



Space research

Horizon 2020

Work Programme 2014-2015

Greek Infoday on Security and Space for Horizon 2020

Athens, 11-12 Dec. 2013

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SPACE

Programmes and Research



MMF - Multiannual Financial Framework 2014-2020

12 B€

3.8 B€



1.4 B€



6.3 B€

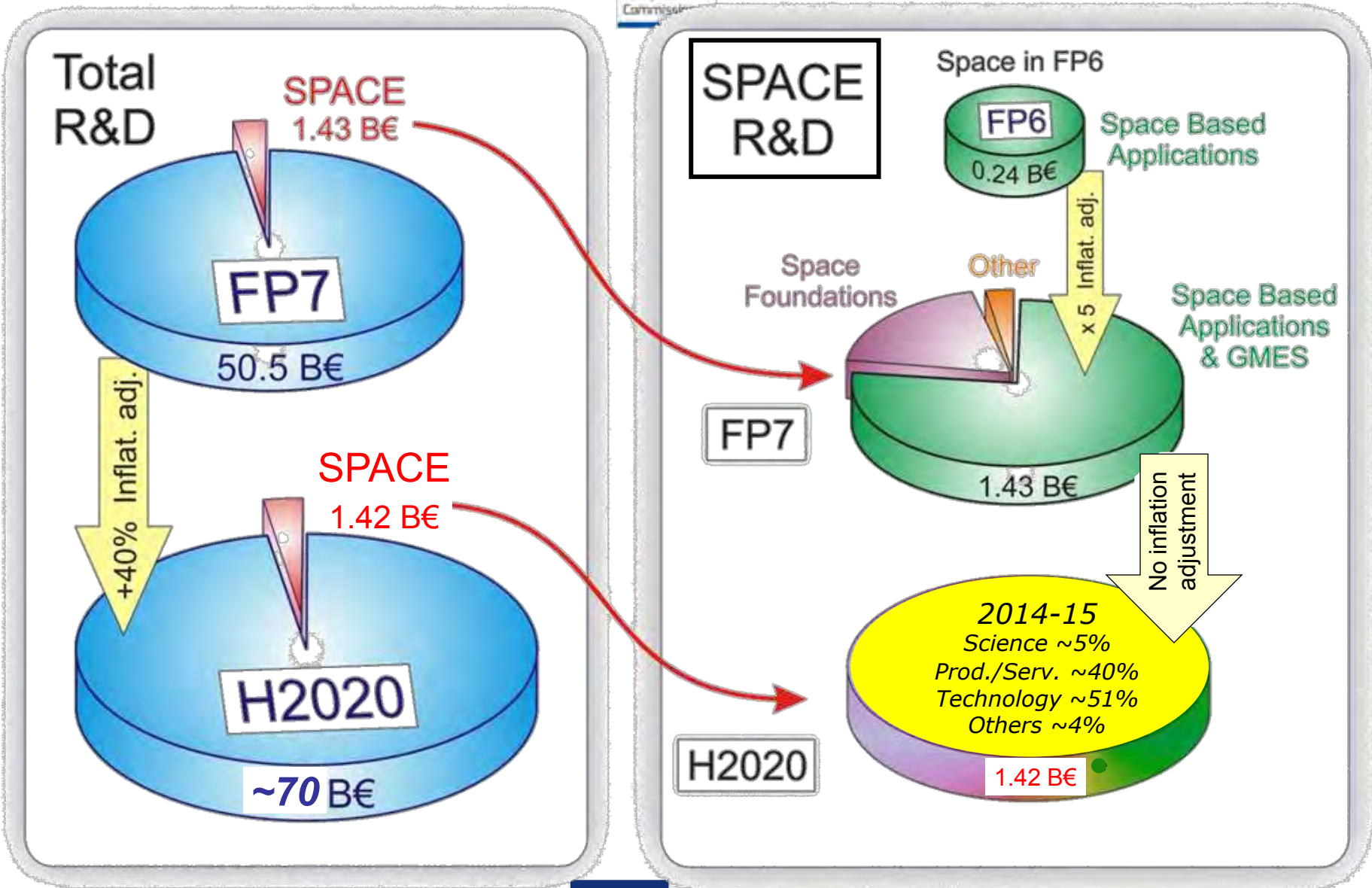


New programme
Protection of Space Assets
(Space Surveillance and Tracking)



FP7 / SPACE

From FP6 → FP7 → H2020





Infrastructures

GMES Sentinel satellites



Data for exploitation

GMES Space Component: Contributing Mission examples



Space Foundations

Space Research Projects



Applications & Services

GMES Services



Activities developed under the FP7 / SPACE

A view of the
Space Research Programme

HORIZON 2020





Horizon 2020

72 B€

The three pillars

~33 %

Excellent Science

~24 %

Industrial Leadership

~43 %

Societal Challenges

*There is a place
for SPACE
everywhere*

SPACE
in H2020

**There is a place
for SPACE
everywhere**

Industrial Leadership

Societal Challenges

Excellent Science

Innov. SMEs Acces Risk
 Finance

Info. Commun.
Technologies
Key Enabling
Technologies



Beneficiary

Space Theme
RTD&I

Enabler

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

← Frontier research
European Research
Council (ERC)

← Future and Emerging
Technologies (FET)

← Marie Curie actions
on skills, training and
career development

← Research
Infrastructures

Space

SPACE in H2020

Space
applications





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,.....**



Horizon 2020 Space

Horizon-2020 work programme is published

Discussions, 3 meetings with member states in September-November

Publication: 11 December 2013

<http://ec.europa.eu/research/participants/portal>

A "two year" work programme 2014 and 2015

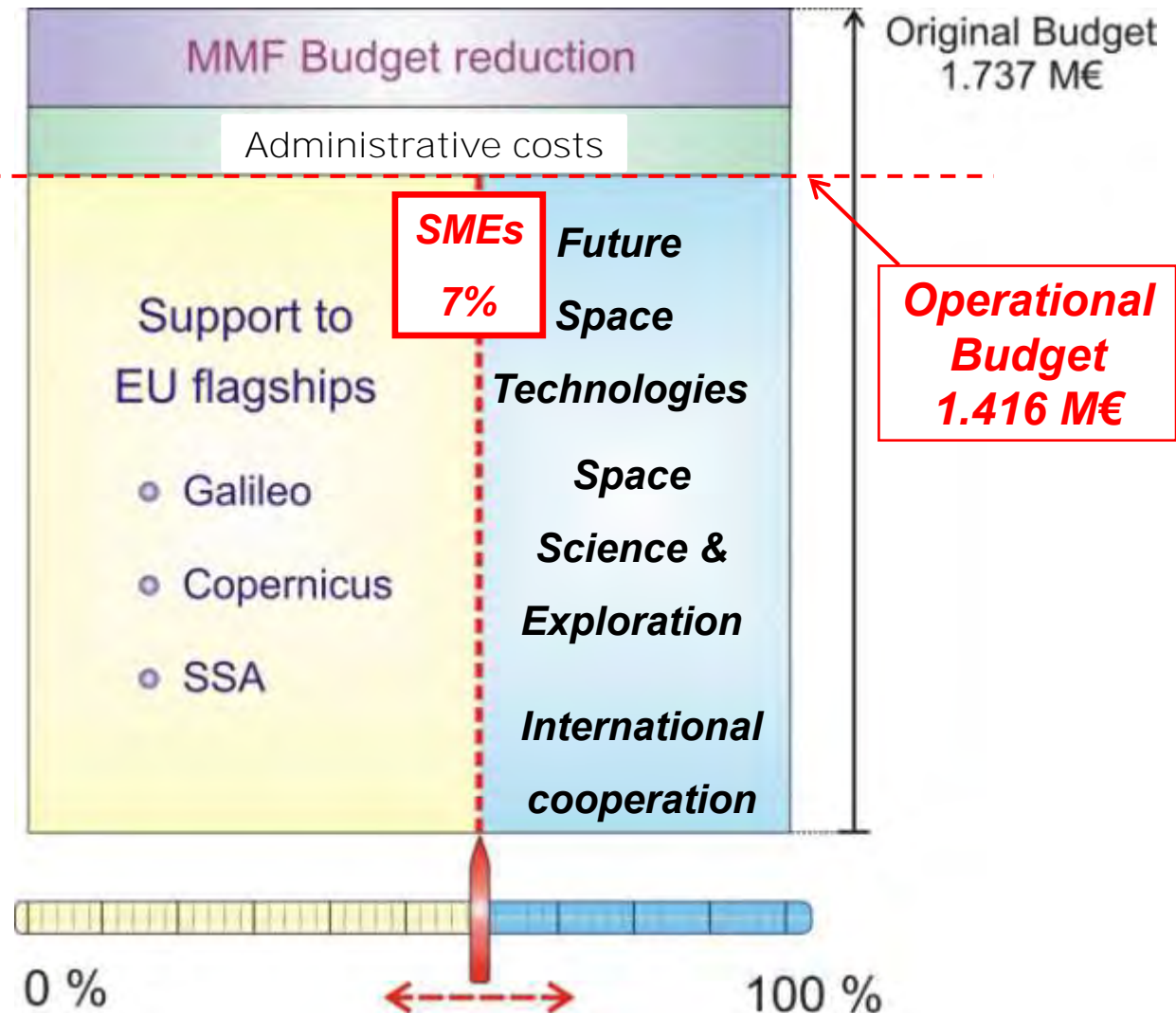
- 2015 "indicative" at this stage – final decision in 2014
- Call deadlines 26 March 2014 and end of 2014

State of play of H2020 / Space



Main topics

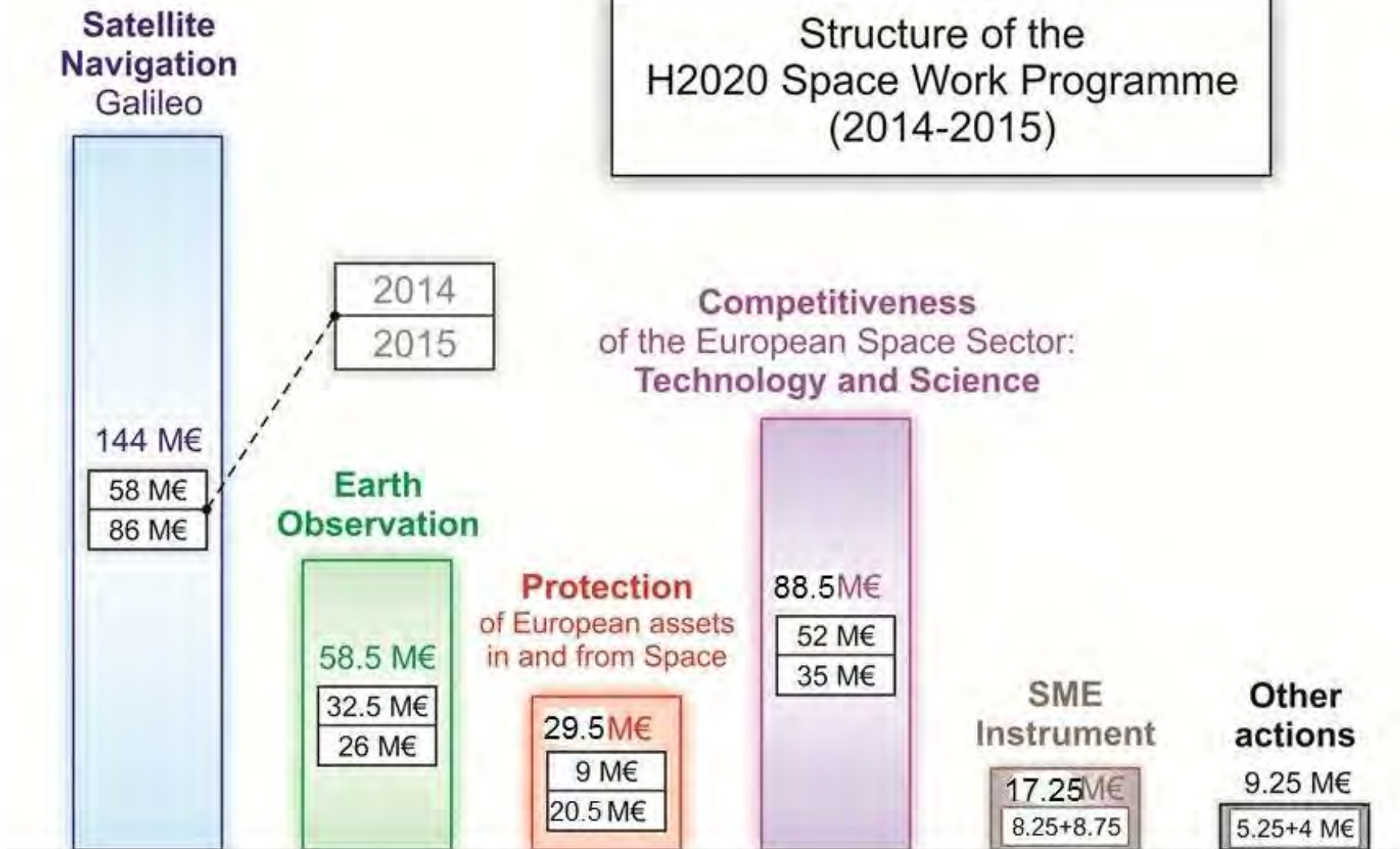
- Satellite navigation (Galileo)
- Earth Observation (Copernicus)
- SSA → Protection from Space-related threats (SST)





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

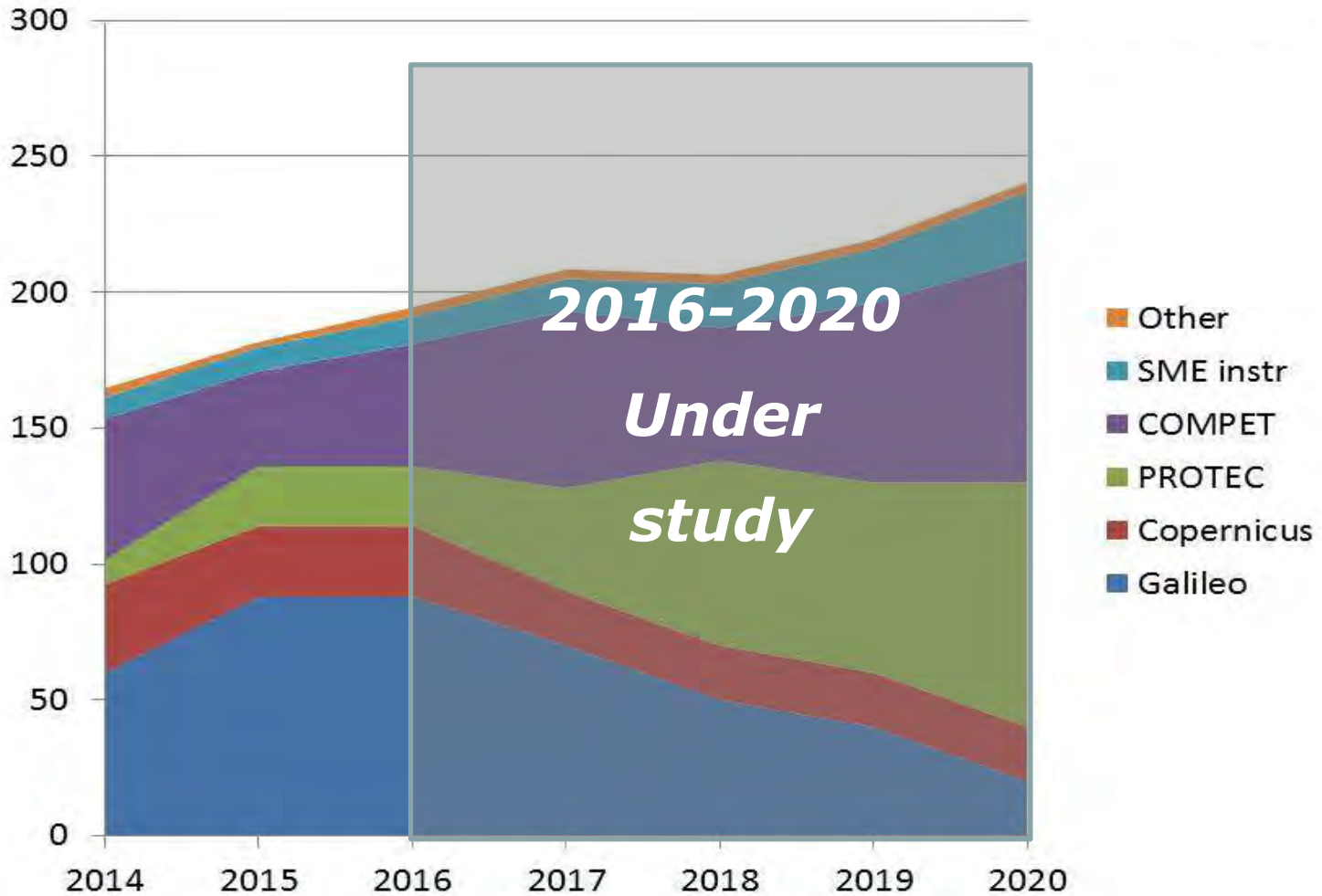
Competitiveness
of the European Space Sector:
Technology and Science



Budget Indicative Evolution



Space 2014-2020





Galileo

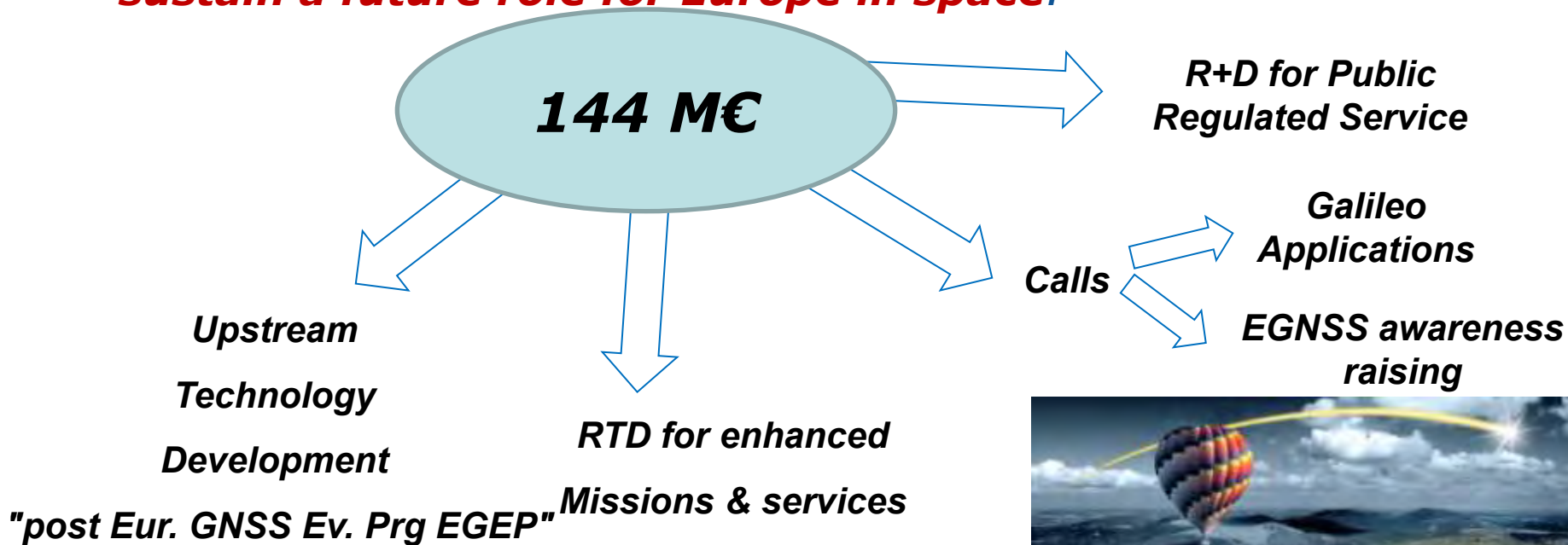
2014-2015



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 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

The 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.

5-8 M€





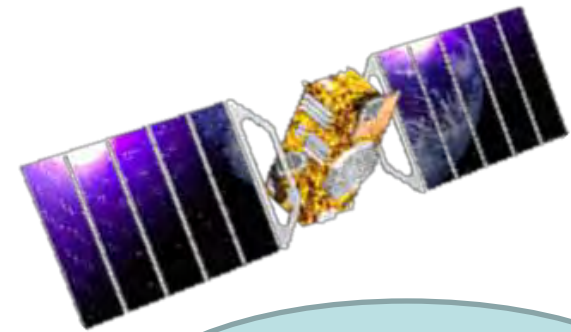
Galileo 4 - EGNSS awareness raising, capacity building and/or promotion activities in and outside of EU

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€



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**

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€

2015 indicative



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 activities

Prepare for 2nd generation Galileo system

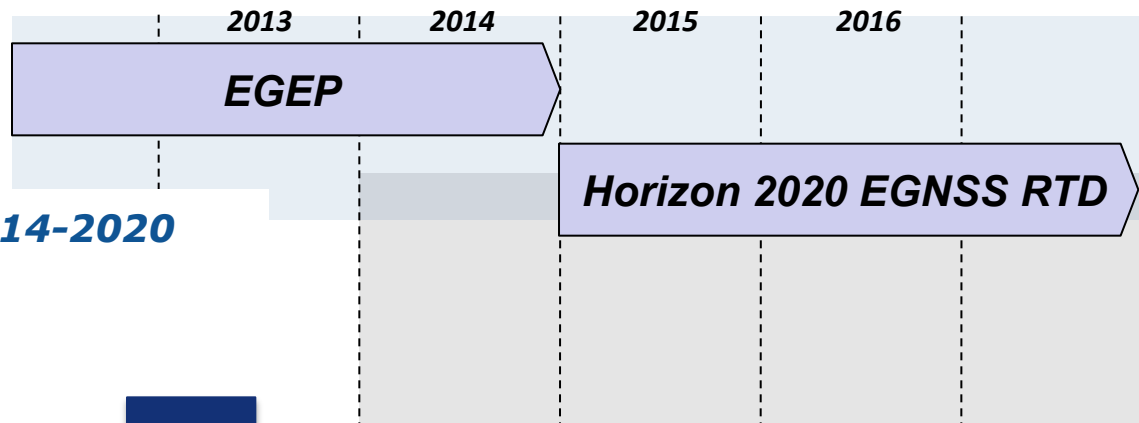
R+D to have European state-of-the-art and cost-effective technologies for the development of the next generation (>2020) Galileo system.

55 M€

ESA – Indirect Management

Transition from ESA framework.....

..... to EU MFF 2014-2020 framework





Earth Observation

2014-2015

New ideas for Earth-relevant space applications

Stimulating the emergence of novel ideas on what can be observed from space => enhance scientific exploitation European space infrastructure.

- **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)**

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.

- **Significantly contribute to the availability of validated space-based observational data on Climate Change as a long-time series.**

5,5 M€

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.

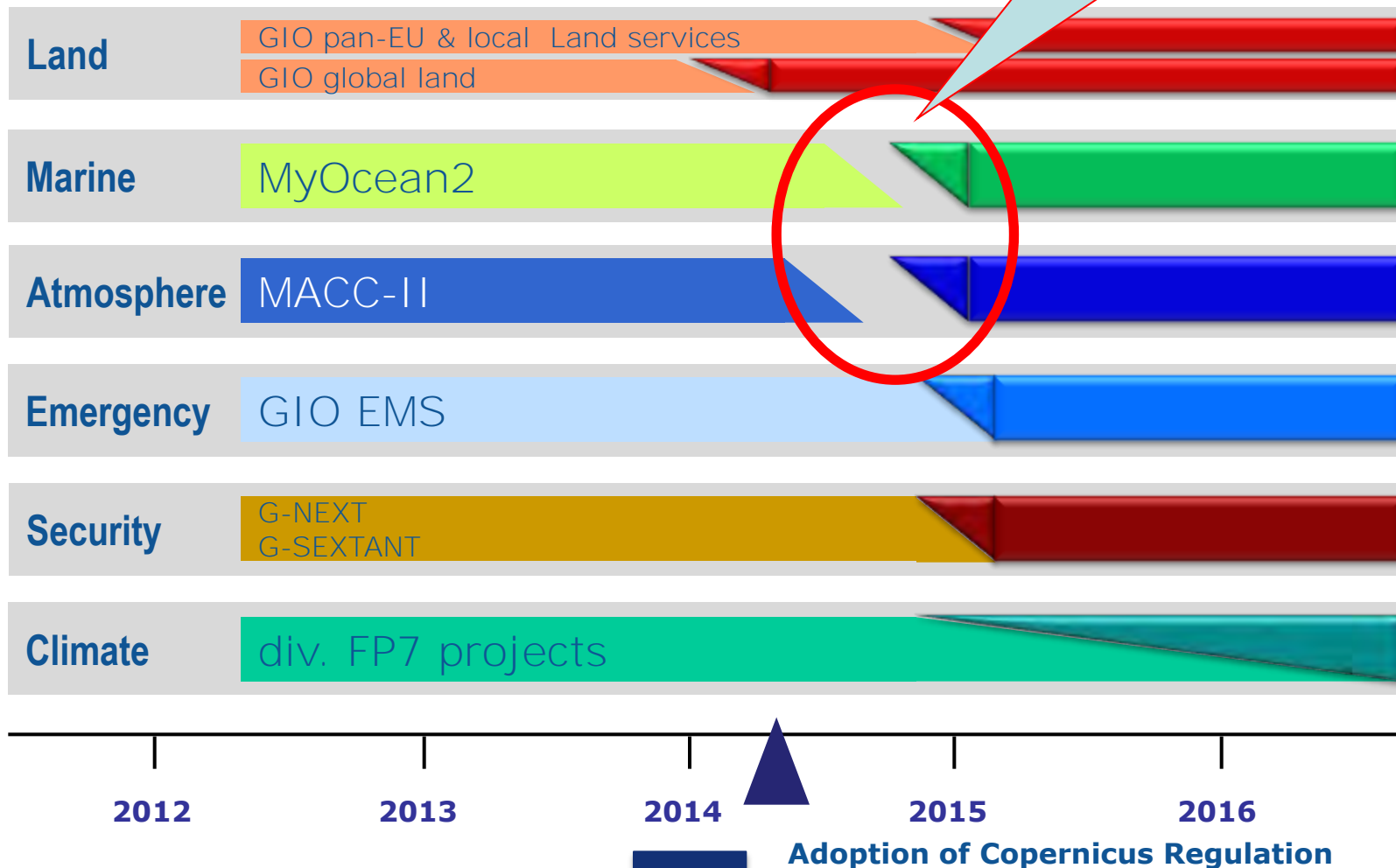
- **Gather the consensus of key players**
- **Foster advances in the consistency and cross-calibration of long-term measurements**
- **Better overview of uncertainty of available data to generate Climate Data Records**

6 M€



Service Deployment

H2020
continuity actions for
Atmosphere &
Marine **11 M€**





EO 1: Bringing EO applications to the market

"Innovation actions (70%)"
10 M€

EO2: Stimulating wider research use of Copernicus Sentinel data

11 M€

EO 3: Technology developments for competitive imaging from space

5 M€

2015 indicative



Protection of European assets in and from Space

2014-2015

Space Weather, NEO, SST, Debris

- *Space Weather*
- *NEO: access technologies and characterisation*
- *Space Surveillance and Tracking*
- *Passive means to reduce the impact of space debris*



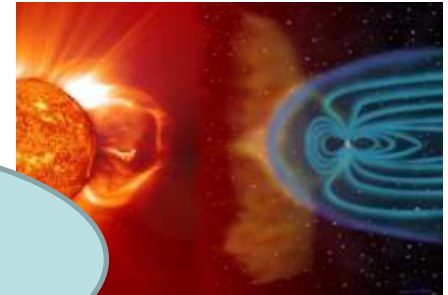
29,5 M€

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 NEOs, ESA's SSA and 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**





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.

Continuation of the STA and STEP projects in FP7

security classification

1 M€

***Identified
Beneficiary***





PROTEC 1 - Passive means to reduce the impact of Space Debris

- *safe de-orbiting and disposal*

6,5 M€

In OTHER ACTIONS

Space surveillance and tracking (SST)

- *Support to a consortium of MS preparing the SST support programme*

2 M€

*Identified
Beneficiary*

Improving the Performances of the SST at European Level

- *actions to upgrade and develop new SST assets*

12 M€

*Identified
Beneficiary*

2015 indicative



Competitiveness of the European Space Sector

***Non-dependence &
technology development
2014-2015***



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.



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€





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€





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
6 M€

2015 indicative





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: PSA 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)**

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
Consortium of ≥ 3 orgs from ≥ 3 countries

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

4 M€

1 PSA



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, e.g. underwater 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



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 + 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
7 M€

2015 indicative

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***

Space Exploration – Life Support

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

8M€



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€





2015
6M€

Space Exploration – Habitat management

- *Support to scientific and technological utilisation of ISS for the preparation of the next steps in human exploration*

Open for ESA participation

2015
6 M€

Scientific exploitation of astrophysics, planetary and comets data

- *tools for advanced processing and the generation of high-level data products*

2015 indicative



International cooperation Outreach/communication

2014-2015



Technology "demonstrator" projects for exploration

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

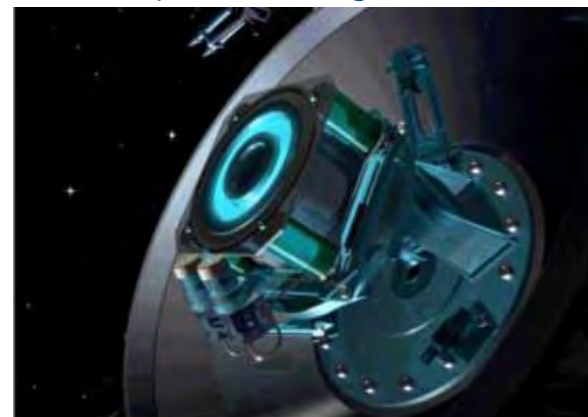
3 M€

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 indicative

**2015
1,5 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

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





Rules for Participation

ESSENTIALS



- **Calls for proposals: not overly prescriptive, bottom-up, broad description of call topics**

Principle: Industry knows better than Commission which solutions are viable and how to stay competitive in the world market

- **Minimum consortium**

Three partners from at least three member states or associated states
International participation possible

- **Open competition for grants, EU rules**

Evaluation by independent experts,

No geo-return principle (also valid for EU funds delegated to ESA)

- **IPR owned by the creator(s)**

Access rights for exploitation to be granted free of charge to project partners
(Consortium agreement must provide details)

Forms of funding



1. Grants: Strong simplification of the funding rates

- **Research and innovation actions: 100%**

With flat rate of 25% of direct cost for indirect cost

- **Innovation actions: 70%**

With flat rate of 25% of direct cost for indirect cost

Exception – non-profit entities = 100% + 25%

- **Coordination and Support Actions (CSA): 100%**

With flat rate of 25% for indirect cost

Some exceptions to the 25% flat rate apply: e.g. subcontracting

is a direct eligible cost but does not give right to extra 25%

2. Procurement *Following financial regulation*

3. Others *Co-fund 70% (Art. 185-187... but not used in the WP / Space)*

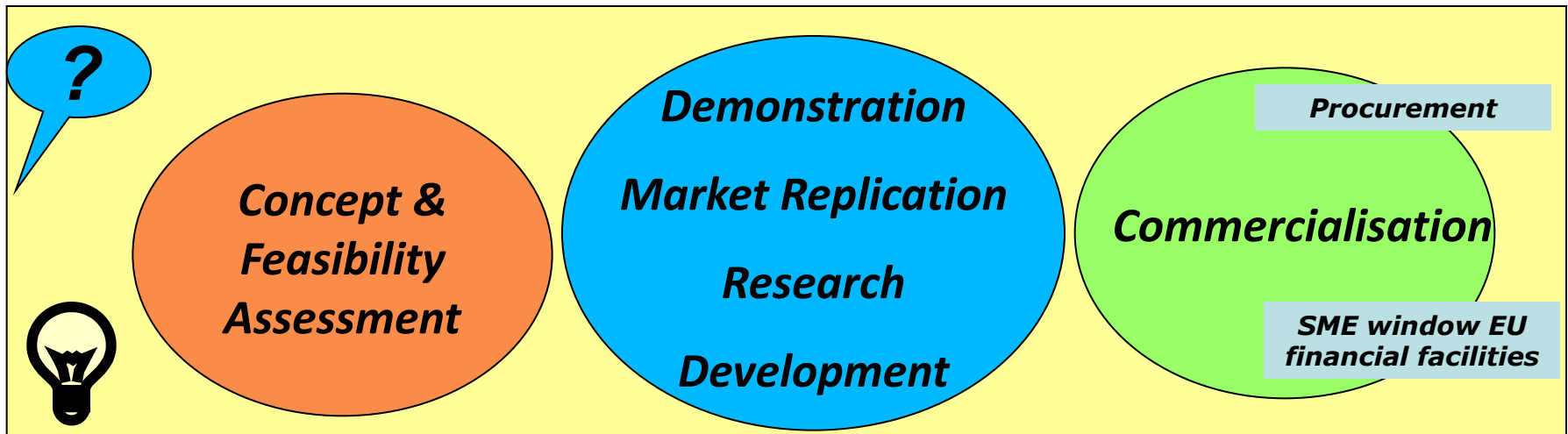
"Rules for participation and dissemination in Horizon 2020 – The Framework Programme for Research and Innovation (2014-2020)" Nov. 22 2013 (Soon in web)



The SME instrument in Horizon 2020



Phases



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

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

Support via networking, training, information

IDEA

business coaching throughout the project

MARKET

Lump sum: 50.000 €
~ 6 months

1-5 M€ EC funding
~ 12 to 24 months

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



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



Horizon 2020 / Space

Register as EXPERT

Register as expert!

- For proposal evaluation
- For project reviews



At the participant portal:

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



Thank you

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***More information at
http://ec.europa.eu/embrace_space***