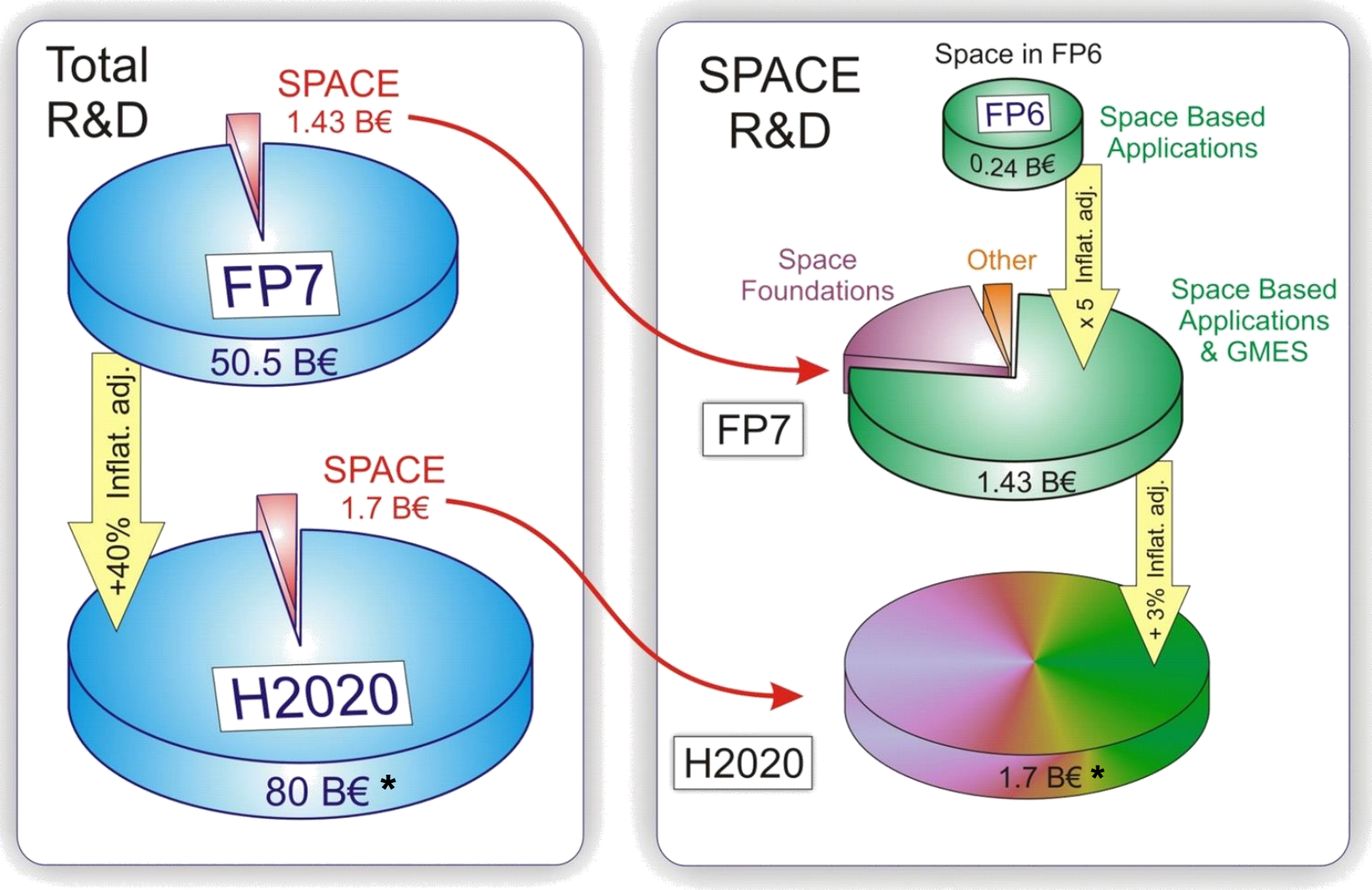
Space research

Horizon 2020 - Work Programme 2014-2015

Horizon 2020 Space Information day

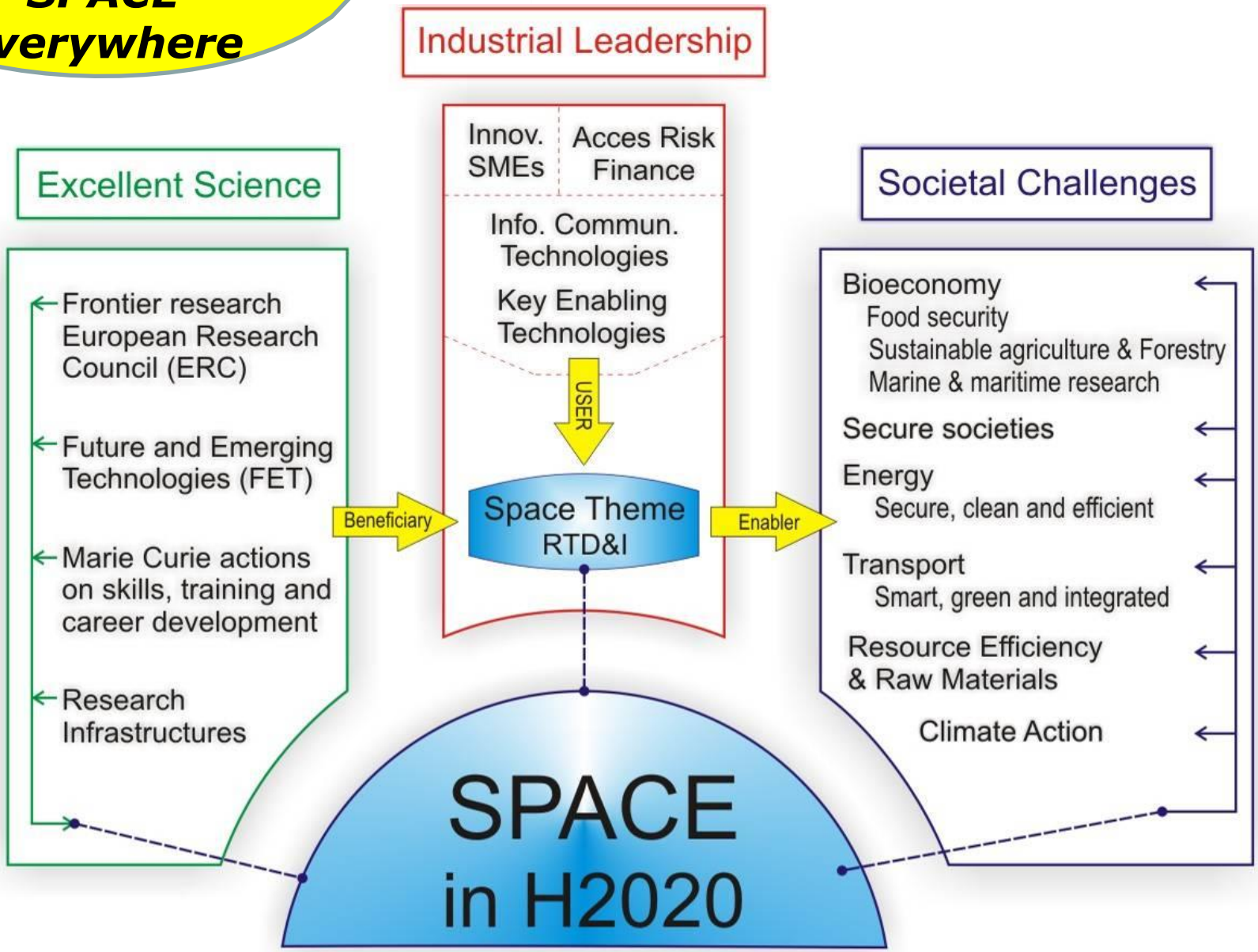
Paris - January 2014

From
FP6 → FP7 → H2020



** European Commission proposal*

There is a place for SPACE everywhere



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,.....**

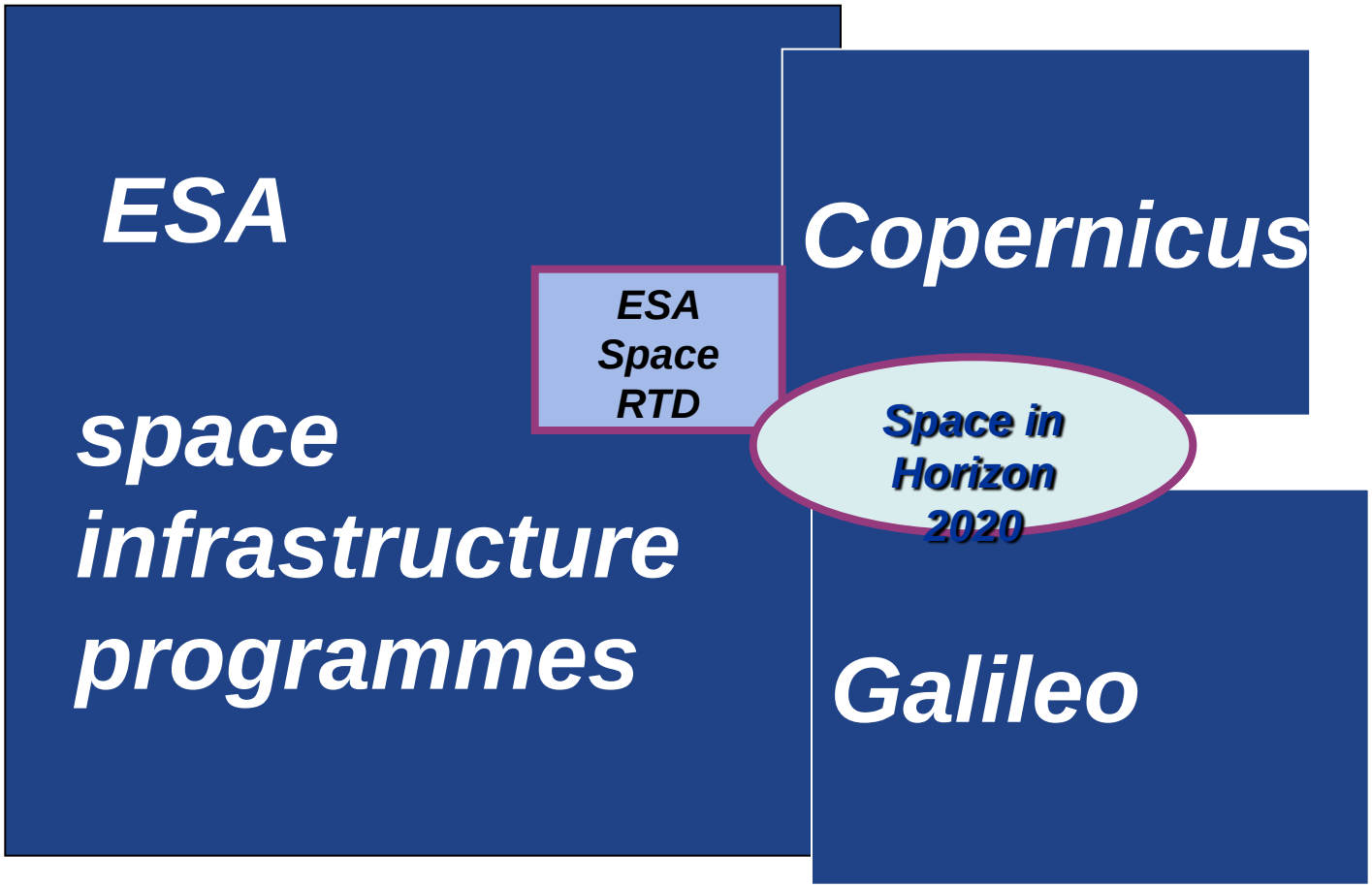
H2020 and ESA, EU and Member States

Relationship of Horizon 2020 to other Space R&D is clearly spelt out by EU Member States in the amendement to the Horizon 2020 regulation text:

In the field of space research, action at Union level will be carried out in conjunction with the space research activities of the Member States and European Space Agency (ESA),_aiming at building up complementarity among different actors.

Context: RTD and infrastructure

European Commission



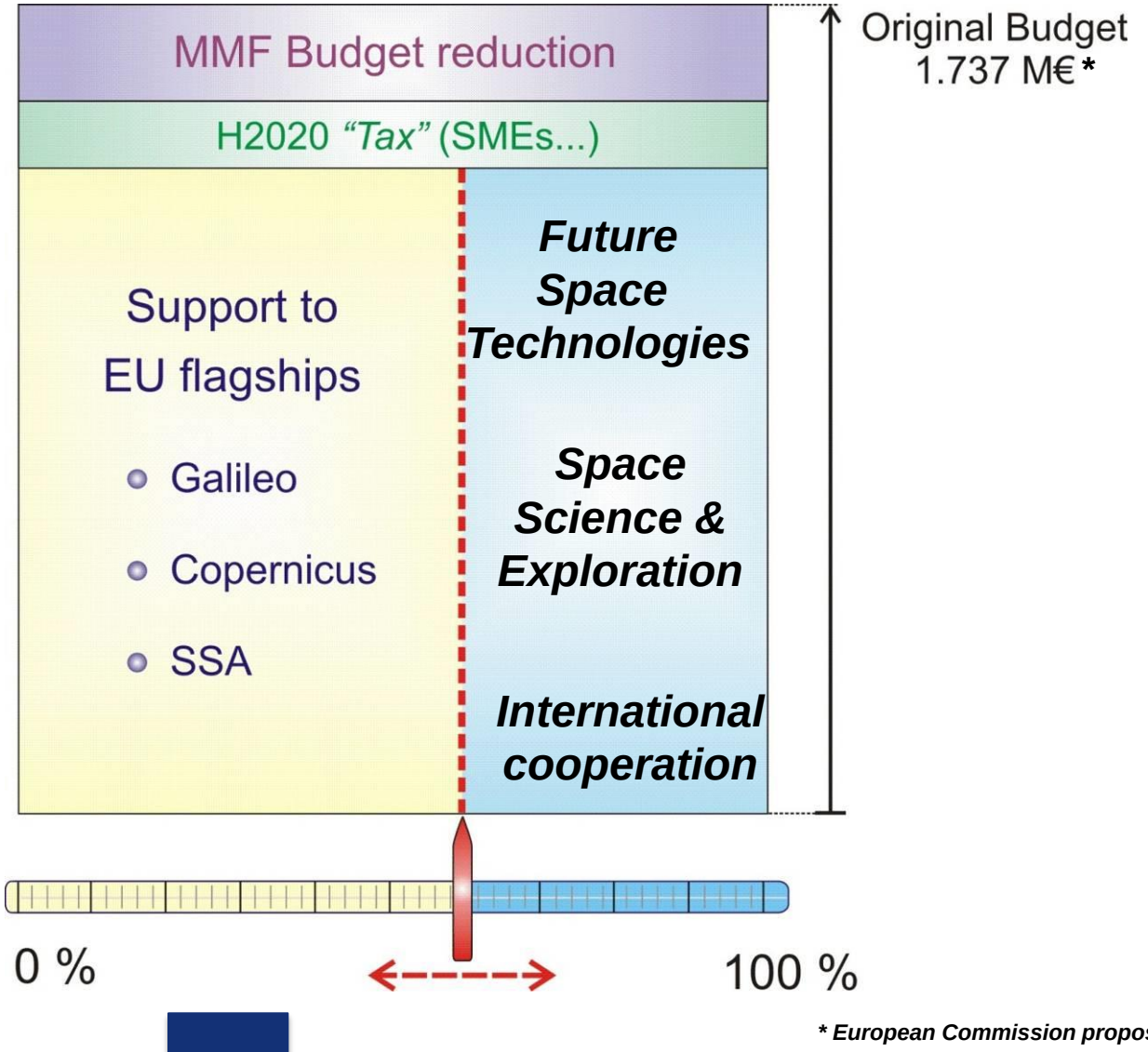
State of play of H2020

European Commission

Potential topics

Under discussion

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



** European Commission proposal*

H2020 Instruments and Implementation

European Commission

Horizon 2020 has a wider and more flexible range of instruments that can be used for the entire range from basic research to close to market demonstration

- Collaborative Project, Coordination and Support Action
  => **Open competitive calls**
- Prizes, pre-commercial procurement, loans, loan guarantees
- Single beneficiaries possible
  => GSA
  => partnership with ESA where appropriate
- Agenda-driven, roadmap approach
  ⇒ **SRC "Strategic Research Cluster" : Roadmaps to be developed, coordinated projects to be implemented, in order to reach a strategic objective**
  ⇒ **PSA "Programme Support Activity" to design the SRC**

H2020 - Space : Structure

European Commission

GALILEO : Applications in satellite navigation – Galileo

EO : Earth Observation – **Copernicus**

PROTEC : Protection of european assets in and from space

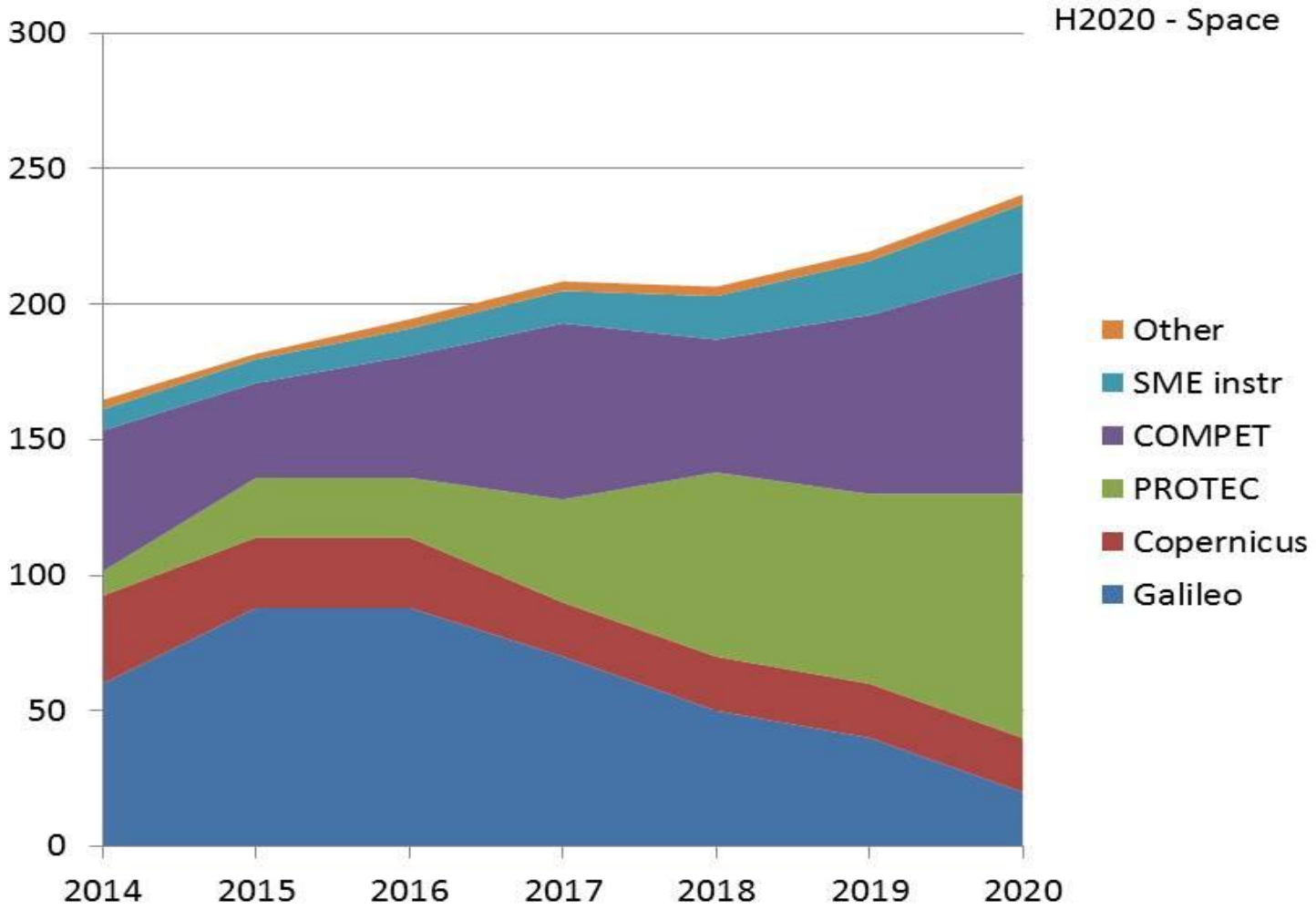
COMPET :Competitiveness of the European space sector

- **Space Technology**
- **Space exploration and science**
- **International cooperation in space matters**
- **Outreach and communication**

Other actions (not subject to calls for proposals)

Indicative Evolution

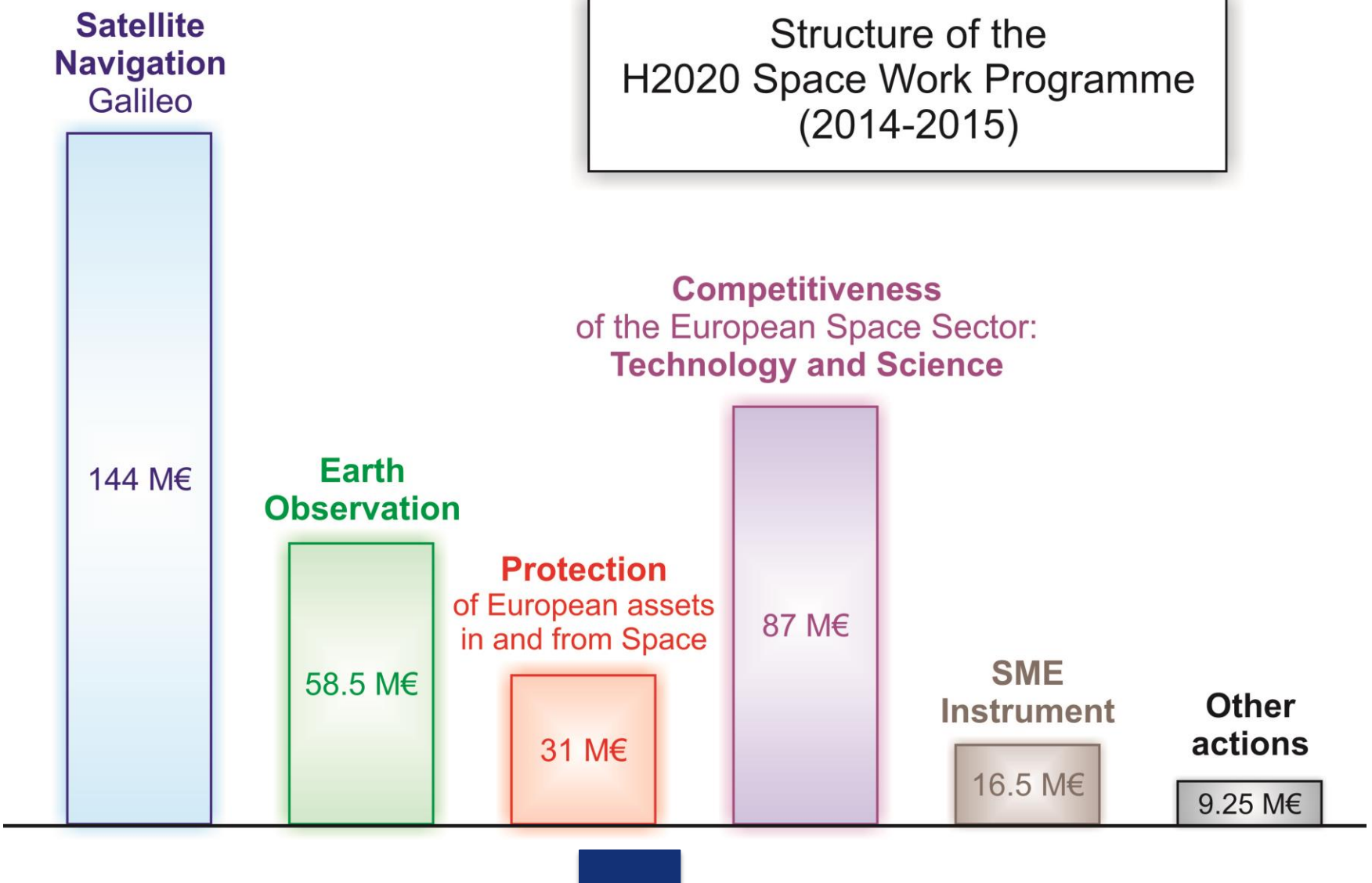
Space 2014-2020



DRAFT BUDGET

European Commission

Structure of the
H2020 Space Work Programme
(2014-2015)



European Commission

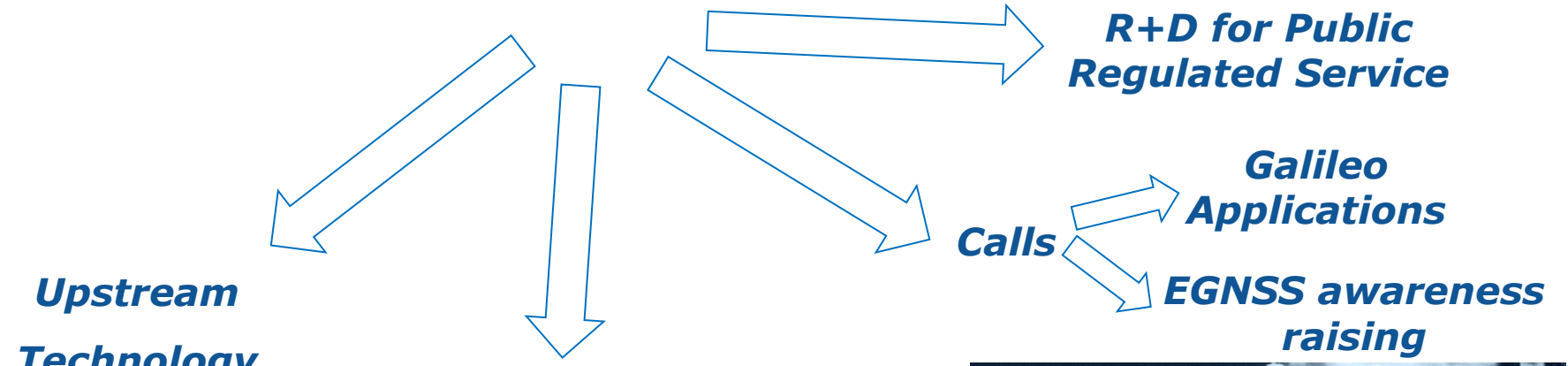
Galileo

2014-2015

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 1, 2 and 3

European Commission

Galileo 1 - EGNSS applications

35 M€

Galileo 2 - SME based EGNSS applications

15 M€

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

10 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

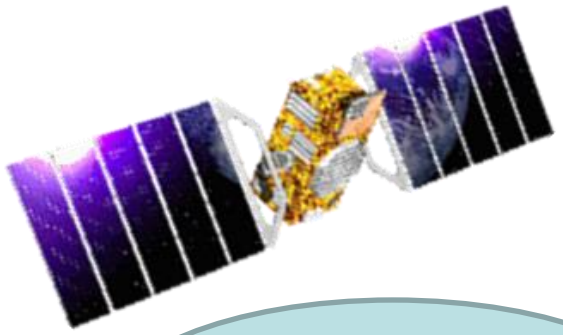
Galileo 4 - EGNSS awareness raising, capacity building and/or promotion activities in and outside of EU

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.



14 M€

B 2014: Activity 1

Research and Development activities related to Galileo Public Regulated Service (PRS)

Procurement topics:

1. Development of enabling technologies for PRS

2. Enabling the development of low-end PRS receivers

The overall objective of these procurements is to enable space-related technologies and the demonstrators for PRS applications.

20 M€ Procurement GSA -

B-2015 Activity 1

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

B-2015 Activity 2

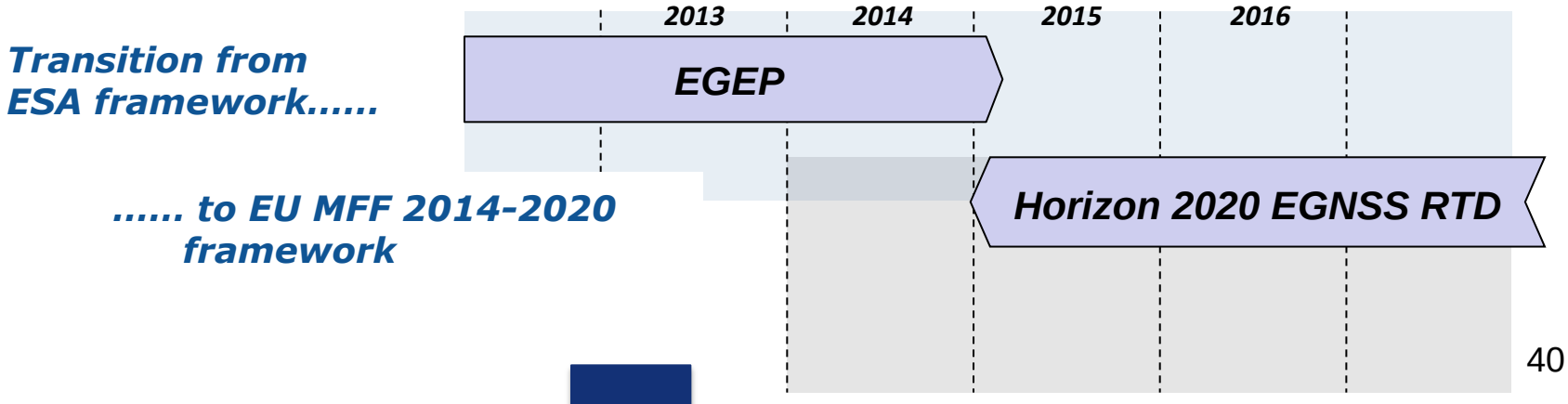
GNSS Evolution: infrastructure-related R&D activities

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€

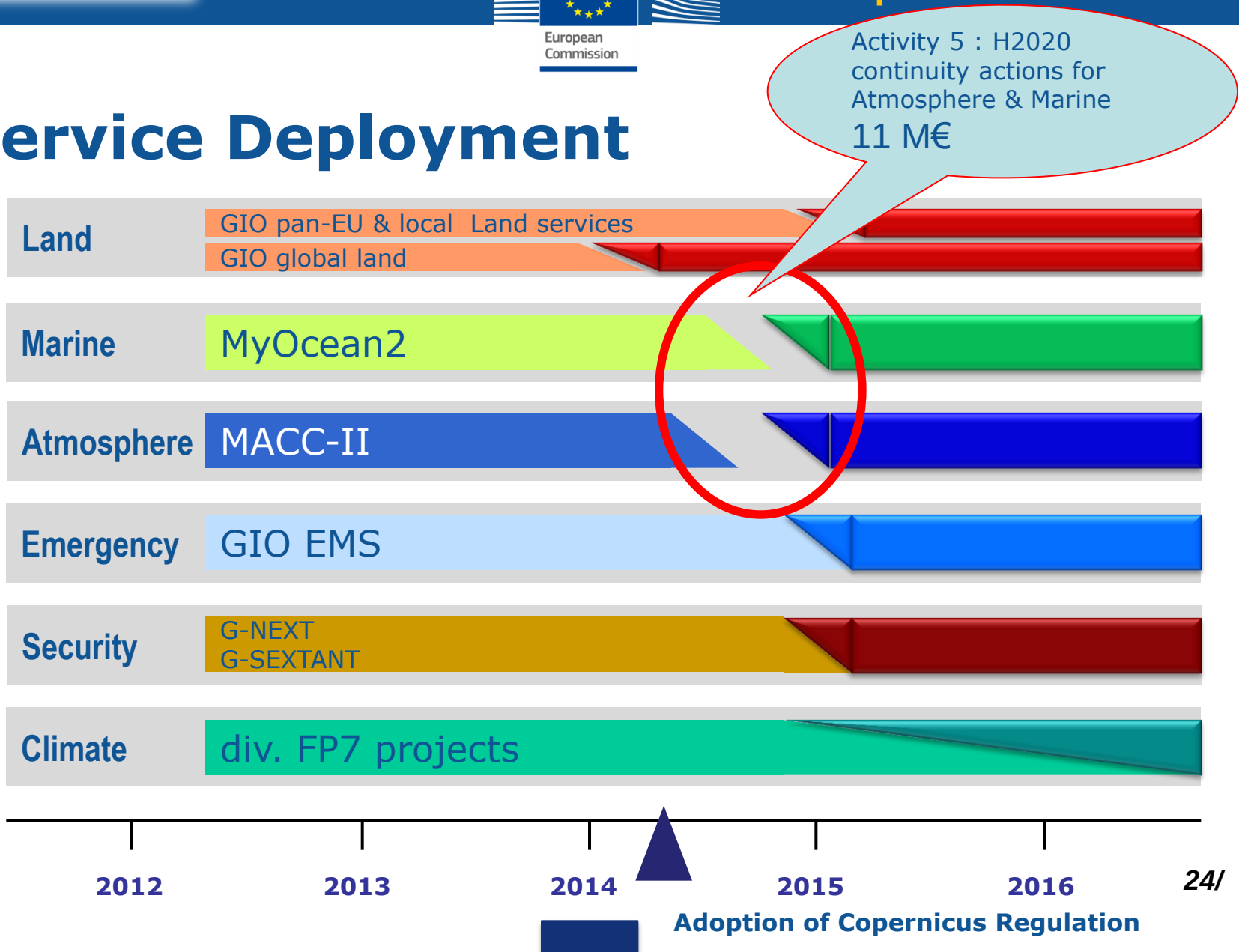
Observation capacity mapping in the context of Climate change

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



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 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.

"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€

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€

Protection of European assets in and from Space

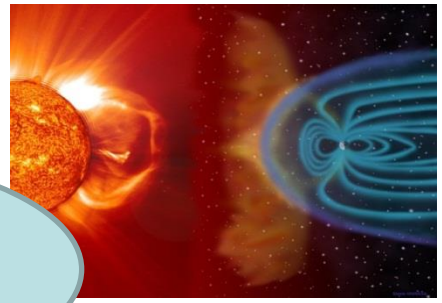
2014-2015

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).

- **Physical characterization & modelling (thermal properties, Yarkovsky drift, structure, reaction to impactor…)**
- **Investigate feasible mitigation techniques**
- **Mitigation test mission**

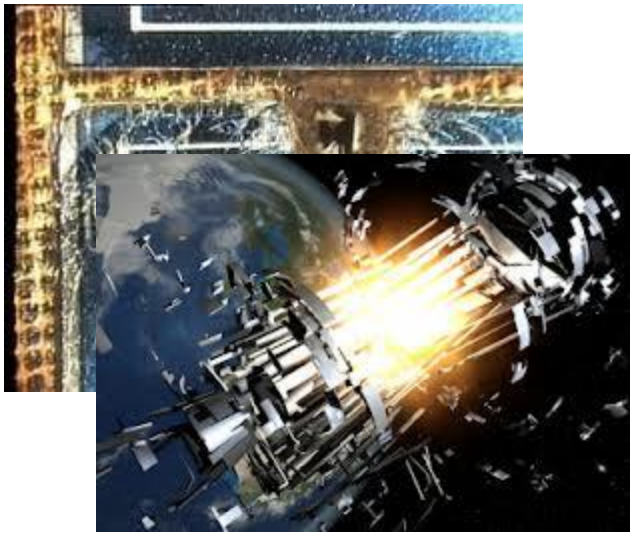
Passive means to reduce the impact of Space Debris

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€



B 2014: Activity 2

Participation of the EU Satcen in the Space Surveillance and Tracking Service Function

Objectives

- contribute to the identification of the necessary functional elements of the SST service delivery function.
- assess the type of data and interfaces which could be made available to the various users
- contribute to the design of the SST at European level but also propose improvements which could be undertaken among the SST users.

Consistent with the proposal for establishing an SST support programme (COM 2013 107)

CSA

security classification

1 M€

Predefined Beneficiary

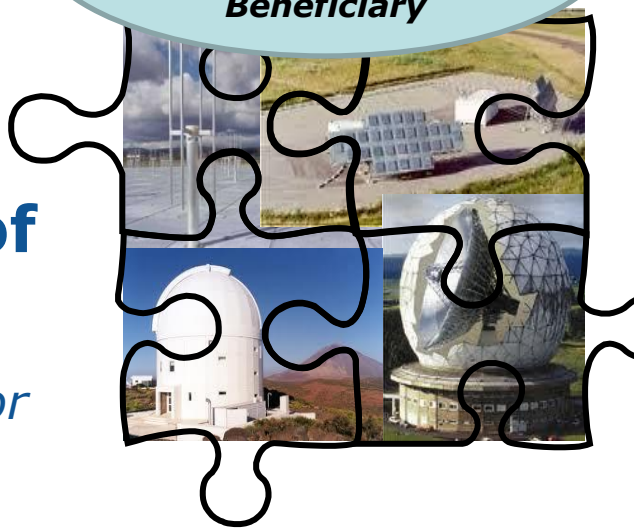
Activities 3-4

3. Space surveillance and tracking (SST)

- *H2020 Contribution to the funding of the SST support programme (Commission proposal (COM (2013)107 final)*

2 M€

Predefined Beneficiary



4. Improving the Performances of the SST at European Level

- *action plan (including scope and priorities) for future EU research and innovation*
- *actions to upgrade and develop new assets which form the SST at European Level.*

12 M€

Predefined Beneficiary

Consistent with the proposal for establishing an SST support programme (COM 2013 107)

CSA ***security classification***

Competitiveness of the European Space Sector

Non-dependence

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

22 M€

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

14 M€

Strategic Research Clusters - Call for Programme Support Actions (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 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 call for operational SRC grants to be included in future WP of H2020. PSAs might be opened to ESA.

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

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

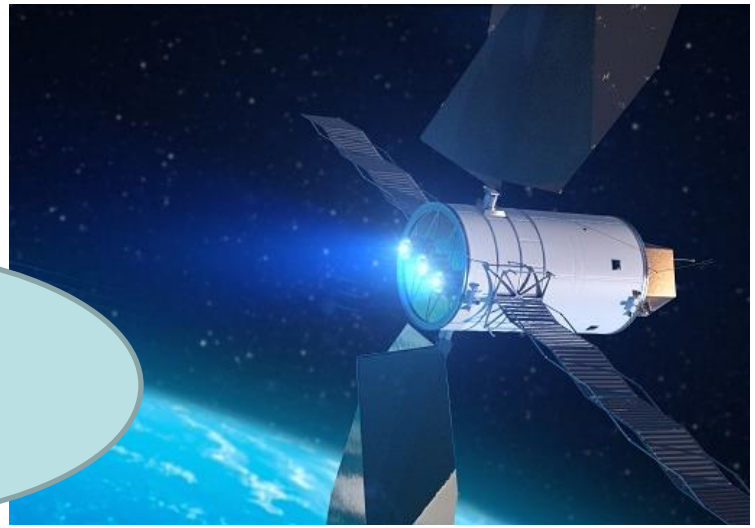
The **final objective** of the SRC is to validate electrical thrusters during the SRC with a flight to be executed not later than 2023

Open for ESA participation

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

4 M€

1 PSA



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)

Open for ESA participation

4 M€

1PSA

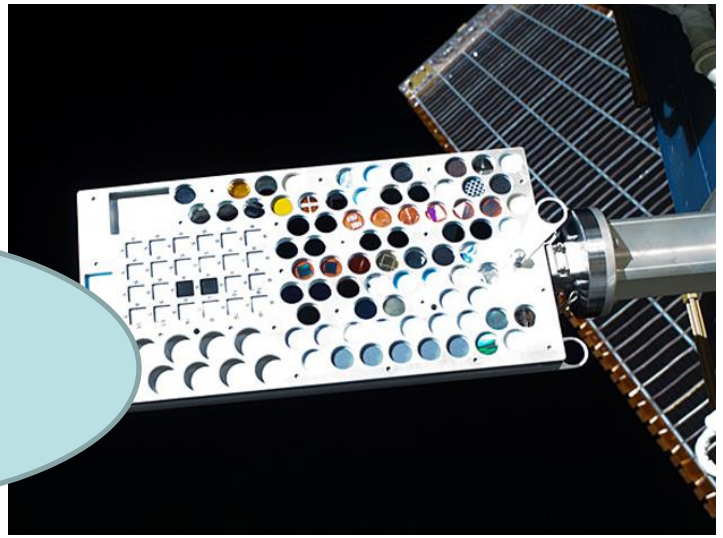
Programme Support Activity (PSA), for the future implementation of a Strategic Research Cluster (SRC)

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€



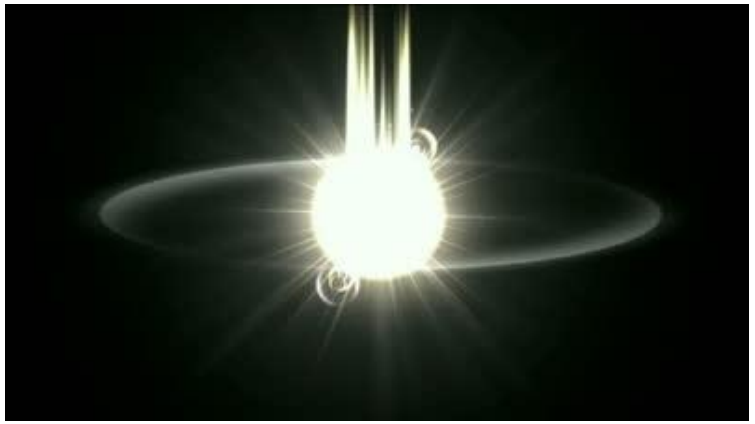
Bottom-up space technologies at low TRL

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

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

10 M€



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

Space exploration and science

2014-2015

European Commission

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.

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€

Open for ESA participation

European Commission

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.

6M€

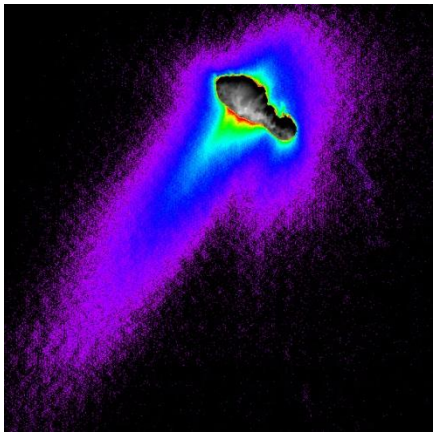
Open for ESA participation

European Commission

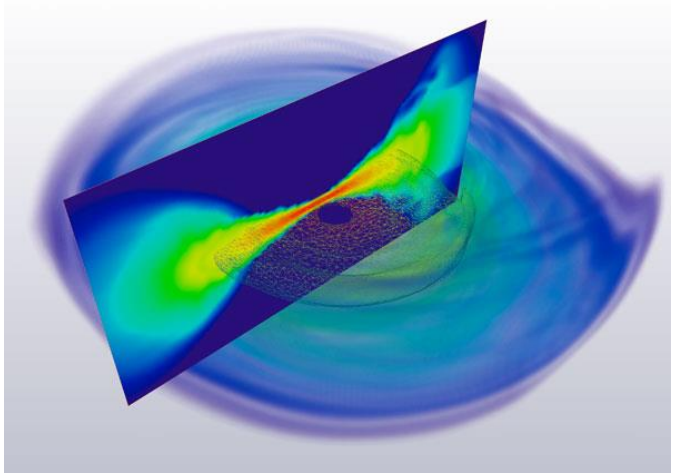
Scientific exploitation of astrophysics, planetary and comets data

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…)



6 M€



International cooperation
Outreach/communication
2014-2015

European Commission

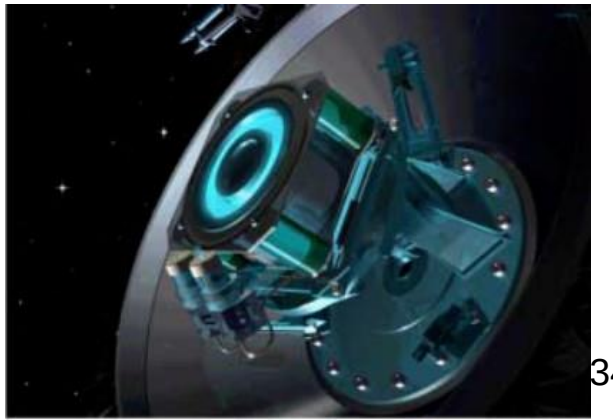
Technology "demonstrator" projects for exploration

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

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.

4,5 M€



OUTREACH & COMMUNICATION

4 M€

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

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 within the Space Theme**

SME instrument in Horizon 2020

SME support: integrated approach

20 % global budgetary target in LEIT & SC

'Innovation in SMEs'

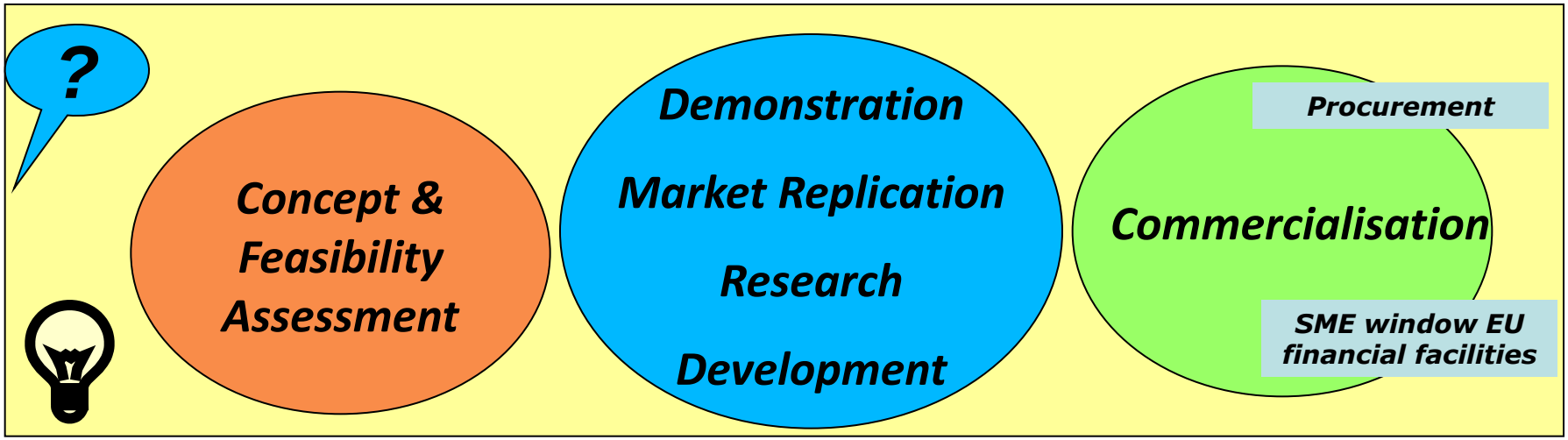
Collaborative projects
13%

SME instrument
7%

Eurostars II
Enhancing Innovation Capacity
Market-driven Innovation

Access to Risk Finance

Phases



IDEA — business coaching throughout the project — MARKET

SME instrument

European Commission

Phase 3 & coaching
~ 2% budget

Phase 1: Concept and feasibility assessment

***Input*: Idea/Concept: "Business Plan 1"**

(~ 10 pages)

10% budget

~ 10% success

***Activities*:**

Feasibility of concept
Risk assessment
IP regime
Partner search
Design study
Pilot application
etc.

***Output*: elaborated "Business plan 2"**

Lump sum: 50.000 €

~ 6 months

Phase 2: R&D, demonstration, market replication

***Input:* "Business plan 2" plus description of activities under Phase 2 (~ 30 pages)**

90% budget

~30-50% success

Activities:

Development, prototyping, testing, piloting, miniaturisation, scaling-up, market replication, research

***Output*: "investor-ready Business plan 3"**

1-5 M€ EC funding

~ 12 to 24 months

Phase 3: Commercialisation

Promote instrument as quality label for successful projects

Facilitate access to private finance

Support via networking , training, information, addressing i.a. IP management, knowledge sharing, dissemination

SME window in the EU financial facilities (debt facility and equity facility)

Possible connection to public procurement activities

No direct funding

SME instrument

- Targeted at **all types of innovative SMEs** showing a strong ambition to develop, grow and internationalise
- **Only SMEs** allowed to apply for funding and support
- **Single company** support **possible**
- No obligation for applicants to sequentially cover all three phases; **each phase open to all SMEs**
- Combination of demonstration activities (testing, prototyping, …), market replication encouraging the involvement of end users or potential clients, and research

Implementation

Article 18(2) Framework H2020 Regulation

[…] a dedicated SME instrument that is targeted at all types of SMEs with an innovation potential, in a broad sense, shall be created under **a single centralised management system** and shall be **implemented primarily in a bottom-up manner** via a **continuously open call** […]

- **Implemented centrally by EASME**
- **Continuously open call** with around 4 cut-off dates per year: First cut-off for Phase 1 around March 2014; first cut-off for Phase 2 in November 2014.

SME instrument+Fast Track to innovation

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.

7,75 M€
8,75 M€

Fast Track to Innovation pilot - launched 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

? M€

Thank you for your attention

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http://ec.europa.eu/enterprise/policies/space/research/index_en.htm