




3 - Space research in Horizon 2020

Space in H2020

HORIZON 2020 BUDGET (in current prices): € 79 billion





Excellent science

Priority 1 – **Excellent science**

- **European Research Council (ERC)**
- **Future and Emerging Technologies (FET)**
- **Marie Skłodowska-Curie Actions**
- **Research Infrastructures**

Why?

- World class science is the foundation of tomorrow's technologies, jobs and wellbeing
- Europe needs to develop, attract and retain research talent
- Researchers need access to the best infrastructures



Industrial leadership

Priority 2 – **Industrial leadership**

- **Leadership in enabling and industrial technologies (LEIT)**
 - Information and Communication Technologies (ICT)
 - Nanotechnologies
 - Biotechnology
 - Advanced manufacturing and Processing
 - **Space**
- Access to risk finance
- Innovation in SMEs

Why?

- Strategic investments in key technologies(e.g. advanced manufacturing, micro-electronics) underpin innovation across existing and emerging sectors
- Europe needs to attract more private investment in research and innovation
- Europe needs more innovative small and medium-sized enterprises (SMEs) to create growth and jobs



Societal challenges

Priority 3 – **Societal Challenges**

- **SC1 - Health, demographic change and well-being**
- **SC2 - Food security, sustainable agriculture and forestry, Marine, Maritime and Inland water research, and Bioeconomy**
- **SC3 - Secure, clean and efficient energy**
- **SC4 - Smart, green and integrated transport**
- **SC5 - Climate action, Environment, Resource efficiency and Raw materials**
- **SC6 - Europe in a changing world – Inclusive, Innovative and Reflective societies**
- **SC7 - Secure societies – Protecting freedom and Security of Europe and its citizens**

Why?

- Concerns of citizens and society/EU policy objectives (climate, environment, energy, transport, etc) cannot be achieved without innovation
- Breakthrough solutions come from multi-disciplinary collaborations, including social sciences & humanities
- Promising solutions need to be tested, demonstrated and scaled up



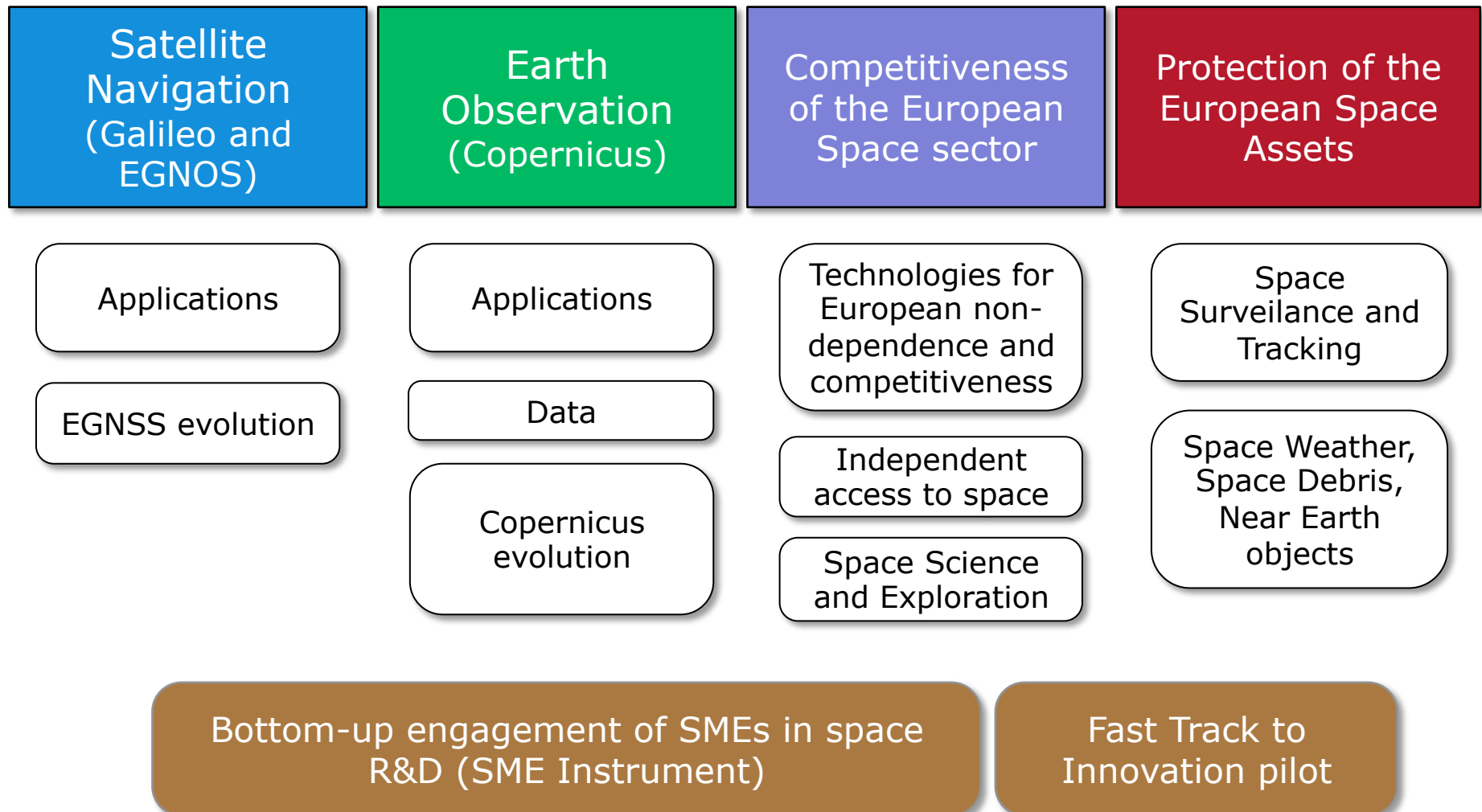
- Enabling European **competitiveness**, **non-dependence** and **innovation** of the European space sector
 - ✓ Safeguard and further develop a competitive, sustainable and entrepreneurial space industry and research community and strengthen European non-dependence in space systems
 - ✓ Boost innovation between space and non-space sectors
- Enabling advances in **space technologies**
- Enabling the **exploitation of space data**
- Enabling European research in support of **international space partnerships**
- The application of space technologies shall be supported through the respective specific objectives of the priority "**Societal challenges**", where appropriate

For more information please consult Council Decision of 3 December 2013, [OJ L 347/993](#).

H2020 Space building blocks



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H2020 Space Calls for proposals



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2014-2015 work programme published in 10 December 2013

2014 call: call closed, grants signed, projects launched in January 2015

2015 call: call closed, grants signed, projects launched in January 2016

2016-2017 work programme published on 10 November 2015
(to be updated in July 2016)

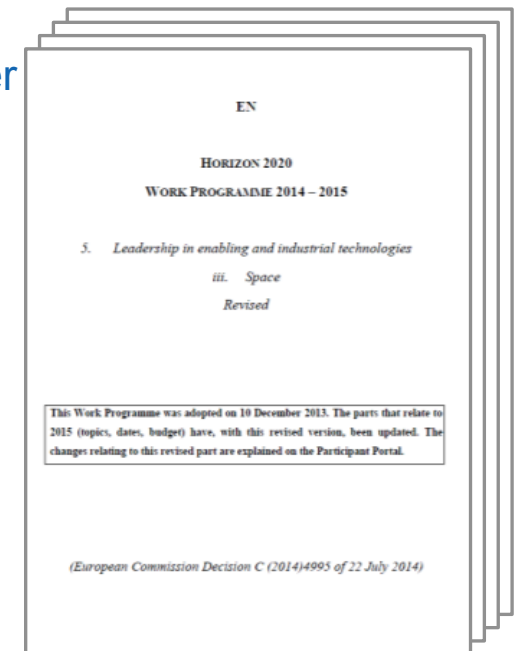
2016 call call closed (deadline 3 March 2016), projects under evaluation

2017 call deadline 1 March 2017

Work Programme (part 05iii LEIT-Space) is available at the H2020 participant portal: <http://ec.europa.eu/research/participants/portal/>

The associated guidance documents are available at:

<http://ec.europa.eu/growth/sectors/space/research/horizon-2020/>



WP 2016-2017 Implementation calendar



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Calls	Opening dates	Deadlines
EO-2016 COMPET-2016	10 November 2015	3 March 2016
GALILEO-2017 EO-2017 COMPET-2017	8 November 2016	1 March 2017



EU agencies involved

- ***Research Executive Agency (REA)***
- ***European GNSS Agency (GSA)***
- ***Executive Agency for SMEs (EASME)***

TASKS

Call handling, receipt of proposals, evaluation process, grant agreement preparation, grant agreements signature, receipt of reporting, reviews, payments, audits...

Types of actions and Funding rates



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- **Research and innovation actions (Funding rate: 100%):** Projects aiming to establish new knowledge, new or improved technology by possibly including basic and applied research, technology development, testing and validation on a small-scale prototype.
- **Innovation actions (Funding rate: 70% - exception: 100% for non-profit legal entities):** Projects aiming to produce plans, arrangements or designs for a new or improved product, design, process or service by possibly including large-scale product validation and market replication.
- **Coordination and support actions (Funding rate: 100%):** Projects consisting of accompanying/complementary measures (standardisation, awareness-raising, communication, policy dialogues, networking, studies, etc.)

Full detailed description can be found in the **General Annexes 20 – part D** of the Work Programme 2016-2017:

http://ec.europa.eu/research/participants/data/ref/h2020/other/wp/2016-2017/annexes/h2020-wp1617-annex-ga_en.pdf



4 - Horizon 2020 Space Work Programme 2017

Horizon 2020 Space WP 2017 structure



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EGNSS

Galileo & EGNOS
applications and
infrastructure

Calls for proposals:

- EGNSS applications

Other actions:

- Evolution of EGNSS
infrastructure, mission
and services

EO

Earth Observation
applications and services

Calls for proposals:

- EO downstream
applications
- EO "big data" shift
- Preparation for a
European capacity to
monitor CO2
anthropogenic
emissions

COMPET

Competitiveness of the
European Space sector:
Technology and Science
(incl. Space Weather)

Calls for proposals:

- Critical space technologies
- Strategic research clusters
- EO & SatCom technologies
- Science and Exploration
- **Space Weather**
- Space Portal
- Technology transfer

Other actions:

- ESA Engineering support
- Horizon prize on
low-cost access to space

SST

Space Surveillance
and Tracking support
framework

Other actions:

- Contribution to the
SST support
framework
- Improving the
performance of
SST at European
level

SME Instrument

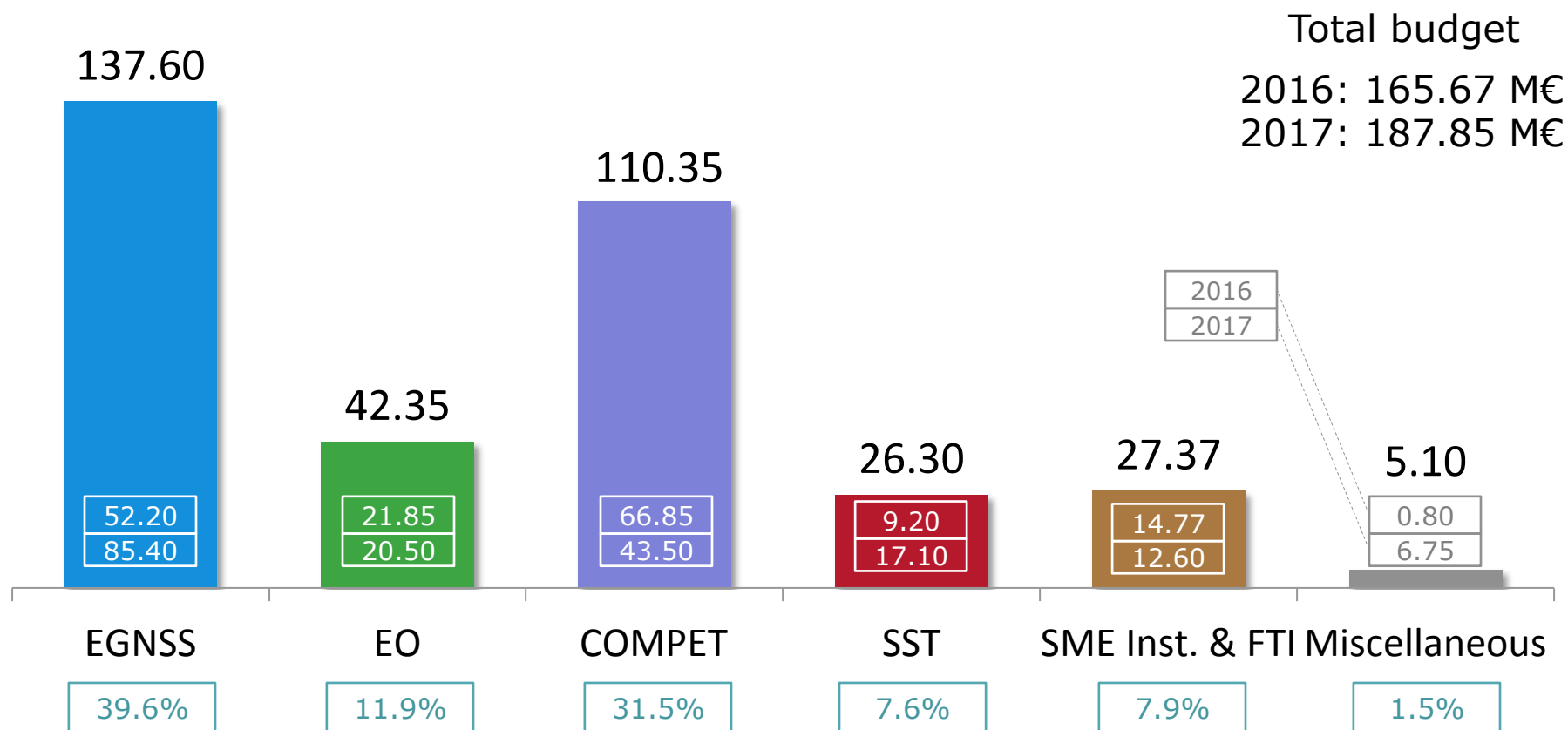
Fast Track to
Innovation 'pilot'

WP 2016-2017 Indicative budget



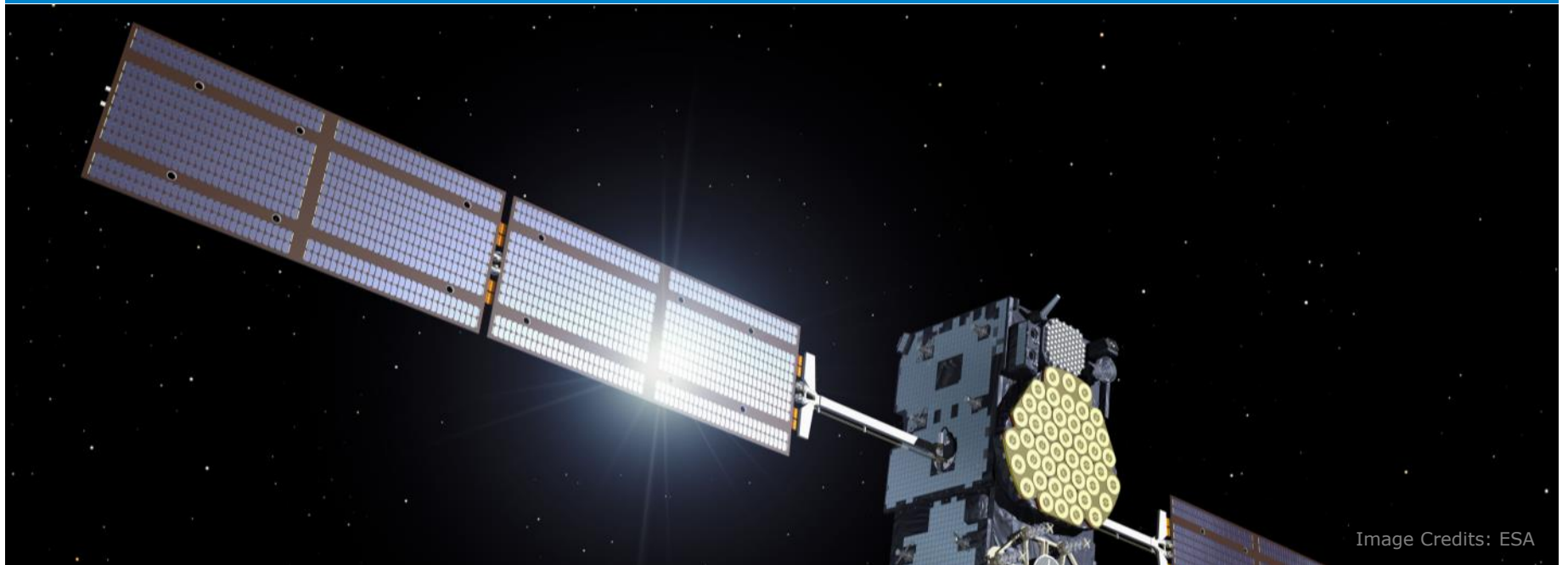
22

LEIT-Space 2016-2017 WP **indicative budget** (figures in M€) Calls for proposals + "Other actions"



2017 call topics

Satellite Navigation – Galileo and EGNOS



Deadline: 1 March 2017

Satellite Navigation Galileo and EGNOS



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Satellite Navigation – Galileo and EGNOS: summary

WP 2016	
Other actions	Indicative budget (M€)
Activity 1 - Galileo Evolution, Mission and Service related R&D activities	3.3
Activity 2 - EGNOS, Mission and Service related R&D activities	0.9
Activity 4 - GNSS evolution, infrastructure-related R&D activities	48.0

WP 2017	
Call for proposals	Indicative budget (M€)
GALILEO-1-2017: EGNSS Transport applications	14.5
GALILEO-2-2017: EGNSS mass market applications	9.0
GALILEO-3-2017: EGNSS professional applications	8.0
GALILEO-4-2017: EGNSS awareness raising and capacity building	1.5
Total GALILEO-2017	33.0
Other actions	Indicative budget (€ million)
Activity 12 - GNSS Evolution, Mission and Services related R&D activities	3.2
Activity 13 - EGNOS, Mission and Service related R&D activities	0.7
Activity 15 - GNSS evolution, infrastructure-related R&D activities	48.5

2017 call topics

Earth observation



Deadline: 1 March 2017



EO-1-2017

Downstream applications

Proposals may address a wide variety of applications stemming from the use of Earth observation and its smart integration with other related technologies...

The outcome of this innovation project 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...

Corresponding validations and customisations are to be undertaken, and the business case for the application is to be demonstrated...

The choice of EO application is left to the proposer...

Recommened project size
Indicative budget
Type of action

1 to 2 M€

12 M€

**Innovation
Actions**

EO-2-2017

EO Big Data Shift

Activities are expected to address the adaptation of big data technologies to Copernicus user scenarios ...

Activities should include the development of tools ... should address any relevant aspect of the data lifecycle which can solve EO big data challenges ...(e.g. collection, processing including online processing, quality control, documentation, dissemination, cataloguing, preservation, usage tracking, integration) and usage activities (e.g. discovery, analysis (including visual), product generation, user feedback, tagging, knowledge extraction, decision making)...

Participation of industry, in particular SMEs, is encouraged.

Recommened project size
Indicative budget
Type of action

1 to 2 M€

6.5 M€

**Research and
Innovation
Actions**

Topic updated



EO-3-2017

Preparation for a European capacity to monitor CO₂ anthropogenic emissions

Activities will encompass the coordination of ongoing efforts, include mutual identification of research and infrastructural gaps, and facilitate a cooperation of further research and development to be undertaken to reach sufficiently mature capacities for an operational integration as a subsequent step. The areas needing attention are:

1. Reconciling Top down and bottom up estimates
2. Library of simulations for emissions and atmospheric transport
3. Uncertainty trade-off for fossil fuel emissions
4. Attributing CO₂ emissions from in-situ measurements

Recommened project size
Indicative budget
Type of action

1 Project

3,5 M€

**Coordination
and support
action**

New Topic

Earth observation calls for proposals: summary

'Space' WP 2016/2017		
	2016	2017
Call for proposals	Indicative budget (M€)	Indicative budget (M€)
EO-1-2016/2017: Downstream applications	9.85	12.0
EO-2-2016: Downstream services for public authorities	3.0	-
EO-3-2016: Evolution of Copernicus services	9.0	-
EO-2-2017: EO Big Data Shift	-	6.5
EO-3-2017: Preparation for a European capacity to monitor CO2 anthropogenic emissions		3.5
Sub-total EO-2016/2017	21.85	22.0
COMPET-2-2017: Competitiveness in Earth observation mission technologies		7.0
Total EO related 'Space' (2016/2017)	21.85	29.0



Societal Challenge 2

Blue Growth – demonstrating an ocean of opportunities (H2020-BG-2016-2017):

- BG-9-2016: An integrated Arctic observing system
- BG-12-2016: Towards an integrated Mediterranean Sea Observing System

Sustainable Food Security – resilient agri-food chains (H2020-SFS-2016-2017):

- SFS-43-2017: Earth Observation services for the monitoring of agricultural production in Africa

Societal Challenge 5

Climate Action, Environment, Resource Efficiency and Raw Materials – Earth Observation (H2020-SC5-2016-2017):

- SC5-18-2017 - Novel in-situ observation systems
- SC5-19-2017 - Coordination of citizens' observatories initiatives
- SC5-20-2016 - European data hub of the GEOSS information system

SME Instrument (H2020-SMEInst-2016-2017), although not dedicated uniquely to Earth Observation, is particularly well suited for SMEs addressing space based applications

- SMEInst-04-2016-2017: Engaging SMEs in space research and development
- SMEInst-12-2016-2017: Boosting the potential of small businesses in the areas and priorities of Societal Challenge 5

Related Earth Observation activities



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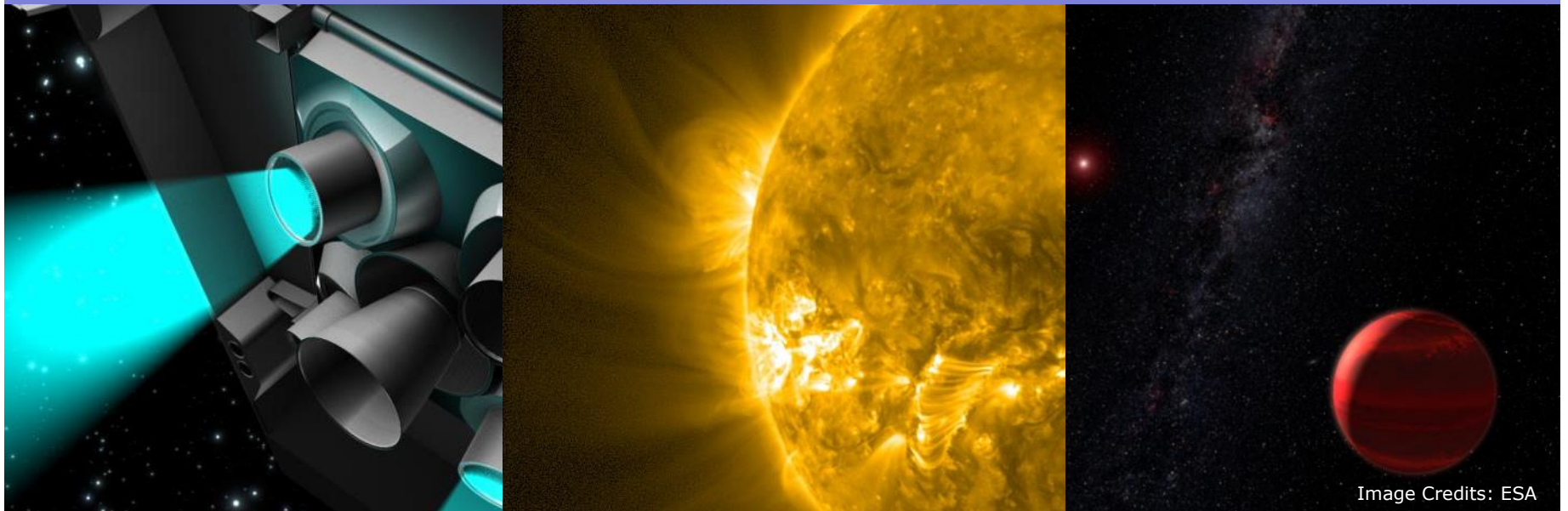
'SC2' + 'SC5' WP 2016/2017	
	2016/2017
Societal Challenge 2: Blue Growth – demonstrating an ocean of opportunities (H2020-BG-2016-2017)	Indicative budget (M€)
BG-9-2016: An integrated Arctic observing system (RIA)	15.0
BG-12-2016: Towards an integrated Mediterranean Sea Observing System (RIA)	8.0
Societal Challenge 2: Sustainable Food Security – resilient agri-food chains (H2020-SFS-2016-2017)	Indicative budget (M€)
SFS-43-2017: Earth Observation services for the monitoring of agricultural production in Africa (RIA)	10.0
Societal Challenge 5: Earth Observation (H2020-SC5-2016-2017)	Indicative budget (M€)
SC5-18-2017 - Novel in-situ observation systems (RIA)	15.0
SC5-19-2017 - Coordination of citizens' observatories initiatives (CSA)	4.6*
SC5-20-2016 - European data hub of the GEOSS information system (RIA)	10.0
Total EO related in SC2 and SC5 (2016/2017)	58.0

* This amount corresponds to three topics, among which SC5-19-2017 (not included in the total).



2017 call topics

Competitiveness of the European Space Sector Technology and Science



Deadline: 1 March 2017

Competitiveness of European Space Sector



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Competitiveness of the European Space Sector –Technology and Science: summary

WP 2016	
Call for proposals	Indicative budget (M€)
COMPET-1-2016: Technologies for European non-dependence and competitiveness	14.85
COMPET-2-2016: Maturing Satellite Communication technologies	7.0
COMPET-3-2016: SRC – In-Space electrical propulsion and station keeping	23.0
COMPET-4-2016: SRC – Space Robotics Technologies	18.0
COMPET-5-2017: Scientific instrumentation	3.0
Total COMPET-2016	65.85
Other actions	Indicative budget (€ million)
Activity 7 - Engineering support by ESA	1.0

WP 2017	
Call for proposals	Indicative budget (M€)
COMPET-1-2017: Technologies for European non-dependence and competitiveness	15.0
COMPET-2-2017: Competitiveness in Earth observation mission technologies	7.0
COMPET-3-2017: High speed data chain	10.0
COMPET-4-2017: Scientific data exploitation	6.0
COMPET-5-2017: Space Weather	3.0
COMPET-5-2017: Space portal	0.5
COMPET-6-2017: Technology transfer and business generators	2.0
Total COMPET-2017	43.5
Other actions	Indicative budget (€ million)
Activity 11 - Horizon Prize for low cost access to space (4M€ prize from 2020 budget)	-
Activity 18 - Engineering support by ESA	1.0

Space Surveillance and Tracking



2017 Other actions

Space Surveillance and Tracking: summary

WP 2016	
Other actions	Indicative budget (€ million)
Activity 5 - Framework Partnership Agreement on the SST Support Framework	-
Activity 6 - SST contribution to the support Framework	1.2
Activity 7 - Improving the Performances of the SST at European Level	8.0

WP 2017	
Other actions	Indicative budget (€ million)
Activity 16 - SST contribution to the support Framework	1.6
Activity 17 - Improving the Performances of the SST at European Level	15.0

SME Instrument and Fast Track to Innovation

THE FRAMEWORK PROGRAMME FOR RESEARCH AND INNOVATION

The graphic for Horizon 2020 features the word "HORIZON" in large, white, sans-serif capital letters, followed by "2020" in a similar font. A small, realistic globe of the Earth is positioned between the 'O' in "HORIZON" and the '2' in "2020". The background is a deep blue with a bright, glowing horizon line and radiating light beams, suggesting a sunrise or a view from space.

HORIZON 2020

SME Instrument phases





SME Instrument and Fast Track to Innovation: summary

WP 2016/2017		
	2016	2017
Call for proposals	Indicative budget (€ million)	Indicative budget (€ million)
SMEInst-04-2016-2017: Engaging SMEs in space research and development	11.37	12.60
Fast Track to Innovation	3.40	-

Fast Track to Innovation



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Fast Track to Innovation Pilot

THE ULTIMATE BOOST FOR OUTSTANDING BUSINESS INNOVATORS WITH A NEED FOR SPEED...

PREPARE YOUR PROPOSAL

Build your industry-intensive consortium*
minimum 3 partners – maximum 5 partners
(all based in the EU and / or in Horizon 2020
associated countries)

Proposal



Outstanding Business Innovation Concept
(high-readiness level / TRL 6, meaning
demonstrated in a relevant environment)

Continuous open call
until end 2016

6 months time-to-grant

DEVELOP YOUR INNOVATION

Receive an EU grant of EUR 1 million to 3 million
(70% of funding, 100% of funding for non-profit entities)

From Mature R&D
Demonstration
Market-Oriented
R&D
to Market-Mature Innovation

12-24 months for implementation

HIT THE MARKET!

Start your commercial activities



The Market
Market-Maturity to Market
Launch



Market-ready result
(finished product, service,
process/ TRL 9)

At most 36 months from grant to market

*In a consortium with 3 or 4 partners, at least 2
should be industry, and in a consortium with 5
partners, at least 3; alternatively at least 60% of
the project budget should be allocated to industry
(i.e. private for profit entities)

... AND EAGER TO COMPETE ON GLOBAL MARKETS...!

ACTIVITIES SUPPORTED

Systems validation in real working conditions – Testing – Piloting – Business model validation – Standard setting – Pre-normative research – EU quality label

Space

SME Instrument and Fast Track to Innovation: summary

WP 2016/2017		
	2016	2017
Call for proposals	Indicative budget (€ million)	Indicative budget (€ million)
SMEInst-04-2016-2017: Engaging SMEs in space research and development	11.37	12.60
Fast Track to Innovation	3.40	-

RTD Projects in FP7/Space



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999 PROPOSALS submitted in 6 CALLS

262 PROJECTS funded by EC with ~ 662 M€



Further information available in
http://ec.europa.eu/growth/sectors/space/research/fp7/index_en.htm



MAARBLE

Monitoring, Analyzing and Assessing Radiation Belt Loss and Energization



Maarble Earth radiation

ABSTRACT

MAARBLE aims at shading light on the ways the dynamic evolution of the Earth's radiation belt is influenced by ultra low frequency electromagnetic waves in geospace.

UNDERSTANDING THE DYNAMICS OF Earth'S RADIATION BELTS

The Van Allen radiation belts are two torus-shaped regions encircling the Earth, in which high-energy charged particles are trapped by the geomagnetic field. Radiation belt variability is of outstanding scientific interest and is also of relevance to any human endeavour in space, as it has direct impacts on spacecraft as well as on humans in space.

Although the radiation belts were discovered in the early years of the space era by the Explorer satellites, we still have no complete understanding of radiation belt dynamics. The MAARBLE project employs spacecraft monitoring of the geospace environment, complemented by ground-based magnetometer monitoring, in order to analyze and assess the physical mechanisms leading to radiation belt particle energization and loss. Particular attention is paid to the role of ultra low frequency electromagnetic waves, which are known to play a crucial role in the efficient energization of particles.

MAARBLE will contribute to the scientific understanding of radiation belt dynamics, with distinct merits for robotic and manned space exploration and for the establishment of a European space weather monitoring and forecasting capability. To this end, the project foresees:

- » the use of data assimilation techniques to guide the best estimate of the state of the electron radiation belts;
- » the creation of a database of ultra low and very low frequency (ULF and VLF) waves in the radiation belts;
- » the development of a statistical model of radiation belts' relevant wave activity.



Ioannis A. DAGLIS
Project Coordinator

QUESTIONS & ANSWERS

What is the project designed to achieve?

MAARBLE aims at achieving a deeper understanding of the relationships between ULF and VLF waves and radiation belt dynamics, through the development of a statistical model of waves and the incorporation of particle measurements into data assimilation tools.

Why is this project important for Europe?

Most European satellites operate in regions where they can be exposed to intense fluxes of extremely energetic radiation belt particles. Understanding radiation belt dynamics will provide the means to mitigate risk to European space assets.

How does this project benefit European citizens?

MAARBLE will foster new knowledge on the radiation belts variability, which is of direct relevance to the smooth operation of the European satellite navigation system Galileo and numerous other service satellites of interest to European citizens.

MAARBLE

Monitoring, Analyzing and Assessing Radiation Belt Loss and Energization

LIST OF PARTNERS

- National Observatory of Athens, Greece
- Office National d'Etudes et de Recherches Aéronautiques, France
- Institutet för Rymdfysik, Sweden
- Ústav fyziky atmosféry AV ČR, v.v.i., Czech Republic
- Natural Environment Research Council, United Kingdom
- University of Alberta, Canada
- University of California, Los Angeles, USA

COORDINATOR

National Observatory of Athens, Greece

CONTACT

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PROJECT INFORMATION

Monitoring, Analyzing and Assessing Radiation Belt Loss and Energization (MAARBLE)

Contract N°: 284520
Starting Date: 01/01/2012
Duration: 36 months
EU Contribution: € 1.995.042,90
Estimated total cost: € 2.845.504,37



HORIZON 2020

Thank you
for your attention

Space research and guidance documents

<http://ec.europa.eu/growth/sectors/space/research/horizon-2020/>

Published work programme 2016-2017

http://ec.europa.eu/research/participants/data/ref/h2020/wp/2016_2017/main/h2020-wp1617-leit-space_en.pdf